



# ILI9806H

---

## **a-Si TFT LCD Single-Chip Driver 480(RGB) x 864 Resolution 16.7M-color with Internal GRAM**

### **Specification** ***Preliminary***

Version: V091  
Document No: ILI9806H\_IDT\_V091\_20130423

#### ***ILI TECHNOLOGY CORP.***

8F, No. 38, Taiyuan St, Jhubei City,  
Taiwan 302, R.O.C.  
Tel.886-3-5600099; Fax.886-3-5600585  
<http://www.ilitek.com>

## Table of Contents

| SECTION                                         | PAGE |
|-------------------------------------------------|------|
| 1. Introduction.....                            | 17   |
| 2. Features .....                               | 18   |
| 3. Device Overview .....                        | 20   |
| 3.1. Block Diagram .....                        | 20   |
| 3.2. Block Function Description.....            | 21   |
| System Interface.....                           | 21   |
| Parallel RGB Interface.....                     | 22   |
| Address Counter (AC) .....                      | 22   |
| Graphic RAM (GRAM).....                         | 22   |
| Grayscale Voltage Generating Circuit.....       | 22   |
| Timing Generator.....                           | 22   |
| Oscillator.....                                 | 23   |
| Source Driver Circuit .....                     | 23   |
| Panel Control Circuit .....                     | 23   |
| Power Supply Circuit .....                      | 23   |
| MIPI DSI Controller Circuit .....               | 23   |
| CABC (Content Adaptive Brightness Control)..... | 23   |
| 3.3. Pin Descriptions .....                     | 24   |
| 3.4. Pin Assignment.....                        | 31   |
| 3.5. Pad Coordination.....                      | 33   |
| 4. System Interface .....                       | 42   |
| 4.1. DBI Type B Parallel Interface .....        | 42   |
| Write Cycle Sequence.....                       | 43   |
| Read Cycle Sequence.....                        | 44   |
| DBI Type B Interface Set Table.....             | 45   |
| 4.2. DBI Type C Serial Interface.....           | 48   |
| Write Cycle Sequence.....                       | 48   |
| Read Cycle Sequence.....                        | 50   |
| 4.3. Data Transfer Break and Recovery.....      | 52   |
| 4.4. Data Transfer Pause .....                  | 54   |
| Serial Interface Pause .....                    | 55   |
| Parallel Interface Pause .....                  | 56   |
| Data Transfer Mode .....                        | 57   |
| Method 1.....                                   | 57   |
| Method 2.....                                   | 57   |

|      |                                                                       |     |
|------|-----------------------------------------------------------------------|-----|
| 4.5. | DPI (RGB) Interface .....                                             | 58  |
|      | DPI Interface Selection .....                                         | 58  |
|      | DPI Interface Timing .....                                            | 60  |
| 4.6. | DSI System Interface .....                                            | 62  |
|      | General Description .....                                             | 62  |
|      | Interface Level Communication .....                                   | 63  |
|      | General .....                                                         | 63  |
|      | DSI-CLK Lanes .....                                                   | 64  |
|      | Low Power Mode (LPM) .....                                            | 65  |
|      | Ultra Low Power Mode (ULPM) .....                                     | 67  |
|      | High-Speed Clock Mode (HSCM) .....                                    | 68  |
|      | DSI-D1 and DSI-D0 Data Lanes .....                                    | 70  |
|      | General .....                                                         | 70  |
|      | Escape Modes .....                                                    | 71  |
|      | Low-Power Data Transmission (LPDT) .....                              | 73  |
|      | Ultra-Low Power State (ULPS) .....                                    | 74  |
|      | Remote Application Reset (RAR) .....                                  | 75  |
|      | Tearing Effect (TEE) .....                                            | 76  |
|      | Acknowledge (ACK) .....                                               | 77  |
|      | High-Speed Data Transmission (HSDT) .....                             | 78  |
|      | Entering High-Speed Data Transmission (TSOT of HSDT) .....            | 78  |
|      | Leaving High-Speed Data Transmission (TEOT of HSDT) .....             | 79  |
|      | Burst of the High-Speed Data Transmission (HSDT) .....                | 80  |
|      | Bus Turnaround (BTA) .....                                            | 83  |
|      | Packet Level Communication .....                                      | 84  |
|      | Short Packet (SPa) and Long Packet (LPa) Structures .....             | 84  |
|      | Bit Transmission Order of Bytes in Packets .....                      | 85  |
|      | Byte Transmission Order of Multiple-Byte Information in Packets ..... | 85  |
|      | Packet Header (PH) .....                                              | 86  |
|      | Data Identification (DI) .....                                        | 87  |
|      | Virtual Channel (VC) .....                                            | 88  |
|      | Data Type (DT) .....                                                  | 89  |
|      | Packet Data (PD) of a Short Packet (SPa) .....                        | 91  |
|      | Word Count (WC) of a Long Packet (LPa) .....                          | 92  |
|      | Error Correction Code (ECC) .....                                     | 93  |
|      | Packet Data (PD) of a Long Packet (LPa) .....                         | 98  |
|      | Packet Footer (PF) of a Long Packet (LPa) .....                       | 98  |
|      | Packet Transmissions .....                                            | 100 |

|                                                                          |     |
|--------------------------------------------------------------------------|-----|
| Packet from the MPU to the Display Module .....                          | 100 |
| Display Command Set (DCS).....                                           | 100 |
| Display Command Set (DCS) Write, No Parameter (DCSWN-S).....             | 101 |
| Display Command Set (DCS) Write, 1 Parameter (DCSW1-S).....              | 102 |
| Display Command Set (DCS) Write Long (DCSW-L) .....                      | 103 |
| Display Command Set (DCS) Read, No Parameter (DCSRN-S) .....             | 107 |
| Null Packet, No Data (NP-L) .....                                        | 110 |
| End of Transmission Packet (EoTP).....                                   | 112 |
| Packet from the Display Module to the MPU .....                          | 114 |
| Used Packet Types .....                                                  | 114 |
| Acknowledge with Error Report (AwER) .....                               | 116 |
| DCS Read Long Response (DCSRR-L) .....                                   | 119 |
| DCS Read Short Response, 1 Byte Returned (DCSRR1-S) .....                | 121 |
| DCS Read Short Response, 2 Bytes Returned (DCSRR2-S) .....               | 122 |
| Communication Sequences .....                                            | 123 |
| General.....                                                             | 123 |
| Sequences.....                                                           | 124 |
| DCS Write, 1 Parameter Sequence .....                                    | 124 |
| DCS Write, No Parameter Sequence.....                                    | 125 |
| DCS Write Long Sequence .....                                            | 127 |
| DCS Read, No Parameter Sequence .....                                    | 130 |
| Null Packet, No Data Sequence.....                                       | 132 |
| End of Transmission Packet.....                                          | 132 |
| 16 Bit/Pixel Writing .....                                               | 133 |
| 24 Bit/Pixel Writing .....                                               | 135 |
| 24 bit/pixel Reading.....                                                | 137 |
| 4.7. Display Data Format.....                                            | 140 |
| 3-line Serial Interface .....                                            | 140 |
| SPI Data for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color.....         | 141 |
| SPI Data for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color.....        | 141 |
| SPI Data for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color .....      | 142 |
| 8-bit Parallel MPU Interface .....                                       | 143 |
| 8-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color .....  | 144 |
| 8-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color ..... | 145 |
| 8-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color..... | 146 |
| 9-bit Parallel MPU Interface .....                                       | 147 |
| 9-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color .....  | 148 |
| 9-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color ..... | 149 |

|                                                                            |     |
|----------------------------------------------------------------------------|-----|
| 9-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color .....  | 150 |
| 16-bit Parallel MPU Interface .....                                        | 151 |
| 16-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color .....   | 152 |
| 16-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color .....  | 153 |
| 16-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color ..... | 154 |
| 18-bit Parallel MPU Interface .....                                        | 155 |
| 18-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color .....   | 156 |
| 18-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color .....  | 156 |
| 18-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color ..... | 156 |
| 24-bit Parallel MPU Interface .....                                        | 156 |
| 24-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color ..... | 156 |
| DPI (RGB) Interface .....                                                  | 156 |
| 16-bit/pixel 65K colors order on the DPI Interface .....                   | 156 |
| 18-bit/pixel 262K Colors Order on the DPI Interface .....                  | 156 |
| 24-bit/pixel 16.7M colors order on the DPI Interface .....                 | 156 |
| 16/18-bit Color Data Mapping to 24-bit Pixel Data Operation .....          | 156 |
| DSI Transmission Data Format .....                                         | 156 |
| 16-bit per Pixel, Long Packet, Data Type 00 1110 (0Eh) .....               | 156 |
| 18-bit per Pixel, Long Packet, Data Type = 01 1110 (1Eh) .....             | 156 |
| 18-bit per Pixel, Long Packet, Data Type = 10 1110 (2Eh) .....             | 156 |
| 24-bit per Pixel, Long Packet, Data Type = 11 1110 (3Eh) .....             | 156 |
| 5. Command .....                                                           | 156 |
| 5.1. Command List .....                                                    | 156 |
| Standard Command List .....                                                | 156 |
| Extended Command List .....                                                | 156 |
| 5.2. Command Description .....                                             | 156 |
| NOP (00h) .....                                                            | 156 |
| Software Reset (01h) .....                                                 | 156 |
| Read display identification information (04h) .....                        | 156 |
| Read Number of the Errors on DSI (05h) .....                               | 156 |
| Read Display Status (09h) .....                                            | 156 |
| Read Display Power Mode (0Ah) .....                                        | 156 |
| Read Display MADCTL (0Bh) .....                                            | 156 |
| Read Display Pixel Format (0Ch) .....                                      | 156 |
| Read Display Image Mode (0Dh) .....                                        | 156 |
| Read Display Signal Mode (0Eh) .....                                       | 156 |
| Read Display Self-Diagnostic Result (0Fh) .....                            | 156 |
| Sleep In (10h) .....                                                       | 156 |

|                                                                      |     |
|----------------------------------------------------------------------|-----|
| Sleep Out (11h) .....                                                | 156 |
| Partial Mode On (12h) .....                                          | 156 |
| Normal Display Mode On (13h) .....                                   | 156 |
| Display Inversion Off (20h) .....                                    | 156 |
| Display Inversion On (21h) .....                                     | 156 |
| All Pixel Off (22h) .....                                            | 156 |
| All Pixel On (23h) .....                                             | 156 |
| Display Off (28h) .....                                              | 156 |
| Display ON (29h) .....                                               | 156 |
| Column Address Set (2Ah) .....                                       | 156 |
| Page Address Set (2Bh) .....                                         | 156 |
| Memory Write (2Ch) .....                                             | 156 |
| Memory Read (2Eh) .....                                              | 156 |
| Partial Area (30h) .....                                             | 156 |
| Vertical Scrolling Definition (33h) .....                            | 156 |
| Tearing Effect Line OFF (34h) .....                                  | 156 |
| Tearing Effect Line ON (35h) .....                                   | 156 |
| Memory Access Control (36h) .....                                    | 156 |
| Vertical Scrolling Start Address (37h) .....                         | 156 |
| Idle Mode Off (38h) .....                                            | 156 |
| Idle Mode On (39h) .....                                             | 156 |
| Interface Pixel Format (3Ah) .....                                   | 156 |
| Memory Write Continue (3Ch) .....                                    | 156 |
| Memory Read Continue (3Eh) .....                                     | 156 |
| Write Tear Scan Line (44h) .....                                     | 156 |
| Read Scan Line (45h) .....                                           | 156 |
| Write Display Brightness Value (51h) .....                           | 156 |
| Read Display Brightness Value (52h) .....                            | 156 |
| Write CTRL Display Value (53h) .....                                 | 156 |
| Read CTRL Display Value (54h) .....                                  | 156 |
| Write Content Adaptive Brightness Control Value (55h) .....          | 156 |
| Read Content Adaptive Brightness Control Value (56h) .....           | 156 |
| Write CABC Minimum Brightness (5Eh) .....                            | 156 |
| Read CABC Minimum Brightness (5Fh) .....                             | 156 |
| Read Automatic Brightness Control Self-diagnostic Result (68h) ..... | 156 |
| Read Black/White Low Bits (70h) .....                                | 156 |
| Read Bkx (71h) .....                                                 | 156 |
| Read Bky (72h) .....                                                 | 156 |

|                                                                |     |
|----------------------------------------------------------------|-----|
| Read Wx (73h) .....                                            | 156 |
| Read Wy (74h) .....                                            | 156 |
| Read Red/Green Low Bits (75h) .....                            | 156 |
| Read Rx (76h) .....                                            | 156 |
| Read Ry (77h) .....                                            | 156 |
| Read Gx (78h) .....                                            | 156 |
| Read Gy (79h) .....                                            | 156 |
| Read Blue/A Color Low Bits (7Ah) .....                         | 156 |
| Read Bx (7Bh) .....                                            | 156 |
| Read By (7Ch) .....                                            | 156 |
| Read Ax (7Dh) .....                                            | 156 |
| Read Ay (7Eh) .....                                            | 156 |
| Read DDB Start (A1h) .....                                     | 156 |
| Read DDB Continue (A8h) .....                                  | 156 |
| Read ID1 (DAh) .....                                           | 156 |
| Read ID2 (DBh) .....                                           | 156 |
| Read ID3 (DCh) .....                                           | 156 |
| 5.3. Extend Command (EXTC) Description .....                   | 156 |
| Interface Mode Control (B0h) .....                             | 156 |
| Frame Rate Control 1 (In Normal Mode/Full Colors) (B1h) .....  | 156 |
| Frame Rate Control 2 (In Idle Mode/8 colors) (B2h) .....       | 156 |
| Frame Rate control 3 (In Partial Mode/Full Colors) (B3h) ..... | 156 |
| Display Inversion Control (B4h) .....                          | 156 |
| Blanking Porch Control (B5h) .....                             | 156 |
| Display Function Control (B6h) .....                           | 156 |
| Entry Mode Set (B7h) .....                                     | 156 |
| Interface Setting (B8h) .....                                  | 156 |
| Panel Control (B9h) .....                                      | 156 |
| SPI Interface Setting (BAh) .....                              | 156 |
| Power Control 1 (C0h) .....                                    | 156 |
| Power Control 2 (C1h) .....                                    | 156 |
| Pumping Frequency Control (C6h) .....                          | 156 |
| VCOM Control (C7h) .....                                       | 156 |
| Backlight Control 1 (C8h) .....                                | 156 |
| Backlight Control 2 (C9h) .....                                | 156 |
| NV Memory Write (D0h) .....                                    | 156 |
| NV Memory Protection Key (D1h) .....                           | 156 |
| NV Memory Status Read (D2h) .....                              | 156 |

|                                                                            |     |
|----------------------------------------------------------------------------|-----|
| Read Device Code (D3h) .....                                               | 156 |
| Clamp Control (D7h) .....                                                  | 156 |
| Positive Gamma Control (E0h).....                                          | 156 |
| Negative Gamma Control (E1h) .....                                         | 156 |
| Digital Gamma Control 1 (E2h) .....                                        | 156 |
| Digital Gamma Control 2 (E3h) .....                                        | 156 |
| <b>Digital Gamma Control 3 (E4h)</b> .....                                 | 156 |
| Digital 3 Gamma Enable (EAh) .....                                         | 156 |
| DSI LAN Select (ECh) .....                                                 | 156 |
| Panel Timing Control 1 (F1h) .....                                         | 156 |
| Panel Timing Control 2 (F2h) .....                                         | 156 |
| Resolution Control (F7h) .....                                             | 156 |
| Read EXTC Command In SPI Mode (FBh).....                                   | 156 |
| EXTC Command Set enable register (FFh).....                                | 156 |
| 6. Tearing Effect Information .....                                        | 156 |
| 6.1. Tearing Effect Line.....                                              | 156 |
| Tearing Effect Line Modes .....                                            | 156 |
| Tearing Effect Line Timing .....                                           | 156 |
| 6.2. Tearing Effect Bus Trigger .....                                      | 156 |
| Tearing Effect Bus Trigger Enable .....                                    | 156 |
| Tearing Effect Bus Trigger Disable .....                                   | 156 |
| Tearing Effect Bus Trigger Sequences .....                                 | 156 |
| 7. Content Adaptive Brightness Control (CABC) Function .....               | 156 |
| 8. Sleep Out Command and Self-Diagnostic Functions.....                    | 156 |
| 8.1. Register Loading Detection .....                                      | 156 |
| 8.2. Functionality Detection .....                                         | 156 |
| 9. Power ON/OFF Sequence .....                                             | 156 |
| 9.1. Case 1 – RESX Line is Held High or Unstable by Host at Power ON ..... | 156 |
| 9.2. Case 2 – RESX Line is Held Low by Host at Power ON.....               | 156 |
| 9.3. Abnormal Power Off .....                                              | 156 |
| 10. Power Level Definition.....                                            | 156 |
| 10.1. Power Levels .....                                                   | 156 |
| 10.2. Power Flow Chart.....                                                | 156 |
| 10.3. LCM Voltage Generation .....                                         | 156 |
| 10.4. Gamma Curves .....                                                   | 156 |
| Gamma Curve (GC0), applies the function $y = x^{2.2}$ .....                | 156 |
| 11. Reset .....                                                            | 156 |
| 11.1. Registers .....                                                      | 156 |



|                                                                                                                                                                                                                                                                                                                                                                                                                          |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| 11.2. Driver IC Input and Output pins.....                                                                                                                                                                                                                                                                                                                                                                               | 156 |
| Output Pins, I/O Pins.....                                                                                                                                                                                                                                                                                                                                                                                               | 156 |
| Reset Timing .....                                                                                                                                                                                                                                                                                                                                                                                                       | 156 |
| 12. NV Memory Programming.....                                                                                                                                                                                                                                                                                                                                                                                           | 156 |
| 12.1. NV Memory Programming Flow .....                                                                                                                                                                                                                                                                                                                                                                                   | 156 |
| 13. Gamma Correction .....                                                                                                                                                                                                                                                                                                                                                                                               | 156 |
| 14. Deep Standby Mode Setting .....                                                                                                                                                                                                                                                                                                                                                                                      | 156 |
| 15. Electrical Characteristics .....                                                                                                                                                                                                                                                                                                                                                                                     | 156 |
| 15.1. Absolute Maximum Ratings .....                                                                                                                                                                                                                                                                                                                                                                                     | 156 |
| 15.2. DC Characteristics for Panel Driving.....                                                                                                                                                                                                                                                                                                                                                                          | 156 |
| 15.3. DSI DC Characteristics .....                                                                                                                                                                                                                                                                                                                                                                                       | 156 |
| DC characteristics for Power Lines .....                                                                                                                                                                                                                                                                                                                                                                                 | 156 |
| DC Characteristics for DSI LP Mode.....                                                                                                                                                                                                                                                                                                                                                                                  | 156 |
| Spike/Glitch Rejection .....                                                                                                                                                                                                                                                                                                                                                                                             | 156 |
| DC Characteristics for DSI HS Mode .....                                                                                                                                                                                                                                                                                                                                                                                 | 156 |
| The DSI receiver (HS mode) understands that there is logical 1 (HS-1) when a differential voltage is more than VTHH (CLK+/DATA+). Te DSI receiver (HS mode) understands that there is logical 0 (HS-0) when a differential voltage is more than VTHL (CLK-/DATA-). There is undefined state if the differential voltage is less than VTHH (CLK+/DATA+) and less than VTHL (CLK-/DATA-). A reference figure is below. 156 |     |
| 15.4. AC Characteristics.....                                                                                                                                                                                                                                                                                                                                                                                            | 156 |
| Display Parallel 24/18/16/9/8-bit Interface Timing Characteristics (8080-series) .....                                                                                                                                                                                                                                                                                                                                   | 156 |
| Display Serial Interface Timing Characteristics (3-line SPI system) .....                                                                                                                                                                                                                                                                                                                                                | 156 |
| Parallel 24/18/16-bit RGB Interface Timing Characteristics.....                                                                                                                                                                                                                                                                                                                                                          | 156 |
| DSI Timing Characteristics.....                                                                                                                                                                                                                                                                                                                                                                                          | 156 |
| High Speed Mode – Clock Channel Timing .....                                                                                                                                                                                                                                                                                                                                                                             | 156 |
| High Speed Mode – Data Clock Channel Timing.....                                                                                                                                                                                                                                                                                                                                                                         | 156 |
| High Speed Mode – Rising and Falling Timings .....                                                                                                                                                                                                                                                                                                                                                                       | 156 |
| Low Speed Mode – Bus Turn Around .....                                                                                                                                                                                                                                                                                                                                                                                   | 156 |
| Data Lanes from Low Power Mode to High Speed Mode .....                                                                                                                                                                                                                                                                                                                                                                  | 156 |
| Data Lanes from High Speed Mode to Low Power Mode .....                                                                                                                                                                                                                                                                                                                                                                  | 156 |
| DSI Clock Burst – High Speed Mode to/from Low Power Mode .....                                                                                                                                                                                                                                                                                                                                                           | 156 |
| 16. Application Circuit.....                                                                                                                                                                                                                                                                                                                                                                                             | 156 |
| 16.1. Reference Circuit.....                                                                                                                                                                                                                                                                                                                                                                                             | 156 |
| 16.2. External Component .....                                                                                                                                                                                                                                                                                                                                                                                           | 156 |
| 17. Revision History .....                                                                                                                                                                                                                                                                                                                                                                                               | 156 |

## List of Figures

|                                                                                       |    |
|---------------------------------------------------------------------------------------|----|
| Figure 1: Block Diagram .....                                                         | 20 |
| Figure 2: DBI Type B Write Cycle .....                                                | 43 |
| Figure 3: DBI Type B Write Cycle Sequence .....                                       | 43 |
| Figure 4: DBI Type B Read Cycle .....                                                 | 44 |
| Figure 5: DBI Type B Read Cycle Sequence .....                                        | 45 |
| Figure 6: DBI Type B 24-bit Data Bus .....                                            | 45 |
| Figure 7: DBI Type B 18-bit Data Bus .....                                            | 45 |
| Figure 8: DBI Type B 16-bit Data Bus .....                                            | 46 |
| Figure 9: DBI Type B 9-bit Data Bus .....                                             | 46 |
| Figure 10: DBI Type B 8-bit Data Bus .....                                            | 47 |
| Figure 11: DBI Type C Data Format .....                                               | 48 |
| Figure 12: DBI Type C Protocol (Rising edge example) .....                            | 49 |
| Figure 13: DBI Type C Read Cycle Sequence (Rising edge example) .....                 | 51 |
| Figure 14: Data Transfer Break and Recovery (Rising edge example) .....               | 52 |
| Figure 15: Data Transfer Break - Case 1 .....                                         | 52 |
| Figure 16: Data Transfer Break - Case 2 .....                                         | 53 |
| Figure 17: Data Transfer Pause .....                                                  | 54 |
| Figure 18: DBI Type C Data Transfer Pause(Rising edge example) .....                  | 55 |
| Figure 19: DBI Type B Data Transfer Pause .....                                       | 56 |
| Figure 20: Data Transfer Mode - Method 1 .....                                        | 57 |
| Figure 21: Data Transfer Mode - Method 2 .....                                        | 57 |
| Figure 22: DPI Interface 16/18/24-bit Pixel Format Selection .....                    | 58 |
| Figure 23: General DPI Timing Diagram .....                                           | 59 |
| Figure 24: DPI Interface Timing diagram .....                                         | 61 |
| Figure 25: DSI System Interface Diagram (Diagram is MIPI DSI interface setting) ..... | 62 |
| Figure 26: Power Modes of Clock Lanes .....                                           | 64 |
| Figure 27: From ULPM to LPM .....                                                     | 65 |
| Figure 28: From High Speed Clock Mode (HSCM) to LPM .....                             | 65 |
| Figure 29: All the Changes of the Three Modes to the LPM .....                        | 66 |
| Figure 30: From LPM to ULPM .....                                                     | 67 |
| Figure 31: Mode Change from LPM to ULPM .....                                         | 67 |
| Figure 32: From LPM to HSCM .....                                                     | 68 |
| Figure 33: Mode Change from LPM to HSCM .....                                         | 68 |
| Figure 34: High Speed Clock Burst .....                                               | 69 |
| Figure 35: General Escape Mode Sequence .....                                         | 71 |
| Figure 36: Low-Power Data Transmission (LPDT) .....                                   | 73 |
| Figure 37: Pause (Example) .....                                                      | 73 |

|                                                                                                                                    |    |
|------------------------------------------------------------------------------------------------------------------------------------|----|
| Figure 38: Ultra-Low Power State (ULPS).....                                                                                       | 74 |
| Figure 39: Remote Application Reset (RAR) .....                                                                                    | 75 |
| Figure 40: Tearing Effect (TEE) .....                                                                                              | 76 |
| Figure 41: Acknowledge (ACK).....                                                                                                  | 77 |
| Figure 42: Entering High-Speed Data Transmission (TSOT of HSDT) .....                                                              | 78 |
| Figure 43: Leaving High-Speed Data Transmission (TEOT of HSDT) .....                                                               | 79 |
| Figure 44: Single Packet in High-Speed Data Transmissions .....                                                                    | 80 |
| Figure 45: Multiple Packets in High-Speed Data Transmission – Examples.....                                                        | 80 |
| Figure 46: Abbreviations .....                                                                                                     | 80 |
| Figure 47: Single Packet in HSDT – Even Number of Bytes.....                                                                       | 81 |
| Figure 48: Single Packet in HSDT – Odd Number of Bytes .....                                                                       | 81 |
| Figure 49: Start of Transmission (SoT) in HSDT for Multiple Packets.....                                                           | 81 |
| Figure 50: Continuous Multiple Packets in HSDT when Number of Bytes is Equal on Both Data Lanes at the End of the Packet.....      | 81 |
| Figure 51: Continuous Multiple Packets in HSDT when Number of Bytes is not Equal on Both Data Lanes at the End of the Packet ..... | 82 |
| Figure 52: End of Transmission (EoT) in HSDT when Number of Bytes is Equal on Both Data Lanes at the End of the Packet.....        | 82 |
| Figure 53: End of Transmission (EoT) in HSDT when Number of Bytes is not Equal on Both Data Lanes at the End of the Packet.....    | 82 |
| Figure 54: Bus Turnaround Procedure .....                                                                                          | 83 |
| Figure 55: Short Packet (SPa) Structure .....                                                                                      | 84 |
| Figure 56: Long Packet (LPa) Structure .....                                                                                       | 84 |
| Figure 57: Bit Transmission Order of Bytes in Packets.....                                                                         | 85 |
| Figure 58: Byte Transmission Order of the Multiple-Byte Information in Packets.....                                                | 85 |
| Figure 59: Packet Header (PH) of a Short Packet (SPa) .....                                                                        | 86 |
| Figure 60: Packet Header (PH) on Long Packet (LPa) .....                                                                           | 86 |
| Figure 61: Data Identification (DI) Structure .....                                                                                | 87 |
| Figure 62: Data Identification (DI) in the Packet Header (PH) .....                                                                | 87 |
| Figure 63: Virtual Channel (VC) on the Packet Header (PH).....                                                                     | 88 |
| Figure 64: Virtual Channel (VC) Configuration .....                                                                                | 88 |
| Figure 65: Data Type (DT) in the Packet Header (PH).....                                                                           | 89 |
| Figure 66: Packet Data (PD) of a Short Packet (SPa), 2 Bytes Information .....                                                     | 91 |
| Figure 67: Packet Data (PD) of a Short Packet (SPa), 1 Byte Information .....                                                      | 91 |
| Figure 68: Word Count (WC) of a Long Packet (LPa).....                                                                             | 92 |
| Figure 69: Packet Data in Short and Long Packets.....                                                                              | 92 |
| Figure 70: D [23...0] and P [7...0] of a Short Packet (SPa) .....                                                                  | 93 |
| Figure 71: D [23...0] and P [7...0] of a Long Packet (LPa) .....                                                                   | 93 |

|                                                                                            |     |
|--------------------------------------------------------------------------------------------|-----|
| Figure 72: XOR Functionality in a Short Packet (SPa).....                                  | 94  |
| Figure 73: XOR Functionality in a Long Packet (LPa).....                                   | 95  |
| Figure 74: Internal Error Correction Code (IECC) on the Display Module (the Receiver)..... | 95  |
| Figure 75: Internal XOR Calculation between ECC and IECC Values – No Error .....           | 96  |
| Figure 76: Internal XOR Calculation between ECC and IECC Values - Error .....              | 96  |
| Figure 77: 16-bit Cyclic Redundancy Check (CRC) Calculation .....                          | 98  |
| Figure 78: CRC Calculation – Packet Data (PD) is 01h .....                                 | 98  |
| Figure 79: Packet Footer (PF) Example .....                                                | 99  |
| Figure 80: Display Command Set (DCS) in Short Packet (SPa) and Long Packet (LPa).....      | 100 |
| Figure 81: Display Command Set (DCS) Write, No Parameter (DCSWN-S) - Example.....          | 101 |
| Figure 82: Display Command Set (DCS) Write, 1 Parameter (DCSW1-S) – Example .....          | 102 |
| Figure 83: Display Command Set (DCS) Write Long (DCSW-L) with DCS Only - Example .....     | 104 |
| Figure 84: Display Command Set (DCS) Write Long with DCS and 1 Parameter - Example.....    | 105 |
| Figure 85: Display Command Set (DCS) Write Long with DCS and 4 Parameters - Example.....   | 106 |
| Figure 86 Set Maximum Return Packet Size (SMRPS-S) - Example .....                         | 108 |
| Figure 87 Display Command Set (DCS) Read, No Parameter (DCSRN-S) - Example .....           | 109 |
| Figure 88: Null Packet, No Data (NP-L) - Example .....                                     | 111 |
| Figure 89: End of Transmission Packet (EoTP) .....                                         | 113 |
| Figure 90: End of Transmission Packet (EoTP) - Examples .....                              | 113 |
| Figure 91: Return Bytes in a Single Packet.....                                            | 114 |
| Figure 92: Return Bytes in Several Packets – Not Allowed .....                             | 114 |
| Figure 93: Exception when Return Bytes in Several Packets .....                            | 115 |
| Figure 94: Acknowledge with Error Report (AwER) – Example .....                            | 117 |
| Figure 95: Errors Packets .....                                                            | 118 |
| Figure 96: Flow Chart for Errors on DSI .....                                              | 118 |
| Figure 97: DCS Read Long Response (DCSRR-L) - Example .....                                | 120 |
| Figure 98: DCS Read Short Response, 1 Byte Returned (DCSRR1-S) - Example .....             | 121 |
| Figure 99: DCS Read Short Response, 2 Bytes Returned (DCSRR2-S) - Example .....            | 122 |
| Figure 100: One Pixel Bit and Write Color Orders.....                                      | 133 |
| Figure 101: One Pixel Write (DCSW-L) – Example 1 .....                                     | 133 |
| Figure 102: Red/Green [0:2] Subpixel Write (DCSW1-S) – Example 2 .....                     | 134 |
| Figure 103: Green [3:5]/Blue Subpixel Write (DCSW1-S) – Example 3.....                     | 134 |
| Figure 104: One Pixel Bit and Color Write Orders.....                                      | 135 |
| Figure 105: One Pixel Write (DCSW-L) – Example.....                                        | 135 |
| Figure 106: Blue Subpixel Write (DCSW1-S) – Example 2.....                                 | 136 |
| Figure 107: Green Subpixel Write (DCSW1-S) – Example 3 .....                               | 136 |
| Figure 108: Red Subpixel Write (DCSW1-S) – Example 4 .....                                 | 136 |
| Figure 109: One Pixel Bit and Color Read Order .....                                       | 137 |

|                                                                                                       |     |
|-------------------------------------------------------------------------------------------------------|-----|
| Figure 110: One Pixel Read Response (DCSRR-L) – Example 1 .....                                       | 137 |
| Figure 111: Red Subpixel Response (DCSRR1-S) – Example 2 .....                                        | 138 |
| Figure 112: Green Subpixel Response (DCSRR1-S) – Example 3 .....                                      | 138 |
| Figure 113: Blue Subpixel Response (DCSRR1-S) – Example 4 .....                                       | 138 |
| Figure 114: Red and Green Subpixels Response (DCSRR2-S) – Example 5 .....                             | 139 |
| Figure 115: Green and Blue Subpixels Response (DCSRR2-S) – Example 6 .....                            | 139 |
| Figure 116: Blue and Red Subpixels Response (DCSRR2-S) – Example 7 .....                              | 139 |
| Figure 117: 3-line Serial Interface .....                                                             | 140 |
| Figure 118 :SPI Data for 3-bit/pixel (RGB 1-1-1 bits input), 8-color .....                            | 140 |
| Figure 119: SPI Data for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color (Rising edge example) .....   | 141 |
| Figure 120: SPI Data for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color (Rising edge example) .....  | 141 |
| Figure 121: SPI Data for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color (Rising edge example) ..... | 142 |
| Figure 122: 3-line SPI Mode Read Data (Rising edge example) .....                                     | 142 |
| Figure 123: 8-bit Parallel MPU Interface .....                                                        | 143 |
| Figure 124: 8-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color .....                   | 144 |
| Figure 125: 8-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color .....                  | 145 |
| Figure 126: 8-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color .....                 | 146 |
| Figure 127: 9-bit Parallel MPU Interface .....                                                        | 147 |
| Figure 128: 9-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color .....                   | 148 |
| Figure 129: 9-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color .....                  | 149 |
| Figure 130: 9-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color .....                 | 150 |
| Figure 131: 16-bit Parallel MPU Interface .....                                                       | 151 |
| Figure 132: 16-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color .....                  | 152 |
| Figure 133: 16-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color .....                 | 153 |
| Figure 134: 16-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color .....                | 154 |
| Figure 135: 18-bit Parallel MPU Interface .....                                                       | 155 |
| Figure 136: 18-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color .....                  | 156 |
| Figure 137: 18-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color .....                 | 156 |
| Figure 138: 18-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color .....                | 156 |
| Figure 139: 24-bit Parallel MPU Interface .....                                                       | 156 |
| Figure 140: 24-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color .....                | 156 |
| Figure 141: 16-bit/pixel 65K Colors Order on the DPI Interface .....                                  | 156 |
| Figure 142: 18-bit/pixel 262K colors order on the DPI Interface .....                                 | 156 |
| Figure 143: 24-bit/pixel 16.7M Colors Order on the DPI Interface .....                                | 156 |
| Figure 144: EPF [1:0] = 10, 16-bit data mapping to 24-bit .....                                       | 156 |
| Figure 145: EPF [1:0] = 10, 18-bit data mapping to 24-bit .....                                       | 156 |
| Figure 146: 16-bit per Pixel, Data Type 00 1110 (0Eh) .....                                           | 156 |
| Figure 147: 18-bit per Pixel, Data Type = 01 1110 (1Eh) .....                                         | 156 |

|                                                                                                       |     |
|-------------------------------------------------------------------------------------------------------|-----|
| Figure 148: 18-bit per Pixel, Data Type = 10 1110 (2Eh).....                                          | 156 |
| Figure 149: 24-bit per Pixel, Data Type = 11 1110 (3Eh).....                                          | 156 |
| Figure 150: Tearing Effect Line Mode 1 .....                                                          | 156 |
| Figure 151: Tearing Effect Line Mode 2 .....                                                          | 156 |
| Figure 152: CABC Block Diagram .....                                                                  | 156 |
| Figure 153: PWM OUT on/off period .....                                                               | 156 |
| Figure 154: Register Loading Detection .....                                                          | 156 |
| Figure 155: Functionality Detection .....                                                             | 156 |
| Figure 156: Data bus is Held Low by Host at Power ON.....                                             | 156 |
| Figure 157: Case 1 – RESX Line is Held High or Unstable by Host at Power ON .....                     | 156 |
| Figure 158: Case 2 – RESX Line is Held Low by Host at Power ON.....                                   | 156 |
| Figure 159: Power Mode Flow Chart.....                                                                | 156 |
| Figure 160: Power Stage Diagram.....                                                                  | 156 |
| Figure 161: Gamma Curve (GC0).....                                                                    | 156 |
| Figure 162: Reset Timing.....                                                                         | 156 |
| Figure 163: Positive Noise Pulse during Reset Low.....                                                | 156 |
| Figure 164: NV Memory Programming Flow .....                                                          | 156 |
| Figure 165 : VCM1 Programming Flow .....                                                              | 156 |
| Figure 166: Positive Gamma Control (E0h).....                                                         | 156 |
| Figure 167: Negative Gamma Control (E1h) .....                                                        | 156 |
| Figure 168: Deep Standby Mode Entry/Exit .....                                                        | 156 |
| Figure 169: Noise on Power Supply Lines .....                                                         | 156 |
| Figure 170: Spike/Glitch Rejection .....                                                              | 156 |
| Figure 171: Differential Inputs Logical 0 and 1, Threshold High/Low, Differential Voltage Range ..... | 156 |
| Figure 172: Common Mode Voltage on Clock and Data Channels .....                                      | 156 |
| Figure 173: Differential Pair Termination Resistor on the Receiver Side .....                         | 156 |
| Figure 174: DSI Clock Channel Timing .....                                                            | 156 |
| Figure 175: DSI Data to Clock Channel Timings .....                                                   | 156 |
| Figure 176: Rising and Falling Timings on Clock and Data Channels .....                               | 156 |
| Figure 177: BTA from the MPU to the Display Module .....                                              | 156 |
| Figure 178: BTA from the Display Module to the MPU .....                                              | 156 |
| Figure 179: Data Lanes - Low Power Mode to High Speed Mode Timings.....                               | 156 |
| Figure 180: Data Lanes - High Speed Mode to Low Power Mode Timings.....                               | 156 |
| Figure 181: Clock Lanes - High Speed Mode to/from Low Power Mode Timings .....                        | 156 |
| Figure 182: Reference Circuit.....                                                                    | 156 |



## ***List of Tables***

|                                                                                      |     |
|--------------------------------------------------------------------------------------|-----|
| Table 1: System Operating Mode .....                                                 | 21  |
| Table 2: Bus Interface Pins .....                                                    | 24  |
| Table 3: Driver Output Pins .....                                                    | 27  |
| Table 4: Charge Pump Relative Pins .....                                             | 28  |
| Table 5: DC/DC Converter Pins .....                                                  | 28  |
| Table 6: Power Pins .....                                                            | 29  |
| Table 7: Test Pins .....                                                             | 30  |
| Table 8: DBI Type B Parallel Interface .....                                         | 42  |
| Table 9: DBI Type C Serial Interface .....                                           | 48  |
| Table 10: DPI Interface Selection .....                                              | 58  |
| Table 11: High Speed and Low-Power Lane Pair State Codes .....                       | 63  |
| Table 12: Entering and Leaving Sequences .....                                       | 70  |
| Table 13: Escape Commands .....                                                      | 72  |
| Table 14: Data Types (DT) from the MPU to the Display Module (ILI9806H) .....        | 89  |
| Table 15: Data Types (DT) from the Display Module (ILI9806H) to the MPU .....        | 90  |
| Table 16: One Bit Error Value of the Error Correction Code (ECC) .....               | 97  |
| Table 17: Display Command Set (DCS) Write, No Parameters (DCSWN-S) .....             | 101 |
| Table 18: Display Command Set (DCS) Write, 1 Parameter (DCSW1-S) .....               | 102 |
| Table 19: Display Command Set (DCS) Write Long (DCSW-L) .....                        | 103 |
| Table 20: Display Command Set (DCS) Read, No Parameter (DCSRN-S) .....               | 107 |
| Table 21: Receiving and Transmitting EoTP during LPDT .....                          | 112 |
| Table 22: Acknowledge with Error Report (AwER) for Long Packet (LPa) Response .....  | 116 |
| Table 23: Acknowledge with Error Report (AwER) for Short Packet (SPa) Response ..... | 116 |
| Table 24: Interface Level Communication .....                                        | 123 |
| Table 25: Packet Level Communication .....                                           | 123 |
| Table 26: DCS Write, 1 Parameter Sequence – Example 1 .....                          | 124 |
| Table 27: DCS Write, 1 Parameter Sequence – Example 2 .....                          | 124 |
| Table 28: DCS Write, 1 Parameter Sequence – Example 3 .....                          | 124 |
| Table 29: DCS Write, No Parameter Sequence – Example 1 .....                         | 125 |
| Table 30: DCS Write, No Parameter Sequence – Example 2 .....                         | 125 |
| Table 31: DCS Write, No Parameter Sequence – Example 3 .....                         | 125 |
| Table 32: DCS Write Long Sequence – Example 1 .....                                  | 127 |
| Table 33: DCS Write Long Sequence – Example 2 .....                                  | 127 |
| Table 34: DCS Write Long Sequence – Example 3 .....                                  | 127 |
| Table 35: DCS Write Long Sequence – Example 4 .....                                  | 129 |
| Table 36: DCS Read, No Parameter Sequence – Example 1 .....                          | 130 |
| Table 37: DCS Read, No Parameter Sequence – Example 2 .....                          | 131 |

|                                                                             |     |
|-----------------------------------------------------------------------------|-----|
| Table 38: Null Packet, No Data Sequence - Example .....                     | 132 |
| Table 39: End of Transmission Packet – Example .....                        | 132 |
| Table 40: 16/18-bit Color Data Mapping to 24-bit Pixel Data Operation.....  | 156 |
| Table 41: Tearing Effect Line Timing.....                                   | 156 |
| Table 42: Initial Values of Registers .....                                 | 156 |
| Table 43: Output and I/O Pins.....                                          | 156 |
| Table 44: Reset Timing .....                                                | 156 |
| Table 45: Reset Description .....                                           | 156 |
| Table 46: Absolute Maximum Ratings .....                                    | 156 |
| Table 47: Spike/Glitch Rejection .....                                      | 156 |
| Table 48: DSI Clock Channel Timing .....                                    | 156 |
| Table 49: DSI Data to Clock Channel Timings.....                            | 156 |
| Table 50: Rising and Falling Timings on Clock and Data Channels .....       | 156 |
| Table 51: Low Power State Period Timings – A .....                          | 156 |
| Table 52: Low Power State Period Timings – B .....                          | 156 |
| Table 53: Data Lanes - Low Power Mode to High Speed Mode Timings .....      | 156 |
| Table 54: Data Lanes - High Speed Mode to Low Power Mode Timings .....      | 156 |
| Table 55: Clock Lanes - High Speed Mode to/from Low Power Mode Timings..... | 156 |
| Table 56: External Component Table.....                                     | 156 |



## 1. Introduction

The ILI9806H is a 16.7M single-chip SOC driver for a-Si TFT liquid crystal display panels with a resolution of up to 480 (RGB) x 864 with memory. The ILI9806H is comprised of a 1440-channel source driver, a gate-IC-less level shifter, 622,080-byte GRAM for graphic data of 480 (RGB) x 864 dots, and a power supply circuit.

The ILI9806H supports parallel MPU 8-/9-/16-/18-/24-bit data bus interfaces and a 3-line serial peripheral interface to input commands. The ILI9806H supports a RGB (16-/18-/24-bit) data bus for video image display. For high-speed serial interface, the MIPI DSI interface mode, the ILI9806H supports two data lanes and one clock lane for high-speed and low power transmission in both directions with low EMI noise.

The ILI9806H operates with a wide range of an analog power supply. The ILI9806H supports 8-color display, sleep mode and deep standby power management functions, ideal for medium or small size portable products where battery power conservation is desirable, such as digital cellular phones, smart phones, MP3 players, personal media players, and similar devices with color graphics display. Additionally, it has an internal DC/DC converter that generates the LCD driving voltage and the voltage follower circuit for LCD driver.

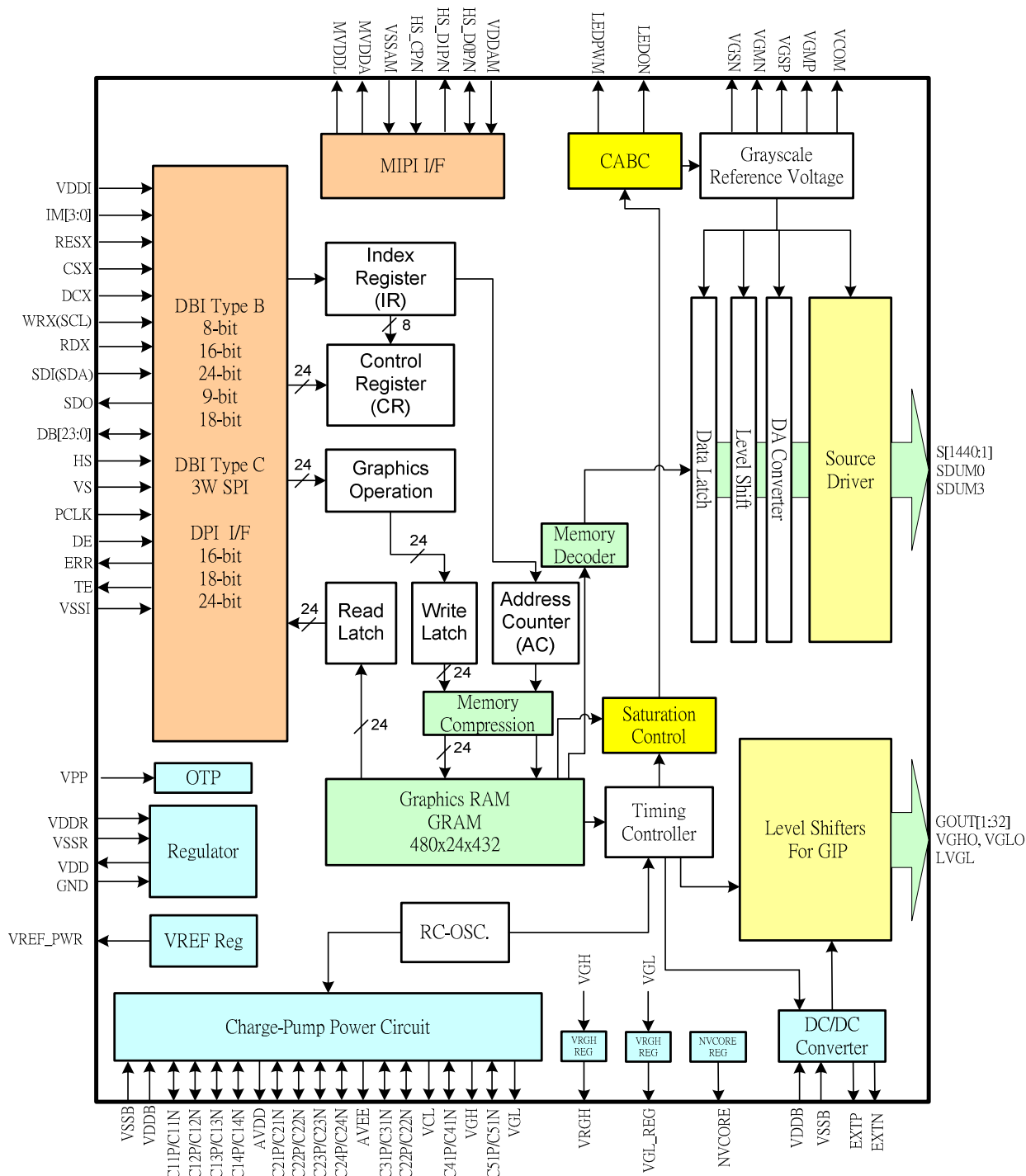
## 2. Features

- ◆ Display resolution options:
  - 480 (RGB) (H) x 864 (V) with GRAM
  - 480 (RGB) (H) x 854 (V) with GRAM
  - 480 (RGB) (H) x 800 (V) with GRAM
  - 480 (RGB) (H) x 720 (V) with GRAM
  - 480 (RGB) (H) x 640 (V) with GRAM
  
- ◆ Display color modes
  - Full color mode:
    - 16.7M colors (24-bit data, R: 8-bit, G: 8-bit, B: 8-bit)
  - Reduced color modes:
    - 262K colors (18-bit data, R: 6-bit, G: 6-bit, B: 6-bit)
    - 65K colors (16-bit data, R: 5-bit, G: 6-bit, B: 5-bit)
    - 8 colors (Idle Mode On): 8 colors (3-bit data, R: 1-bit, G: 1-bit, B: 1-bit)
  
- ◆ Display module:
  - On-chip Frame Memory size 622,080 byte , 480 (RGB) (H) x 864 (V) x 24 bits
  - Supports 1440 source channel outputs
  - Supports gate control signals to gate driver in the panel
  - Supports column/1-dot/2-dot/3-dot inversion
  - Gamma correction (1 preset Gamma curve)
  - On module VCOM control (0V to -4V common electrode output voltage range)
  
- ◆ Display interface types:
  - MPU mode:
    - MIPI-DBI Type B (Display Bus Interface, 80 System) interface, 8/9/16/18/24-bit bus
    - MIPI-DBI Type C (Serial data transfer interface, 3-line SPI) interface
  - MIPI-DSI (Display Serial Interface) interface:
    - Supports one data lane/maximum speed 850Mbps or
    - Supports two data lanes/maximum speed 500Mbps
    - Supports DSI version 1.01.00
    - Supports D-PHY version 1.00.00
    - Supports DCS version 1.02.00
  - MIPI-DPI (Display Pixel Interface) interface:
    - 16 bit/pixel (R: 5-bit, G: 6-bit, B: 5-bit)
    - 18 bit/pixel (R: 6-bit, G: 6-bit, B: 6-bit)
    - 24 bit/pixel (R: 8-bit, G: 8-bit, B: 8-bit)
  
- ◆ Power saving modes:
  - Deep-standby mode
  - Sleep mode

- ◆ Other on-chip functions/Miscellaneous
  - Supports inversion mode
  - Software programmable color depth mode
  - Oscillator for display clock generation
  - Supports DC VCOM driving
  - DC VCOM voltage generator and adjustment
  - OTP (One-Time Programming) memory store initialization register settings
  - Provide 3 times to store DC VCOM value setting, ID setting
  - Supports CABC (Content Adaptive Brightness Control) function
  - Supports 3-Gamma DGC (Digital Gamma Correction) function
  - DC/DC converter
  - VGHO/VGLO voltage generator for gate control signal in panel
  - Supports gate control signals to gate driver in panel (GIP)
  
- ◆ Input power:
  - I/O supply voltage range for VDDI to VSSI = 1.65V ~ 3.3V (VDDI)
  - Analog supply voltage range for VDDDB/VDDA/VDDR to VSSB/VSSA/VSSR = 2.6V ~ 3.3V
  - MIPI regulator voltage for VDDAM to VSSAM = 2.6V ~ 3.3V
  - OTP programming voltage, OTP\_PWR = 8.25V
  
- ◆ Source/VCOM/Gate power supply voltage:
  - AVDD-AVSS = 4.75 to 6.5V (Step-up 1 output voltage range)
  - AVEE-AVSS = -6.5 to -4.75V (Step-up 2 output voltage range)
  - VCL-GND = -VCI to -1.8V (Step-up 3 output voltage range)
  - DC VCOM = 0V to -4V, a step 12.5mV (Common electrode voltage range)
  - VGMP = 3.0V to 6.1875V (AVDD-0.3V) (Positive gamma high voltage range)
  - VGSP = 0.0V to 3.475V (Positive gamma low voltage range)
  - VGMPN = -3.0V to -6.1875V (AVEE+0.3V) (Negative gamma high voltage range)
  - VGSN = 0.0V to -3.475V (Negative gamma low voltage range)
  - VGH-AVSS = 7V to 18V (Positive gate driver output voltage range)
  - VGL-AVSS = -7V to -18V (Negative gate driver output voltage range)
  - LVGL-AVSS = -7V to -18V (Negative gate driver output voltage range)
  - VGL\_REG = -7V to -15V (Negative gate driver output voltage range)
  - VRGH = 7.0V ~ 15.0V (Panel voltage range)

## 3. Device Overview

### 3.1. Block Diagram



**Figure 1: Block Diagram**

## 3.2. Block Function Description

### System Interface

The interface operating mode (DBI, DPI or DSI) is selected by hardware pins IM [3:0], as shown in Table 1 below.

**Table 1: System Operating Mode** <sup>Note 1</sup>

| IM3 | IM2 | IM1 | IM0 | Interface                                              | IO Pin in Use                                          |
|-----|-----|-----|-----|--------------------------------------------------------|--------------------------------------------------------|
| 0   | 0   | 0   | 0   | DBI Type B 8-bit bus interface                         | DB [7:0], WRX, RDX, CSX, DCX, RESX                     |
| 0   | 0   | 0   | 1   | DBI Type B 16-bit bus interface                        | DB [15:0], WRX, RDX, CSX, DCX, RESX                    |
| 0   | 0   | 1   | 0   | DBI Type B 24-bit bus interface                        | DB [23:0], WRX, RDX, CSX, DCX, RESX                    |
| 0   | 0   | 1   | 1   | DPI Type 3 with DBI Type C 3-line 9-bit (Rising edge)  | DB [23:0], VS, HS, PCLK, DE<br>SDI(SDA), SDO, SCL, CSX |
| 0   | 1   | 0   | 1   | MIPI DSI Interface                                     | HS_D0P, HS_D0N, HS_D1P, HS_D1N,<br>HS_CP, HS_CN        |
| 1   | 0   | 1   | 1   | DPI Type 3 with DBI Type C 3-line 9-bit (Falling edge) | DB [23:0], VS, HS, PCLK, DE<br>SDI(SDA), SDO, SCL, CSX |
| 1   | 1   | 0   | 0   | DBI Type B 9-bit bus interface                         | DB [8:0], WRX, RDX, CSX, DCX, RESX                     |
| 1   | 1   | 0   | 1   | DBI Type B 18-bit bus interface                        | DB [17:0], WRX, RDX, CSX, DCX, RESX                    |

## Parallel RGB Interface

The RGB interface is used as the external interface for displaying moving pictures. When the RGB interface is selected, display operations are synchronized with the externally supplied signals, VS, HS, and PCLK. In the RGB interface mode, data (DB23-0) are written in synchronization with these signals according to the polarity of the Enable Signal (DE). This is done in order to prevent flicker on the display while updating display data.

The RGB interface allows transferring data only when updating the frames of a moving picture by writing all display data to the internal RAM. This method is a contributing factor for the low power requirement of moving picture display.

The ILI9806H includes an IR (index register) which stores the index data of internal control register and GRAM. When DCX = L, the command is written into the driver IC via the DBI interface. When DCX = H, GRAM data via the R2Ch register is written through the data bus. When the data is written into the GRAM from the MPU, it is first written into the write-data latch and then automatically written into the GRAM by internal operation. Data is read through the read-data latch when reading display data from the GRAM.

## Address Counter (AC)

The address counter (AC) assigns an address for writing pixel data to the GRAM, or for reading pixel data from the GRAM. Each time a pixel data is written into the GRAM, the X address or Y address of the AC is automatically increased by 1 (or decreased by 1), as determined by the register setting (MV, MX and MY bit). To simplify the access control of GRAM address, the window address function allows writing data only to a window area of the GRAM specified by Column and Row address registers. After data is written to the GRAM, the AC will be increased or decreased within the setting window address range specified by the Column address register (start: SC, end: EC) and the Row address register (start: SP, end: EP). The window address function enables writing data only in the rectangular area set by users on the GRAM.

## Graphic RAM (GRAM)

GRAM is the graphic RAM used to store bit-pattern data with 24 bits per pixel, enabling a maximum of 480(RGB) x 864 dots graphic display.

## Grayscale Voltage Generating Circuit

The grayscale voltage generating circuit generates the LCD drive voltage which corresponds to 256 grayscale level set in the Gamma correction register. The ILI9806H can display up to 16.7M colors at maximum.

## Timing Generator

The timing generator is used to generate timing signals for operating internal circuits. The timing generator generates timing signals for internal circuits, such as the internal GRAM. Timing for display operations (such as RAM read operation) and timing for internal operations (such as RAM access by the MPU) are outputted separately so that they do not interfere with each other.

## **Oscillator**

The ILI9806H incorporates with an RC oscillator circuit. Command settings are used to change the frame frequency.

## **Source Driver Circuit**

The LCD display driver circuit consists of a 480-output source driver (S1~S1440). The display pattern data is latched when 480RGB pixels of data are input. The voltage is output from the source driver according to the latched data.

## **Panel Control Circuit**

The panel control circuit outputs GOUT [1:32] signals at either the VGHO or VGLO or AVDD level.

## **Power Supply Circuit**

The LCD drive power supply circuit generates the voltage levels for driving a panel. Voltage levels are adjusted according to the register setting.

## **MIPI DSI Controller Circuit**

The MIPI DSI controller circuit consists of the D-PHY controller, Protocol Control Unit (PCU), Packet Processing Unit (PPU), ECC generating circuit, internal data/command buffer and analog transceiver. The D-PHY controls communication with the analog block, and the ECC generating circuit generates the ECC to check the outgoing data stream for accuracy of the receiving data packet. The PCU controls outgoing and incoming data streams, and the PPU controls transmitting packet distribution and merging. The internal data and command buffer are used for temporary storage of incoming commands and display data.

## **CABC (Content Adaptive Brightness Control)**

The CABC (Content Adaptive Brightness Control) dynamic backlight control function is used to reduce the power consumption of the luminance source.

### 3.3. Pin Descriptions

**Table 2: Bus Interface Pins**

| Bus Interface Pins                        |     |                                                                                                                                                                                                     |     |                   |     |                                                         |
|-------------------------------------------|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------|-----|---------------------------------------------------------|
| Pin Name                                  | I/O | Descriptions                                                                                                                                                                                        |     |                   |     |                                                         |
| IM [3:0]                                  | I   | - Select the interface mode                                                                                                                                                                         |     |                   |     |                                                         |
|                                           |     | IM3                                                                                                                                                                                                 | IM2 | IM1               | IM0 | Interface                                               |
|                                           |     | 0                                                                                                                                                                                                   | 0   | 0                 | 0   | DBI Type B 8-bit                                        |
|                                           |     | 0                                                                                                                                                                                                   | 0   | 0                 | 1   | DBI Type B 16-bit                                       |
|                                           |     | 0                                                                                                                                                                                                   | 0   | 1                 | 0   | DBI Type B 24-bit                                       |
|                                           |     | 0                                                                                                                                                                                                   | 0   | 1                 | 1   | DPI Type 3 with DBI Type C<br>(SPI 3-line Rising edge)  |
|                                           |     | 0                                                                                                                                                                                                   | 1   | 0                 | 1   | MIPI DSI                                                |
|                                           |     | 1                                                                                                                                                                                                   | 0   | 1                 | 1   | DPI Type 3 with DBI Type C<br>(SPI 3-line Falling edge) |
|                                           |     | 1                                                                                                                                                                                                   | 1   | 0                 | 0   | DBI Type B 9-bit                                        |
| 1                                         | 1   | 0                                                                                                                                                                                                   | 1   | DBI Type B 18-bit |     |                                                         |
| RESX                                      | I   | - The external reset signal input pin.<br>- Initializes the chip with a low pulse.<br>Be sure to execute a reset process after applying power to this device.                                       |     |                   |     |                                                         |
| CSX                                       | I   | - A chip select signal.<br>Low: the chip is selected and accessible<br>High: the chip is not selected and not accessible<br><b>Fix to VDDI or VSSI level when not in use.</b>                       |     |                   |     |                                                         |
| DCX                                       | I   | - The DBI Type B interface (DCX): The signal for command or parameter data select.<br>Low: Command<br>High: Parameter<br><b>Fix to VDDI or VSSI level when not in use.</b>                          |     |                   |     |                                                         |
| RDX                                       | I   | - Serves as a read signal and read data at the rising edge.<br><b>Fix to VDDI or VSSI level when not in use.</b>                                                                                    |     |                   |     |                                                         |
| WRX<br>(SCL)                              | I   | - The DBI Type B system (WRX):<br>Serves as a write signal and writes data at the rising edge.<br>- Serial interface (SCL): Serial clock input<br><b>Fix to VDDI or VSSI level when not in use.</b> |     |                   |     |                                                         |
| DB [23:0]                                 | I/O | - A 24-bit parallel bi-directional data bus for MPU system                                                                                                                                          |     |                   |     |                                                         |
|                                           |     | Interface Mode                                                                                                                                                                                      |     | Data Pin in Use   |     |                                                         |
|                                           |     | DBI Type B 8-bit                                                                                                                                                                                    |     | DB [7:0]          |     |                                                         |
|                                           |     | DBI Type B 16-bit                                                                                                                                                                                   |     | DB [15:0]         |     |                                                         |
|                                           |     | DBI Type B 24-bit                                                                                                                                                                                   |     | DB [23:0]         |     |                                                         |
|                                           |     | DBI Type B 9-bit                                                                                                                                                                                    |     | DB [8:0]          |     |                                                         |
|                                           |     | DBI Type B 18-bit                                                                                                                                                                                   |     | DB [17:0]         |     |                                                         |
| DPI Type 3 with DBI Type C 3-line         |     | DB [23:0], SDI(SDA), SDO                                                                                                                                                                            |     |                   |     |                                                         |
| <b>Fix to VSSI level when not in use.</b> |     |                                                                                                                                                                                                     |     |                   |     |                                                         |
| SDI<br>(SDA)                              | I/O | Serial data input pin of the SPI Interface                                                                                                                                                          |     |                   |     |                                                         |



|                                      |     | SDI: Serial data input pin<br>SDA: Serial data input/output bidirectional pin<br><b>Fix to VDDI or VSSI level when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
|--------------------------------------|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--------|--------|--------|--------|--------|--------|--|-------|-------|-------|-------|--------|--------|--------|--------|---|---|-------|-------|--------|--------|--------|--------|--|--|---|-------|-------|--------|--------|--------|--------|--|--|---|---|-------|-------|--------|--------|--------|--------|--|--|---|-------|-------|--------|--------|--------|--------|--|--|
| SDO                                  | O   | Serial data output pin of the SPI Interface<br><b>Leave the pin open when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| TE_L / TE_R<br>(TE)                  | O   | -Tearing effect output<br>TE = TE_L= TE_R<br><b>Leave the pin open when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| PCLK                                 | I   | - Dot-clock signal for DPI interface operation<br><b>Fix to VDDI or VSSI level when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| VS                                   | I   | - Frame synchronizing signal for DPI interface operation<br><b>Fix to VDDI or VSSI level when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| HS                                   | I   | - Line synchronizing signal for DPI interface operation<br><b>Fix to VDDI or VSSI level when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| DE                                   | I   | - Data enable signal for DPI interface operation<br>Low: access enabled<br>High: access disabled<br><b>Fix to VDDI or VSSI level when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| HS_CP<br>HS_CN                       | I   | - MIPI DSI differential clock pair<br>The symbol DSI CLK+/- is same as HS_CP/HS_CN<br><b>If those pins were not used , they should be connect to MVDDL (typical 1.2V)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| HS_D0P<br>HS_D0N<br>HS_D1P<br>HS_D1N | I/O | - MIPI DSI differential data pair.<br>The symbol DSI-D1+/- is same as HS_D1P/HS_D1N<br>The symbol DSI-D0+/- is same as HS_D0P/HS_D0N<br><b>If those pins were not used , they should be connect to MVDDL (typical 1.2V)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| ERR                                  | O   | - CRC and ECC error output pin for the MIPI interface, activated by S/W command. This pin is output low when it is not activated. When this pin is activated, it is output high if CRC/ECC error is found.<br><b>Leave the pin open when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| DSWAP<br>PSWAP                       | I   | - Differential clock polarity swap<br>For MIPI interface<br><table border="1"><thead><tr><th rowspan="2"></th><th rowspan="2"></th><th colspan="6">Pins</th></tr><tr><th>DSWAP</th><th>PSWAP</th><th>HS_CP</th><th>HS_CN</th><th>HS_D0P</th><th>HS_D0N</th><th>HS_D1P</th><th>HS_D1N</th></tr></thead><tbody><tr><td rowspan="2">0</td><td>0</td><td>HS_CP</td><td>HS_CN</td><td>HS_D0P</td><td>HS_D0N</td><td>HS_D1P</td><td>HS_D1N</td><td></td><td></td></tr><tr><td>1</td><td>HS_CN</td><td>HS_CP</td><td>HS_D0N</td><td>HS_D0P</td><td>HS_D1N</td><td>HS_D1P</td><td></td><td></td></tr><tr><td rowspan="2">1</td><td>0</td><td>HS_CP</td><td>HS_CN</td><td>HS_D1P</td><td>HS_D1N</td><td>HS_D0P</td><td>HS_D0N</td><td></td><td></td></tr><tr><td>1</td><td>HS_CN</td><td>HS_CP</td><td>HS_D1N</td><td>HS_D1P</td><td>HS_D0N</td><td>HS_D0P</td><td></td><td></td></tr></tbody></table><br><b>Fix to VSSI level when not in use.</b> |       |        | Pins   |        |        |        |        |  | DSWAP | PSWAP | HS_CP | HS_CN | HS_D0P | HS_D0N | HS_D1P | HS_D1N | 0 | 0 | HS_CP | HS_CN | HS_D0P | HS_D0N | HS_D1P | HS_D1N |  |  | 1 | HS_CN | HS_CP | HS_D0N | HS_D0P | HS_D1N | HS_D1P |  |  | 1 | 0 | HS_CP | HS_CN | HS_D1P | HS_D1N | HS_D0P | HS_D0N |  |  | 1 | HS_CN | HS_CP | HS_D1N | HS_D1P | HS_D0N | HS_D0P |  |  |
|                                      |     | Pins                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
|                                      |     | DSWAP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | PSWAP | HS_CP  | HS_CN  | HS_D0P | HS_D0N | HS_D1P | HS_D1N |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| 0                                    | 0   | HS_CP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | HS_CN | HS_D0P | HS_D0N | HS_D1P | HS_D1N |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
|                                      | 1   | HS_CN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | HS_CP | HS_D0N | HS_D0P | HS_D1N | HS_D1P |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| 1                                    | 0   | HS_CP                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | HS_CN | HS_D1P | HS_D1N | HS_D0P | HS_D0N |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
|                                      | 1   | HS_CN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | HS_CP | HS_D1N | HS_D1P | HS_D0N | HS_D0P |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| VGSW[3:0]                            | I   | - Input pins to select power on/off sequence.(depend on panel design)<br><b>Fix to VSSI level When not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| NBWSEL                               | I   | - Input pin to select the gamma voltage level sequence of V0~V255.<br>Low: V0 > V1 >...> V254 > V255, normally white<br>High: V255 > V254 >...> V1 > V0, normally black<br><b>Fix to VDDI level when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |
| LEDON                                | O   | - Used for turning On/Off external LED backlight control.<br><b>Leave the pin open when not in use.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |       |        |        |        |        |        |        |  |       |       |       |       |        |        |        |        |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |   |   |       |       |        |        |        |        |  |  |   |       |       |        |        |        |        |  |  |

|        |   |                                                                                                         |
|--------|---|---------------------------------------------------------------------------------------------------------|
| LEDPWM | O | - The PWM frequency output for LED driver control.<br><b><i>Leave the pin open when not in use.</i></b> |
|--------|---|---------------------------------------------------------------------------------------------------------|

**Table 3: Driver Output Pins**

| Driver Output Pins      |     |                          |                                                                                                     |
|-------------------------|-----|--------------------------|-----------------------------------------------------------------------------------------------------|
| Pin Name                | I/O | Type                     | Descriptions                                                                                        |
| S [1:1440]              | O   | LCD                      | - Source output voltage which applied to a LCD panel                                                |
| GOUT [1:32]             | O   | LCD                      | - Gate control signals and the swing voltage range is from VGHO to VGLO                             |
| SDUM0<br>SDUM3          | O   | LCD                      | - Dummy Source<br><b>Leave the pin open when not in use.</b>                                        |
| VGHO                    | O   | LCD                      | - High voltage level for gate control signals and gate circuit of panel                             |
| VGLO                    | O   | LCD                      | - Low voltage level for gate control signals and gate circuit of panel                              |
| LVGL_R/LVGL_L<br>(LVGL) | O   | LCD                      | - Low voltage level for gate circuit of panel                                                       |
| VCOM_R/VCOM_L<br>(VCOM) | O   | Stabilizing<br>capacitor | - Regulating output voltage for common voltage of panel                                             |
| VGMP_PAD<br>(VGMP)      | O   | LCD                      | - Output voltage is generated from AVDD for positive gamma high reference voltage of source driver. |
| VGSP_PAD<br>(VGSP)      | O   | LCD                      | - Output voltage is generated from AVDD for positive gamma low reference voltage (offset voltage).  |
| VGMN_PAD<br>(VGMN)      | O   | LCD                      | - Output voltage is generated from AVEE for negative gamma high reference voltage of source driver. |
| VGSN_PAD<br>(VGSN)      | O   | LCD                      | - Output voltage is generated from AVEE for negative gamma low reference voltage (offset voltage).  |

**Table 4: Charge Pump Relative Pins**

| Charge Pump Relative Pins                            |     |                       |                                                                                                                                               |
|------------------------------------------------------|-----|-----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Pin Name                                             | I/O | Type                  | Descriptions                                                                                                                                  |
| AVDD                                                 | O   | Stabilizing capacitor | - AVDD is output voltage of step-up circuit 1 which the input voltage is VDDB<br>- Connect to a stabilizing capacitor between AVDD and VSSB.  |
| AVEE                                                 | O   | Stabilizing capacitor | - AVEE is output voltage of step-up circuit 2 which the input voltage is VDDB.<br>- Connect to a stabilizing capacitor between AVEE and VSSB. |
| VCL                                                  | O   | Stabilizing capacitor | - VCL is output voltage of step-up circuit 3 which the input voltage is VDDB<br>- Connect to a stabilizing capacitor between VCL and VSSB.    |
| VGH                                                  | O   | Stabilizing capacitor | - VGH is output voltage of step-up circuit 4 which the input voltage is VDDB<br>- Connect to a stabilizing capacitor between VGH and VSSB.    |
| VGL                                                  | O   | Stabilizing capacitor | - VGL is output voltage of step-up circuit 5 which the input voltage is VDDB<br>- Connect to a stabilizing capacitor between VGL and VSSB.    |
| C11P, C11N<br>C12P, C12N<br>C13P, C13N<br>C14P, C14N | -   | Flying capacitor      | - Connect the charge-pumping capacitor for generating AVDD level.<br>- Capacitor connection pins for the step-up circuit 1.                   |
| C21P, C21N<br>C22P, C22N<br>C23P, C23N<br>C24P, C24N | -   | Flying capacitor      | - Connect the charge-pumping capacitor for generating AVEE level.<br>- Capacitor connection pins for the step-up circuit 2.                   |
| C31P, C31N<br>C32P, C32N                             | -   | Flying capacitor      | - Connect the charge-pumping capacitor for generating VCL level.<br>- Capacitor connection pins for the step-up circuit 3.                    |
| C41P, C41N                                           | -   | Flying capacitor      | - Connect the charge-pumping capacitor for generating VGHO level.<br>- Capacitor connection pins for the step-up circuit 4.                   |
| C51P, C51N                                           | -   | Flying capacitor      | - Connect the charge-pumping capacitor for generating VGL level.<br>- Capacitor connection pins for the step-up circuit 5.                    |

**Table 5: DC/DC Converter Pins**

| DC/DC Converter Pins |     |               |                                                                                                                                                       |
|----------------------|-----|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pin Name             | I/O | Type          | Descriptions                                                                                                                                          |
| EXTN<br>(CTRL_A)     | O   | Positive NMOS | -PWM controls output for gate of NMOS in positive DC/DC converter (for AVDD)<br>-CTRL_A : Control signal for an external charge pump IC (ex: ILI4002) |
| EXTP<br>(CTRL_B)     | O   | Negative PMOS | -PWM controls output for gate of PMOS in negative DC/DC converter (for AVEE)<br>-CTRL_B : Control signal for an external charge pump IC (ex: ILI4002) |

**Table 6: Power Pins**

| Power Pins   |     |                           |                                                                                                                                                                                                                                                  |
|--------------|-----|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pin Name     | I/O | Type                      | Descriptions                                                                                                                                                                                                                                     |
| VRGH         | O   | LDO Stabilizing Capacitor | <ul style="list-style-type: none"> <li>- Output voltage is generated from VGHO.</li> <li>- Connect a capacitor for stabilization.</li> <li><b>Leave the pin open when not in use.</b></li> </ul>                                                 |
| VGL_REG      | O   | LDO Stabilizing Capacitor | <ul style="list-style-type: none"> <li>- Output voltage is generated from VGL.</li> <li>- LDO output is used for panel voltage.</li> <li>- Connect a capacitor for stabilization.</li> <li><b>Leave the pin open when not in use.</b></li> </ul> |
| VREF_PWR     | O   | LDO Stabilizing Capacitor | <ul style="list-style-type: none"> <li>- Reference voltage for regulator output.</li> <li>- Connect a capacitor for stabilization.</li> </ul>                                                                                                    |
| VDDA         | P   | Analog                    | <ul style="list-style-type: none"> <li>- Power supply for analog system.</li> <li>- VDDA, VDDR, VDDA1 and VDDB should be the same input voltage level of 2.6 ~ 3.3V.</li> </ul>                                                                  |
| VDDA1        | P   | Analog                    | <ul style="list-style-type: none"> <li>- Power supply for analog system.</li> <li>- VDDA, VDDR, VDDA1 and VDDB should be the same input voltage level of 2.6 ~ 3.3V.</li> </ul>                                                                  |
| VDDR         | P   | Regulator                 | <ul style="list-style-type: none"> <li>- Power supply for regulator system.</li> <li>- VDDA, VDDR, VDDA1 and VDDB should be the same input voltage level of 2.6 ~ 3.3V.</li> </ul>                                                               |
| VDDB         | P   | DC/DC                     | <ul style="list-style-type: none"> <li>- Power supply for DC/DC converter.</li> <li>- VDDA, VDDR, VDDA1 and VDDB should be the same input voltage level of 2.6 ~ 3.3V.</li> </ul>                                                                |
| VDDI         | P   | I/O                       | <ul style="list-style-type: none"> <li>- Power supply for I/O block.</li> </ul>                                                                                                                                                                  |
| VDD          | O   | Stabilizing Capacitor     | <ul style="list-style-type: none"> <li>- Internal logic voltage output</li> <li>- Connect a capacitor for stabilization.</li> </ul>                                                                                                              |
| NVCORE       | O   | Stabilizing Capacitor     | <ul style="list-style-type: none"> <li>- Negative internal logic voltage output</li> <li>- Connect a capacitor for stabilization.</li> </ul>                                                                                                     |
| VDDAM        | P   | DSI                       | <ul style="list-style-type: none"> <li>- Power supply for MIPI analog system.</li> <li>Voltage level of 2.6 ~ 3.3V.</li> </ul>                                                                                                                   |
| MVDDA        | O   | Stabilizing Capacitor     | <ul style="list-style-type: none"> <li>- Regulator output for internal MIPI analog system (1.5V typical)</li> <li>- Connect a capacitor for stabilization.</li> </ul>                                                                            |
| MVDDL        | O   | Stabilizing Capacitor     | <ul style="list-style-type: none"> <li>- Regulator output for internal MIPI low power system. (1.2V typical)</li> <li>- Connect a capacitor for stabilization.</li> </ul>                                                                        |
| VSSA         | P   | Analog                    | <ul style="list-style-type: none"> <li>- System ground for analog circuit.</li> </ul>                                                                                                                                                            |
| VSSR (VSSR1) | P   | Regulator                 | <ul style="list-style-type: none"> <li>- System ground for regulator circuit.</li> </ul>                                                                                                                                                         |
| VSSB         | P   | DC/DC                     | <ul style="list-style-type: none"> <li>- System ground for DC/DC convertor.</li> </ul>                                                                                                                                                           |
| GND          | P   | Digital                   | <ul style="list-style-type: none"> <li>- System ground for internal digital system.</li> </ul>                                                                                                                                                   |
| AVSS         | P   | Source OP                 | <ul style="list-style-type: none"> <li>- System ground for source OP system.</li> </ul>                                                                                                                                                          |
| VSSAM        | P   | DSI                       | <ul style="list-style-type: none"> <li>- System ground for DSI system.</li> </ul>                                                                                                                                                                |
| VPP          | I   | OTP                       | <ul style="list-style-type: none"> <li>- OTP programming power.</li> </ul>                                                                                                                                                                       |

**Table 7: Test Pins**

| Test Pins                                        |     |      |                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------------------|-----|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pin Name                                         | I/O | Type | Descriptions                                                                                                                                                                                                                                                                                                                                                                                                        |
| PADA [1:4]<br>PADB [1:4]                         | I/O |      | <ul style="list-style-type: none"> <li>- These test pins for chip additional detection.</li> <li>- PADA [1:4] are output pins and PADB [1:4] are input pins</li> <li>- For normal operation:<br/>Connect PADA1 and PADB1 together by ITO trace.<br/>Connect PADA2 and PADB2 together by ITO trace.<br/>Connect PADA3 and PADB3 together by ITO trace.<br/>Connect PADA4 and PADB4 together by ITO trace.</li> </ul> |
| DIOPWR                                           | -   |      | - Leave the pin open.                                                                                                                                                                                                                                                                                                                                                                                               |
| DSTB_SEL                                         | -   |      | - Leave the pin open.                                                                                                                                                                                                                                                                                                                                                                                               |
| I2C_SA0                                          | -   |      | - Leave the pin open..                                                                                                                                                                                                                                                                                                                                                                                              |
| EXB1T                                            | -   |      | - Leave the pin open..                                                                                                                                                                                                                                                                                                                                                                                              |
| VSEL                                             | -   |      | - Leave the pin open..                                                                                                                                                                                                                                                                                                                                                                                              |
| LANSEL                                           | -   |      | - Leave the pin open.                                                                                                                                                                                                                                                                                                                                                                                               |
| CSP                                              | -   |      | - Leave the pin open..                                                                                                                                                                                                                                                                                                                                                                                              |
| CSN                                              | -   |      | - Leave the pin open..                                                                                                                                                                                                                                                                                                                                                                                              |
| CONTACT1A<br>CONTACT1B<br>CONTACT2A<br>CONTACT2B | I/O |      | - Test pin for test bonding quality, in internal IC will connect CONTACT1A with CONTACT1B, CONTACT2A with CONTACT2B                                                                                                                                                                                                                                                                                                 |
| KBBC                                             | -   |      | - Leave the pin open.                                                                                                                                                                                                                                                                                                                                                                                               |
| TEST [7:0]                                       | -   |      | - Leave the pin open.                                                                                                                                                                                                                                                                                                                                                                                               |
| OSC_TEST                                         | -   |      | - Leave the pin open.                                                                                                                                                                                                                                                                                                                                                                                               |
| VGHDUM                                           | -   |      | - Leave the pin open.                                                                                                                                                                                                                                                                                                                                                                                               |
| VSSIDUM[14:0]<br>VSSIDUM[16]<br>VSSIDUM[106:20]  | O   |      | <ul style="list-style-type: none"> <li>- These are dummy pins with VSSI potential<br/>(There are no functions inside).</li> <li>- Signal traces cannot pass through on glass under these pads.</li> </ul>                                                                                                                                                                                                           |
| RGBBP                                            | I   |      | - Test pin<br><b>Fix to VSSI level.</b>                                                                                                                                                                                                                                                                                                                                                                             |
| GPO [3:0]                                        | O   |      | -Test pin<br><b>Leave the pin open.</b>                                                                                                                                                                                                                                                                                                                                                                             |

### 3.4. Pin Assignment

Chip Size: 24060  $\mu\text{m}$  x 1200  $\mu\text{m}$

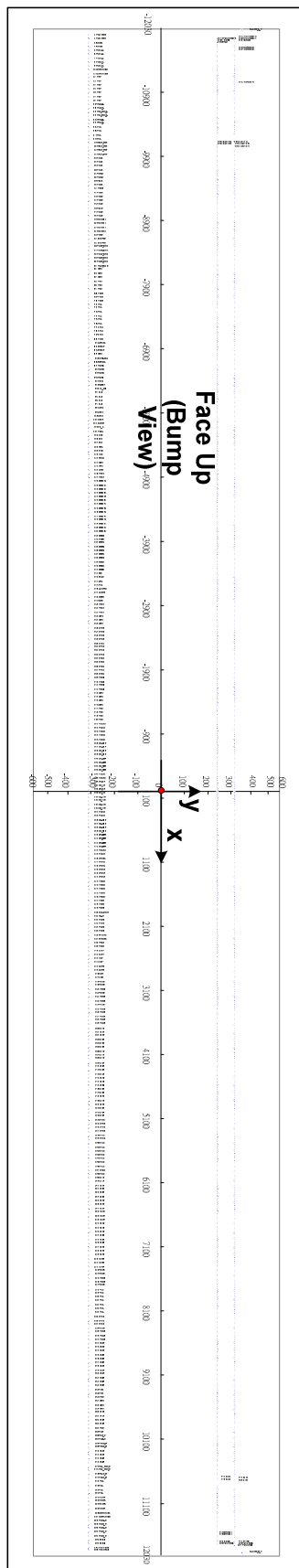
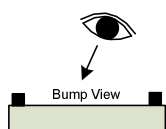
Chip thickness : 280  $\mu\text{m}$  (typ.)

Pad Location: Pad Center.

Coordinate Origin: Chip center

Au Bump Size:

1. Output Pads
  - a. 14  $\mu\text{m}$  x 115  $\mu\text{m}$
  - b. 45  $\mu\text{m}$  x 115  $\mu\text{m}$
2. Input Pads
  - 35  $\mu\text{m}$  x 220  $\mu\text{m}$



Bump Arrangement

|                |                                                      |
|----------------|------------------------------------------------------|
| Output PAD     | <p>Unit: um</p>                                      |
| Input PAD      | <p>Unit: um</p>                                      |
| Alignment mark | <p>Unit : um</p> <p>ALMARK_L_T</p> <p>ALMARK_R_T</p> |



### 3.5. Pad Coordination

| No. | Pad Name  | X      | Y    | No. | Pad Name | X     | Y    | No. | Pad Name | X     | Y    | No. | Pad Name | X     | Y    |
|-----|-----------|--------|------|-----|----------|-------|------|-----|----------|-------|------|-----|----------|-------|------|
| 1   | VSSIDUM0  | -11850 | -305 | 61  | VGMP_PAD | -8250 | -305 | 121 | DB[20]   | -4650 | -305 | 181 | VSSAM    | -1050 | -305 |
| 2   | VSSIDUM1  | -11790 | -305 | 62  | GND      | -8190 | -305 | 122 | DB[19]   | -4590 | -305 | 182 | VSSAM    | -990  | -305 |
| 3   | PADA1     | -11730 | -305 | 63  | GND      | -8130 | -305 | 123 | DB[18]   | -4530 | -305 | 183 | VSSAM    | -930  | -305 |
| 4   | PADB1     | -11670 | -305 | 64  | GND      | -8070 | -305 | 124 | DB[17]   | -4470 | -305 | 184 | VSSAM    | -870  | -305 |
| 5   | VCOM_L    | -11610 | -305 | 65  | VDD      | -8010 | -305 | 125 | DB[16]   | -4410 | -305 | 185 | VSSAM    | -810  | -305 |
| 6   | VCOM_L    | -11550 | -305 | 66  | VDD      | -7950 | -305 | 126 | DB[15]   | -4350 | -305 | 186 | HS_D1P   | -750  | -305 |
| 7   | VCOM_L    | -11490 | -305 | 67  | VDD      | -7890 | -305 | 127 | DB[14]   | -4290 | -305 | 187 | HS_D1P   | -690  | -305 |
| 8   | VCOM_L    | -11430 | -305 | 68  | VDDDB    | -7830 | -305 | 128 | DB[13]   | -4230 | -305 | 188 | HS_D1P   | -630  | -305 |
| 9   | VCOM_L    | -11370 | -305 | 69  | VDDDB    | -7770 | -305 | 129 | DB[12]   | -4170 | -305 | 189 | HS_D1P   | -570  | -305 |
| 10  | CONTACT1A | -11310 | -305 | 70  | VDDDB    | -7710 | -305 | 130 | DB[11]   | -4110 | -305 | 190 | HS_D1N   | -510  | -305 |
| 11  | CONTACT1B | -11250 | -305 | 71  | VCL      | -7650 | -305 | 131 | DB[10]   | -4050 | -305 | 191 | HS_D1N   | -450  | -305 |
| 12  | VPP       | -11190 | -305 | 72  | VCL      | -7590 | -305 | 132 | DB[9]    | -3990 | -305 | 192 | HS_D1N   | -390  | -305 |
| 13  | VPP       | -11130 | -305 | 73  | VCL      | -7530 | -305 | 133 | DB[8]    | -3930 | -305 | 193 | HS_D1N   | -330  | -305 |
| 14  | VPP       | -11070 | -305 | 74  | VCL      | -7470 | -305 | 134 | DB[7]    | -3870 | -305 | 194 | VSSAM    | -270  | -305 |
| 15  | VPP       | -11010 | -305 | 75  | VCL      | -7410 | -305 | 135 | DB[6]    | -3810 | -305 | 195 | VSSAM    | -210  | -305 |
| 16  | VPP       | -10950 | -305 | 76  | VCL      | -7350 | -305 | 136 | DB[5]    | -3750 | -305 | 196 | HS_CP    | -150  | -305 |
| 17  | VGL       | -10890 | -305 | 77  | AVSS     | -7290 | -305 | 137 | DB[4]    | -3690 | -305 | 197 | HS_CP    | -90   | -305 |
| 18  | VGL       | -10830 | -305 | 78  | AVSS     | -7230 | -305 | 138 | DB[3]    | -3630 | -305 | 198 | HS_CP    | -30   | -305 |
| 19  | VGLO      | -10770 | -305 | 79  | AVSS     | -7170 | -305 | 139 | DB[2]    | -3570 | -305 | 199 | HS_CP    | 30    | -305 |
| 20  | VGLO      | -10710 | -305 | 80  | VDDI     | -7110 | -305 | 140 | DB[1]    | -3510 | -305 | 200 | HS_CN    | 90    | -305 |
| 21  | VGL_REG   | -10650 | -305 | 81  | LANSEL   | -7050 | -305 | 141 | DB[0]    | -3450 | -305 | 201 | HS_CN    | 150   | -305 |
| 22  | VGL_REG   | -10590 | -305 | 82  | DSWAP    | -6990 | -305 | 142 | DE       | -3390 | -305 | 202 | HS_CN    | 210   | -305 |
| 23  | VRGH      | -10530 | -305 | 83  | PSWAP    | -6930 | -305 | 143 | PCLK     | -3330 | -305 | 203 | HS_CN    | 270   | -305 |
| 24  | VRGH      | -10470 | -305 | 84  | GND      | -6870 | -305 | 144 | HS       | -3270 | -305 | 204 | VSSAM    | 330   | -305 |
| 25  | VCL       | -10410 | -305 | 85  | DSTB_SEL | -6810 | -305 | 145 | VS       | -3210 | -305 | 205 | VSSAM    | 390   | -305 |
| 26  | VCL       | -10350 | -305 | 86  | NBWSEL   | -6750 | -305 | 146 | LEDPWM   | -3150 | -305 | 206 | HS_D0P   | 450   | -305 |
| 27  | VCL       | -10290 | -305 | 87  | VGSW3    | -6690 | -305 | 147 | LEDON    | -3090 | -305 | 207 | HS_D0P   | 510   | -305 |
| 28  | VCL       | -10230 | -305 | 88  | VGSW2    | -6630 | -305 | 148 | KBBC     | -3030 | -305 | 208 | HS_D0P   | 570   | -305 |
| 29  | VREF_PWR  | -10170 | -305 | 89  | VGSW1    | -6570 | -305 | 149 | ERR      | -2970 | -305 | 209 | HS_D0P   | 630   | -305 |
| 30  | VREF_PWR  | -10110 | -305 | 90  | VGSW0    | -6510 | -305 | 150 | VDDI     | -2910 | -305 | 210 | HS_D0N   | 690   | -305 |
| 31  | VREF_PWR  | -10050 | -305 | 91  | VDDI     | -6450 | -305 | 151 | VDDI     | -2850 | -305 | 211 | HS_D0N   | 750   | -305 |
| 32  | VREF_PWR  | -9990  | -305 | 92  | RGBBP    | -6390 | -305 | 152 | VDDI     | -2790 | -305 | 212 | HS_D0N   | 810   | -305 |
| 33  | VSSA      | -9930  | -305 | 93  | I2C_SA0  | -6330 | -305 | 153 | GND      | -2730 | -305 | 213 | HS_D0N   | 870   | -305 |
| 34  | VSSA      | -9870  | -305 | 94  | IM3      | -6270 | -305 | 154 | GND      | -2670 | -305 | 214 | VSSAM    | 930   | -305 |
| 35  | VSSA      | -9810  | -305 | 95  | IM2      | -6210 | -305 | 155 | GND      | -2610 | -305 | 215 | VSSAM    | 990   | -305 |
| 36  | VSSA      | -9750  | -305 | 96  | IM1      | -6150 | -305 | 156 | AVDD     | -2550 | -305 | 216 | MVDDL    | 1050  | -305 |
| 37  | VDDA      | -9690  | -305 | 97  | IM0      | -6090 | -305 | 157 | AVDD     | -2490 | -305 | 217 | MVDDL    | 1110  | -305 |
| 38  | VDDA      | -9630  | -305 | 98  | GPO3     | -6030 | -305 | 158 | AVDD     | -2430 | -305 | 218 | MVDDL    | 1170  | -305 |
| 39  | VDDA      | -9570  | -305 | 99  | GPO2     | -5970 | -305 | 159 | AVDD     | -2370 | -305 | 219 | MVDDA    | 1230  | -305 |
| 40  | VDDA      | -9510  | -305 | 100 | GPO1     | -5910 | -305 | 160 | AVSS     | -2310 | -305 | 220 | MVDDA    | 1290  | -305 |
| 41  | VDDR      | -9450  | -305 | 101 | GPO0     | -5850 | -305 | 161 | AVSS     | -2250 | -305 | 221 | MVDDA    | 1350  | -305 |
| 42  | VDDR      | -9390  | -305 | 102 | EXB1T    | -5790 | -305 | 162 | AVSS     | -2190 | -305 | 222 | VDDAM    | 1410  | -305 |
| 43  | VDDR      | -9330  | -305 | 103 | TE_L     | -5730 | -305 | 163 | AVSS     | -2130 | -305 | 223 | VDDAM    | 1470  | -305 |
| 44  | VDDR      | -9270  | -305 | 104 | VSEL     | -5670 | -305 | 164 | AVEE     | -2070 | -305 | 224 | VDDAM    | 1530  | -305 |
| 45  | VSSR      | -9210  | -305 | 105 | SDO      | -5610 | -305 | 165 | AVEE     | -2010 | -305 | 225 | VDDAM    | 1590  | -305 |
| 46  | VSSR      | -9150  | -305 | 106 | SDI      | -5550 | -305 | 166 | AVEE     | -1950 | -305 | 226 | VDDAM    | 1650  | -305 |
| 47  | VSSR      | -9090  | -305 | 107 | DCX      | -5490 | -305 | 167 | AVEE     | -1890 | -305 | 227 | VDDB     | 1710  | -305 |
| 48  | VSSR      | -9030  | -305 | 108 | WRX      | -5430 | -305 | 168 | AVEE     | -1830 | -305 | 228 | VDDB     | 1770  | -305 |
| 49  | TEST[0]   | -8970  | -305 | 109 | RDX      | -5370 | -305 | 169 | VDDA1    | -1770 | -305 | 229 | VDDB     | 1830  | -305 |
| 50  | TEST[1]   | -8910  | -305 | 110 | CSX      | -5310 | -305 | 170 | VDDA1    | -1710 | -305 | 230 | OSC_TEST | 1890  | -305 |
| 51  | TEST[2]   | -8850  | -305 | 111 | RESX     | -5250 | -305 | 171 | VDDA1    | -1650 | -305 | 231 | TE_R     | 1950  | -305 |
| 52  | TEST[3]   | -8790  | -305 | 112 | GND      | -5190 | -305 | 172 | VDDA1    | -1590 | -305 | 232 | VSSR1    | 2010  | -305 |
| 53  | VDDR      | -8730  | -305 | 113 | GND      | -5130 | -305 | 173 | GND      | -1530 | -305 | 233 | VSSR1    | 2070  | -305 |
| 54  | DIOPWR    | -8670  | -305 | 114 | GND      | -5070 | -305 | 174 | GND      | -1470 | -305 | 234 | VSSR1    | 2130  | -305 |
| 55  | DIOPWR    | -8610  | -305 | 115 | VDDI     | -5010 | -305 | 175 | GND      | -1410 | -305 | 235 | VSSR1    | 2190  | -305 |
| 56  | VGSN_PAD  | -8550  | -305 | 116 | VDDI     | -4950 | -305 | 176 | GND      | -1350 | -305 | 236 | NVCORE   | 2250  | -305 |
| 57  | VGSN_PAD  | -8490  | -305 | 117 | VDDI     | -4890 | -305 | 177 | VDD      | -1290 | -305 | 237 | NVCORE   | 2310  | -305 |
| 58  | VGSP_PAD  | -8430  | -305 | 118 | DB[23]   | -4830 | -305 | 178 | VDD      | -1230 | -305 | 238 | VRGH     | 2370  | -305 |
| 59  | VGMP_PAD  | -8370  | -305 | 119 | DB[22]   | -4770 | -305 | 179 | VDD      | -1170 | -305 | 239 | VRGH     | 2430  | -305 |
| 60  | VGMP_PAD  | -8310  | -305 | 120 | DB[21]   | -4710 | -305 | 180 | VDD      | -1110 | -305 | 240 | EXTP     | 2490  | -305 |

| No. | Pad Name | X    | Y    | No. | Pad Name | X    | Y    | No. | Pad Name  | X     | Y     | No. | Pad Name | X     | Y     |
|-----|----------|------|------|-----|----------|------|------|-----|-----------|-------|-------|-----|----------|-------|-------|
| 241 | EXTP     | 2550 | -305 | 301 | C21P     | 6150 | -305 | 361 | C41P      | 9750  | -305  | 421 | GOUT[3]  | 11410 | 417.5 |
| 242 | CSP      | 2610 | -305 | 302 | C21N     | 6210 | -305 | 362 | C41N      | 9810  | -305  | 422 | GOUT[3]  | 11396 | 272.5 |
| 243 | CSP      | 2670 | -305 | 303 | C21N     | 6270 | -305 | 363 | C41N      | 9870  | -305  | 423 | GOUT[4]  | 11382 | 417.5 |
| 244 | EXTN     | 2730 | -305 | 304 | C21N     | 6330 | -305 | 364 | VGH       | 9930  | -305  | 424 | GOUT[4]  | 11368 | 272.5 |
| 245 | EXTN     | 2790 | -305 | 305 | C22P     | 6390 | -305 | 365 | VGH       | 9990  | -305  | 425 | GOUT[5]  | 11354 | 417.5 |
| 246 | CSN      | 2850 | -305 | 306 | C22P     | 6450 | -305 | 366 | VGHO      | 10050 | -305  | 426 | GOUT[5]  | 11340 | 272.5 |
| 247 | CSN      | 2910 | -305 | 307 | C22P     | 6510 | -305 | 367 | VGHO      | 10110 | -305  | 427 | GOUT[6]  | 11326 | 417.5 |
| 248 | VDDDB    | 2970 | -305 | 308 | C22N     | 6570 | -305 | 368 | VRGH      | 10170 | -305  | 428 | GOUT[6]  | 11312 | 272.5 |
| 249 | VDDDB    | 3030 | -305 | 309 | C22N     | 6630 | -305 | 369 | VRGH      | 10230 | -305  | 429 | GOUT[7]  | 11298 | 417.5 |
| 250 | VDDDB    | 3090 | -305 | 310 | C22N     | 6690 | -305 | 370 | C51P      | 10290 | -305  | 430 | GOUT[7]  | 11284 | 272.5 |
| 251 | VDDDB    | 3150 | -305 | 311 | C23P     | 6750 | -305 | 371 | C51P      | 10350 | -305  | 431 | GOUT[8]  | 11270 | 417.5 |
| 252 | VDDDB    | 3210 | -305 | 312 | C23P     | 6810 | -305 | 372 | C51N      | 10410 | -305  | 432 | GOUT[8]  | 11256 | 272.5 |
| 253 | VDDDB    | 3270 | -305 | 313 | C23P     | 6870 | -305 | 373 | C51N      | 10470 | -305  | 433 | GOUT[9]  | 11242 | 417.5 |
| 254 | VSSB     | 3330 | -305 | 314 | C23N     | 6930 | -305 | 374 | VGL_REG   | 10530 | -305  | 434 | GOUT[9]  | 11228 | 272.5 |
| 255 | VSSB     | 3390 | -305 | 315 | C23N     | 6990 | -305 | 375 | VGL_REG   | 10590 | -305  | 435 | GOUT[10] | 11214 | 417.5 |
| 256 | VSSB     | 3450 | -305 | 316 | C23N     | 7050 | -305 | 376 | VGLO      | 10650 | -305  | 436 | GOUT[10] | 11200 | 272.5 |
| 257 | VSSB     | 3510 | -305 | 317 | C24P     | 7110 | -305 | 377 | VGLO      | 10710 | -305  | 437 | GOUT[11] | 11186 | 417.5 |
| 258 | VSSB     | 3570 | -305 | 318 | C24P     | 7170 | -305 | 378 | VGL       | 10770 | -305  | 438 | GOUT[11] | 11172 | 272.5 |
| 259 | VSSB     | 3630 | -305 | 319 | C24P     | 7230 | -305 | 379 | VGL       | 10830 | -305  | 439 | GOUT[12] | 11158 | 417.5 |
| 260 | C11P     | 3690 | -305 | 320 | C24N     | 7290 | -305 | 380 | VGL       | 10890 | -305  | 440 | GOUT[12] | 11144 | 272.5 |
| 261 | C11P     | 3750 | -305 | 321 | C24N     | 7350 | -305 | 381 | VGL       | 10950 | -305  | 441 | GOUT[13] | 11130 | 417.5 |
| 262 | C11P     | 3810 | -305 | 322 | C24N     | 7410 | -305 | 382 | TEST[4]   | 11010 | -305  | 442 | GOUT[13] | 11116 | 272.5 |
| 263 | C11N     | 3870 | -305 | 323 | VDDDB    | 7470 | -305 | 383 | TEST[5]   | 11070 | -305  | 443 | GOUT[14] | 11102 | 417.5 |
| 264 | C11N     | 3930 | -305 | 324 | VDDDB    | 7530 | -305 | 384 | TEST[6]   | 11130 | -305  | 444 | GOUT[14] | 11088 | 272.5 |
| 265 | C11N     | 3990 | -305 | 325 | VDDDB    | 7590 | -305 | 385 | TEST[7]   | 11190 | -305  | 445 | GOUT[15] | 11074 | 417.5 |
| 266 | C12P     | 4050 | -305 | 326 | VDDDB    | 7650 | -305 | 386 | CONTACT2A | 11250 | -305  | 446 | GOUT[15] | 11060 | 272.5 |
| 267 | C12P     | 4110 | -305 | 327 | VDDDB    | 7710 | -305 | 387 | CONTACT2B | 11310 | -305  | 447 | GOUT[16] | 11046 | 417.5 |
| 268 | C12P     | 4170 | -305 | 328 | VCL      | 7770 | -305 | 388 | VCOM_R    | 11370 | -305  | 448 | GOUT[16] | 11032 | 272.5 |
| 269 | C12N     | 4230 | -305 | 329 | VCL      | 7830 | -305 | 389 | VCOM_R    | 11430 | -305  | 449 | VGHO     | 11018 | 417.5 |
| 270 | C12N     | 4290 | -305 | 330 | VCL      | 7890 | -305 | 390 | VCOM_R    | 11490 | -305  | 450 | VGHO     | 11004 | 272.5 |
| 271 | C12N     | 4350 | -305 | 331 | VCL      | 7950 | -305 | 391 | VCOM_R    | 11550 | -305  | 451 | VGHO     | 10990 | 417.5 |
| 272 | C13P     | 4410 | -305 | 332 | VCL      | 8010 | -305 | 392 | VCOM_R    | 11610 | -305  | 452 | VGHO     | 10976 | 272.5 |
| 273 | C13P     | 4470 | -305 | 333 | VCL      | 8070 | -305 | 393 | PADA2     | 11670 | -305  | 453 | VGHO     | 10962 | 417.5 |
| 274 | C13P     | 4530 | -305 | 334 | VCL      | 8130 | -305 | 394 | PADB2     | 11730 | -305  | 454 | VGHO     | 10948 | 272.5 |
| 275 | C13N     | 4590 | -305 | 335 | AVSS     | 8190 | -305 | 395 | VSSIDUM2  | 11790 | -305  | 455 | VGHUM    | 10934 | 417.5 |
| 276 | C13N     | 4650 | -305 | 336 | AVSS     | 8250 | -305 | 396 | VSSIDUM3  | 11850 | -305  | 456 | VGHUM    | 10920 | 272.5 |
| 277 | C13N     | 4710 | -305 | 337 | AVSS     | 8310 | -305 | 397 | VSSIDUM4  | 11760 | 417.5 | 457 | VGLO     | 10906 | 417.5 |
| 278 | C14P     | 4770 | -305 | 338 | VSSB     | 8370 | -305 | 398 | VSSIDUM5  | 11732 | 272.5 | 458 | VGLO     | 10892 | 272.5 |
| 279 | C14P     | 4830 | -305 | 339 | VSSB     | 8430 | -305 | 399 | VSSIDUM6  | 11718 | 417.5 | 459 | VGLO     | 10878 | 417.5 |
| 280 | C14P     | 4890 | -305 | 340 | VSSB     | 8490 | -305 | 400 | PADA3     | 11704 | 272.5 | 460 | VGLO     | 10864 | 272.5 |
| 281 | C14N     | 4950 | -305 | 341 | VSSB     | 8550 | -305 | 401 | PADB3     | 11690 | 417.5 | 461 | VGLO     | 10850 | 417.5 |
| 282 | C14N     | 5010 | -305 | 342 | C31P     | 8610 | -305 | 402 | VGHO      | 11676 | 272.5 | 462 | VGLO     | 10836 | 272.5 |
| 283 | C14N     | 5070 | -305 | 343 | C31P     | 8670 | -305 | 403 | VGHO      | 11662 | 417.5 | 463 | VGLO     | 10822 | 417.5 |
| 284 | AVDD     | 5130 | -305 | 344 | C31P     | 8730 | -305 | 404 | VGHO      | 11648 | 272.5 | 464 | VGLO     | 10808 | 272.5 |
| 285 | AVDD     | 5190 | -305 | 345 | C31N     | 8790 | -305 | 405 | VGLO      | 11634 | 417.5 | 465 | VGLO     | 10794 | 417.5 |
| 286 | AVDD     | 5250 | -305 | 346 | C31N     | 8850 | -305 | 406 | VGLO      | 11620 | 272.5 | 466 | VSSIDUM7 | 10780 | 272.5 |
| 287 | AVDD     | 5310 | -305 | 347 | C31N     | 8910 | -305 | 407 | VGLO      | 11606 | 417.5 | 467 | VSSIDUM8 | 10766 | 417.5 |
| 288 | AVSS     | 5370 | -305 | 348 | C32P     | 8970 | -305 | 408 | GOUT[1]   | 11592 | 272.5 | 468 | SDUM0    | 10752 | 272.5 |
| 289 | AVSS     | 5430 | -305 | 349 | C32P     | 9030 | -305 | 409 | GOUT[1]   | 11578 | 417.5 | 469 | S[0]     | 10738 | 417.5 |
| 290 | AVSS     | 5490 | -305 | 350 | C32P     | 9090 | -305 | 410 | GOUT[2]   | 11564 | 272.5 | 470 | S[1]     | 10724 | 272.5 |
| 291 | AVSS     | 5550 | -305 | 351 | C32N     | 9150 | -305 | 411 | GOUT[2]   | 11550 | 417.5 | 471 | S[2]     | 10710 | 417.5 |
| 292 | AVSS     | 5610 | -305 | 352 | C32N     | 9210 | -305 | 412 | LVGL_R    | 11536 | 272.5 | 472 | S[3]     | 10696 | 272.5 |
| 293 | AVEE     | 5670 | -305 | 353 | C32N     | 9270 | -305 | 413 | LVGL_R    | 11522 | 417.5 | 473 | S[4]     | 10682 | 417.5 |
| 294 | AVEE     | 5730 | -305 | 354 | VDD      | 9330 | -305 | 414 | LVGL_R    | 11508 | 272.5 | 474 | S[5]     | 10668 | 272.5 |
| 295 | AVEE     | 5790 | -305 | 355 | VDD      | 9390 | -305 | 415 | VRGH      | 11494 | 417.5 | 475 | S[6]     | 10654 | 417.5 |
| 296 | AVEE     | 5850 | -305 | 356 | VDD      | 9450 | -305 | 416 | VRGH      | 11480 | 272.5 | 476 | S[7]     | 10640 | 272.5 |
| 297 | AVEE     | 5910 | -305 | 357 | GND      | 9510 | -305 | 417 | VRGH      | 11466 | 417.5 | 477 | S[8]     | 10626 | 417.5 |
| 298 | AVEE     | 5970 | -305 | 358 | GND      | 9570 | -305 | 418 | VGLO      | 11452 | 272.5 | 478 | S[9]     | 10612 | 272.5 |
| 299 | C21P     | 6030 | -305 | 359 | GND      | 9630 | -305 | 419 | VGLO      | 11438 | 417.5 | 479 | S[10]    | 10598 | 417.5 |
| 300 | C21P     | 6090 | -305 | 360 | C41P     | 9690 | -305 | 420 | VGLO      | 11424 | 272.5 | 480 | S[11]    | 10584 | 272.5 |

| No. | Pad Name | X     | Y     | No. | Pad Name | X    | Y     | No. | Pad Name | X    | Y     | No. | Pad Name | X    | Y     |
|-----|----------|-------|-------|-----|----------|------|-------|-----|----------|------|-------|-----|----------|------|-------|
| 481 | S[12]    | 10570 | 417.5 | 541 | S[72]    | 9730 | 417.5 | 601 | S[132]   | 8890 | 417.5 | 661 | S[192]   | 8050 | 417.5 |
| 482 | S[13]    | 10556 | 272.5 | 542 | S[73]    | 9716 | 272.5 | 602 | S[133]   | 8876 | 272.5 | 662 | S[193]   | 8036 | 272.5 |
| 483 | S[14]    | 10542 | 417.5 | 543 | S[74]    | 9702 | 417.5 | 603 | S[134]   | 8862 | 417.5 | 663 | S[194]   | 8022 | 417.5 |
| 484 | S[15]    | 10528 | 272.5 | 544 | S[75]    | 9688 | 272.5 | 604 | S[135]   | 8848 | 272.5 | 664 | S[195]   | 8008 | 272.5 |
| 485 | S[16]    | 10514 | 417.5 | 545 | S[76]    | 9674 | 417.5 | 605 | S[136]   | 8834 | 417.5 | 665 | S[196]   | 7994 | 417.5 |
| 486 | S[17]    | 10500 | 272.5 | 546 | S[77]    | 9660 | 272.5 | 606 | S[137]   | 8820 | 272.5 | 666 | S[197]   | 7980 | 272.5 |
| 487 | S[18]    | 10486 | 417.5 | 547 | S[78]    | 9646 | 417.5 | 607 | S[138]   | 8806 | 417.5 | 667 | S[198]   | 7966 | 417.5 |
| 488 | S[19]    | 10472 | 272.5 | 548 | S[79]    | 9632 | 272.5 | 608 | S[139]   | 8792 | 272.5 | 668 | S[199]   | 7952 | 272.5 |
| 489 | S[20]    | 10458 | 417.5 | 549 | S[80]    | 9618 | 417.5 | 609 | S[140]   | 8778 | 417.5 | 669 | S[200]   | 7938 | 417.5 |
| 490 | S[21]    | 10444 | 272.5 | 550 | S[81]    | 9604 | 272.5 | 610 | S[141]   | 8764 | 272.5 | 670 | S[201]   | 7924 | 272.5 |
| 491 | S[22]    | 10430 | 417.5 | 551 | S[82]    | 9590 | 417.5 | 611 | S[142]   | 8750 | 417.5 | 671 | S[202]   | 7910 | 417.5 |
| 492 | S[23]    | 10416 | 272.5 | 552 | S[83]    | 9576 | 272.5 | 612 | S[143]   | 8736 | 272.5 | 672 | S[203]   | 7896 | 272.5 |
| 493 | S[24]    | 10402 | 417.5 | 553 | S[84]    | 9562 | 417.5 | 613 | S[144]   | 8722 | 417.5 | 673 | S[204]   | 7882 | 417.5 |
| 494 | S[25]    | 10388 | 272.5 | 554 | S[85]    | 9548 | 272.5 | 614 | S[145]   | 8708 | 272.5 | 674 | S[205]   | 7868 | 272.5 |
| 495 | S[26]    | 10374 | 417.5 | 555 | S[86]    | 9534 | 417.5 | 615 | S[146]   | 8694 | 417.5 | 675 | S[206]   | 7854 | 417.5 |
| 496 | S[27]    | 10360 | 272.5 | 556 | S[87]    | 9520 | 272.5 | 616 | S[147]   | 8680 | 272.5 | 676 | S[207]   | 7840 | 272.5 |
| 497 | S[28]    | 10346 | 417.5 | 557 | S[88]    | 9506 | 417.5 | 617 | S[148]   | 8666 | 417.5 | 677 | S[208]   | 7826 | 417.5 |
| 498 | S[29]    | 10332 | 272.5 | 558 | S[89]    | 9492 | 272.5 | 618 | S[149]   | 8652 | 272.5 | 678 | S[209]   | 7812 | 272.5 |
| 499 | S[30]    | 10318 | 417.5 | 559 | S[90]    | 9478 | 417.5 | 619 | S[150]   | 8638 | 417.5 | 679 | S[210]   | 7798 | 417.5 |
| 500 | S[31]    | 10304 | 272.5 | 560 | S[91]    | 9464 | 272.5 | 620 | S[151]   | 8624 | 272.5 | 680 | S[211]   | 7784 | 272.5 |
| 501 | S[32]    | 10290 | 417.5 | 561 | S[92]    | 9450 | 417.5 | 621 | S[152]   | 8610 | 417.5 | 681 | S[212]   | 7770 | 417.5 |
| 502 | S[33]    | 10276 | 272.5 | 562 | S[93]    | 9436 | 272.5 | 622 | S[153]   | 8596 | 272.5 | 682 | S[213]   | 7756 | 272.5 |
| 503 | S[34]    | 10262 | 417.5 | 563 | S[94]    | 9422 | 417.5 | 623 | S[154]   | 8582 | 417.5 | 683 | S[214]   | 7742 | 417.5 |
| 504 | S[35]    | 10248 | 272.5 | 564 | S[95]    | 9408 | 272.5 | 624 | S[155]   | 8568 | 272.5 | 684 | S[215]   | 7728 | 272.5 |
| 505 | S[36]    | 10234 | 417.5 | 565 | S[96]    | 9394 | 417.5 | 625 | S[156]   | 8554 | 417.5 | 685 | S[216]   | 7714 | 417.5 |
| 506 | S[37]    | 10220 | 272.5 | 566 | S[97]    | 9380 | 272.5 | 626 | S[157]   | 8540 | 272.5 | 686 | S[217]   | 7700 | 272.5 |
| 507 | S[38]    | 10206 | 417.5 | 567 | S[98]    | 9366 | 417.5 | 627 | S[158]   | 8526 | 417.5 | 687 | S[218]   | 7686 | 417.5 |
| 508 | S[39]    | 10192 | 272.5 | 568 | S[99]    | 9352 | 272.5 | 628 | S[159]   | 8512 | 272.5 | 688 | S[219]   | 7672 | 272.5 |
| 509 | S[40]    | 10178 | 417.5 | 569 | S[100]   | 9338 | 417.5 | 629 | S[160]   | 8498 | 417.5 | 689 | S[220]   | 7658 | 417.5 |
| 510 | S[41]    | 10164 | 272.5 | 570 | S[101]   | 9324 | 272.5 | 630 | S[161]   | 8484 | 272.5 | 690 | S[221]   | 7644 | 272.5 |
| 511 | S[42]    | 10150 | 417.5 | 571 | S[102]   | 9310 | 417.5 | 631 | S[162]   | 8470 | 417.5 | 691 | S[222]   | 7630 | 417.5 |
| 512 | S[43]    | 10136 | 272.5 | 572 | S[103]   | 9296 | 272.5 | 632 | S[163]   | 8456 | 272.5 | 692 | S[223]   | 7616 | 272.5 |
| 513 | S[44]    | 10122 | 417.5 | 573 | S[104]   | 9282 | 417.5 | 633 | S[164]   | 8442 | 417.5 | 693 | S[224]   | 7602 | 417.5 |
| 514 | S[45]    | 10108 | 272.5 | 574 | S[105]   | 9268 | 272.5 | 634 | S[165]   | 8428 | 272.5 | 694 | S[225]   | 7588 | 272.5 |
| 515 | S[46]    | 10094 | 417.5 | 575 | S[106]   | 9254 | 417.5 | 635 | S[166]   | 8414 | 417.5 | 695 | S[226]   | 7574 | 417.5 |
| 516 | S[47]    | 10080 | 272.5 | 576 | S[107]   | 9240 | 272.5 | 636 | S[167]   | 8400 | 272.5 | 696 | S[227]   | 7560 | 272.5 |
| 517 | S[48]    | 10066 | 417.5 | 577 | S[108]   | 9226 | 417.5 | 637 | S[168]   | 8386 | 417.5 | 697 | S[228]   | 7546 | 417.5 |
| 518 | S[49]    | 10052 | 272.5 | 578 | S[109]   | 9212 | 272.5 | 638 | S[169]   | 8372 | 272.5 | 698 | S[229]   | 7532 | 272.5 |
| 519 | S[50]    | 10038 | 417.5 | 579 | S[110]   | 9198 | 417.5 | 639 | S[170]   | 8358 | 417.5 | 699 | S[230]   | 7518 | 417.5 |
| 520 | S[51]    | 10024 | 272.5 | 580 | S[111]   | 9184 | 272.5 | 640 | S[171]   | 8344 | 272.5 | 700 | S[231]   | 7504 | 272.5 |
| 521 | S[52]    | 10010 | 417.5 | 581 | S[112]   | 9170 | 417.5 | 641 | S[172]   | 8330 | 417.5 | 701 | S[232]   | 7490 | 417.5 |
| 522 | S[53]    | 9996  | 272.5 | 582 | S[113]   | 9156 | 272.5 | 642 | S[173]   | 8316 | 272.5 | 702 | S[233]   | 7476 | 272.5 |
| 523 | S[54]    | 9982  | 417.5 | 583 | S[114]   | 9142 | 417.5 | 643 | S[174]   | 8302 | 417.5 | 703 | S[234]   | 7462 | 417.5 |
| 524 | S[55]    | 9968  | 272.5 | 584 | S[115]   | 9128 | 272.5 | 644 | S[175]   | 8288 | 272.5 | 704 | S[235]   | 7448 | 272.5 |
| 525 | S[56]    | 9954  | 417.5 | 585 | S[116]   | 9114 | 417.5 | 645 | S[176]   | 8274 | 417.5 | 705 | S[236]   | 7434 | 417.5 |
| 526 | S[57]    | 9940  | 272.5 | 586 | S[117]   | 9100 | 272.5 | 646 | S[177]   | 8260 | 272.5 | 706 | S[237]   | 7420 | 272.5 |
| 527 | S[58]    | 9926  | 417.5 | 587 | S[118]   | 9086 | 417.5 | 647 | S[178]   | 8246 | 417.5 | 707 | S[238]   | 7406 | 417.5 |
| 528 | S[59]    | 9912  | 272.5 | 588 | S[119]   | 9072 | 272.5 | 648 | S[179]   | 8232 | 272.5 | 708 | S[239]   | 7392 | 272.5 |
| 529 | S[60]    | 9898  | 417.5 | 589 | S[120]   | 9058 | 417.5 | 649 | S[180]   | 8218 | 417.5 | 709 | S[240]   | 7378 | 417.5 |
| 530 | S[61]    | 9884  | 272.5 | 590 | S[121]   | 9044 | 272.5 | 650 | S[181]   | 8204 | 272.5 | 710 | S[241]   | 7364 | 272.5 |
| 531 | S[62]    | 9870  | 417.5 | 591 | S[122]   | 9030 | 417.5 | 651 | S[182]   | 8190 | 417.5 | 711 | S[242]   | 7350 | 417.5 |
| 532 | S[63]    | 9856  | 272.5 | 592 | S[123]   | 9016 | 272.5 | 652 | S[183]   | 8176 | 272.5 | 712 | S[243]   | 7336 | 272.5 |
| 533 | S[64]    | 9842  | 417.5 | 593 | S[124]   | 9002 | 417.5 | 653 | S[184]   | 8162 | 417.5 | 713 | S[244]   | 7322 | 417.5 |
| 534 | S[65]    | 9828  | 272.5 | 594 | S[125]   | 8988 | 272.5 | 654 | S[185]   | 8148 | 272.5 | 714 | S[245]   | 7308 | 272.5 |
| 535 | S[66]    | 9814  | 417.5 | 595 | S[126]   | 8974 | 417.5 | 655 | S[186]   | 8134 | 417.5 | 715 | S[246]   | 7294 | 417.5 |
| 536 | S[67]    | 9800  | 272.5 | 596 | S[127]   | 8960 | 272.5 | 656 | S[187]   | 8120 | 272.5 | 716 | S[247]   | 7280 | 272.5 |
| 537 | S[68]    | 9786  | 417.5 | 597 | S[128]   | 8946 | 417.5 | 657 | S[188]   | 8106 | 417.5 | 717 | S[248]   | 7266 | 417.5 |
| 538 | S[69]    | 9772  | 272.5 | 598 | S[129]   | 8932 | 272.5 | 658 | S[189]   | 8092 | 272.5 | 718 | S[249]   | 7252 | 272.5 |
| 539 | S[70]    | 9758  | 417.5 | 599 | S[130]   | 8918 | 417.5 | 659 | S[190]   | 8078 | 417.5 | 719 | S[250]   | 7238 | 417.5 |
| 540 | S[71]    | 9744  | 272.5 | 600 | S[131]   | 8904 | 272.5 | 660 | S[191]   | 8064 | 272.5 | 720 | S[251]   | 7224 | 272.5 |

| No. | Pad Name | X    | Y     | No. | Pad Name | X    | Y     | No. | Pad Name | X    | Y     | No. | Pad Name | X    | Y     |
|-----|----------|------|-------|-----|----------|------|-------|-----|----------|------|-------|-----|----------|------|-------|
| 721 | S[252]   | 7210 | 417.5 | 781 | S[312]   | 6370 | 417.5 | 841 | S[372]   | 5530 | 417.5 | 901 | S[432]   | 4690 | 417.5 |
| 722 | S[253]   | 7196 | 272.5 | 782 | S[313]   | 6356 | 272.5 | 842 | S[373]   | 5516 | 272.5 | 902 | S[433]   | 4676 | 272.5 |
| 723 | S[254]   | 7182 | 417.5 | 783 | S[314]   | 6342 | 417.5 | 843 | S[374]   | 5502 | 417.5 | 903 | S[434]   | 4662 | 417.5 |
| 724 | S[255]   | 7168 | 272.5 | 784 | S[315]   | 6328 | 272.5 | 844 | S[375]   | 5488 | 272.5 | 904 | S[435]   | 4648 | 272.5 |
| 725 | S[256]   | 7154 | 417.5 | 785 | S[316]   | 6314 | 417.5 | 845 | S[376]   | 5474 | 417.5 | 905 | S[436]   | 4634 | 417.5 |
| 726 | S[257]   | 7140 | 272.5 | 786 | S[317]   | 6300 | 272.5 | 846 | S[377]   | 5460 | 272.5 | 906 | S[437]   | 4620 | 272.5 |
| 727 | S[258]   | 7126 | 417.5 | 787 | S[318]   | 6286 | 417.5 | 847 | S[378]   | 5446 | 417.5 | 907 | S[438]   | 4606 | 417.5 |
| 728 | S[259]   | 7112 | 272.5 | 788 | S[319]   | 6272 | 272.5 | 848 | S[379]   | 5432 | 272.5 | 908 | S[439]   | 4592 | 272.5 |
| 729 | S[260]   | 7098 | 417.5 | 789 | S[320]   | 6258 | 417.5 | 849 | S[380]   | 5418 | 417.5 | 909 | S[440]   | 4578 | 417.5 |
| 730 | S[261]   | 7084 | 272.5 | 790 | S[321]   | 6244 | 272.5 | 850 | S[381]   | 5404 | 272.5 | 910 | S[441]   | 4564 | 272.5 |
| 731 | S[262]   | 7070 | 417.5 | 791 | S[322]   | 6230 | 417.5 | 851 | S[382]   | 5390 | 417.5 | 911 | S[442]   | 4550 | 417.5 |
| 732 | S[263]   | 7056 | 272.5 | 792 | S[323]   | 6216 | 272.5 | 852 | S[383]   | 5376 | 272.5 | 912 | S[443]   | 4536 | 272.5 |
| 733 | S[264]   | 7042 | 417.5 | 793 | S[324]   | 6202 | 417.5 | 853 | S[384]   | 5362 | 417.5 | 913 | S[444]   | 4522 | 417.5 |
| 734 | S[265]   | 7028 | 272.5 | 794 | S[325]   | 6188 | 272.5 | 854 | S[385]   | 5348 | 272.5 | 914 | S[445]   | 4508 | 272.5 |
| 735 | S[266]   | 7014 | 417.5 | 795 | S[326]   | 6174 | 417.5 | 855 | S[386]   | 5334 | 417.5 | 915 | S[446]   | 4494 | 417.5 |
| 736 | S[267]   | 7000 | 272.5 | 796 | S[327]   | 6160 | 272.5 | 856 | S[387]   | 5320 | 272.5 | 916 | S[447]   | 4480 | 272.5 |
| 737 | S[268]   | 6986 | 417.5 | 797 | S[328]   | 6146 | 417.5 | 857 | S[388]   | 5306 | 417.5 | 917 | S[448]   | 4466 | 417.5 |
| 738 | S[269]   | 6972 | 272.5 | 798 | S[329]   | 6132 | 272.5 | 858 | S[389]   | 5292 | 272.5 | 918 | S[449]   | 4452 | 272.5 |
| 739 | S[270]   | 6958 | 417.5 | 799 | S[330]   | 6118 | 417.5 | 859 | S[390]   | 5278 | 417.5 | 919 | S[450]   | 4438 | 417.5 |
| 740 | S[271]   | 6944 | 272.5 | 800 | S[331]   | 6104 | 272.5 | 860 | S[391]   | 5264 | 272.5 | 920 | S[451]   | 4424 | 272.5 |
| 741 | S[272]   | 6930 | 417.5 | 801 | S[332]   | 6090 | 417.5 | 861 | S[392]   | 5250 | 417.5 | 921 | S[452]   | 4410 | 417.5 |
| 742 | S[273]   | 6916 | 272.5 | 802 | S[333]   | 6076 | 272.5 | 862 | S[393]   | 5236 | 272.5 | 922 | S[453]   | 4396 | 272.5 |
| 743 | S[274]   | 6902 | 417.5 | 803 | S[334]   | 6062 | 417.5 | 863 | S[394]   | 5222 | 417.5 | 923 | S[454]   | 4382 | 417.5 |
| 744 | S[275]   | 6888 | 272.5 | 804 | S[335]   | 6048 | 272.5 | 864 | S[395]   | 5208 | 272.5 | 924 | S[455]   | 4368 | 272.5 |
| 745 | S[276]   | 6874 | 417.5 | 805 | S[336]   | 6034 | 417.5 | 865 | S[396]   | 5194 | 417.5 | 925 | S[456]   | 4354 | 417.5 |
| 746 | S[277]   | 6860 | 272.5 | 806 | S[337]   | 6020 | 272.5 | 866 | S[397]   | 5180 | 272.5 | 926 | S[457]   | 4340 | 272.5 |
| 747 | S[278]   | 6846 | 417.5 | 807 | S[338]   | 6006 | 417.5 | 867 | S[398]   | 5166 | 417.5 | 927 | S[458]   | 4326 | 417.5 |
| 748 | S[279]   | 6832 | 272.5 | 808 | S[339]   | 5992 | 272.5 | 868 | S[399]   | 5152 | 272.5 | 928 | S[459]   | 4312 | 272.5 |
| 749 | S[280]   | 6818 | 417.5 | 809 | S[340]   | 5978 | 417.5 | 869 | S[400]   | 5138 | 417.5 | 929 | S[460]   | 4298 | 417.5 |
| 750 | S[281]   | 6804 | 272.5 | 810 | S[341]   | 5964 | 272.5 | 870 | S[401]   | 5124 | 272.5 | 930 | S[461]   | 4284 | 272.5 |
| 751 | S[282]   | 6790 | 417.5 | 811 | S[342]   | 5950 | 417.5 | 871 | S[402]   | 5110 | 417.5 | 931 | S[462]   | 4270 | 417.5 |
| 752 | S[283]   | 6776 | 272.5 | 812 | S[343]   | 5936 | 272.5 | 872 | S[403]   | 5096 | 272.5 | 932 | S[463]   | 4256 | 272.5 |
| 753 | S[284]   | 6762 | 417.5 | 813 | S[344]   | 5922 | 417.5 | 873 | S[404]   | 5082 | 417.5 | 933 | S[464]   | 4242 | 417.5 |
| 754 | S[285]   | 6748 | 272.5 | 814 | S[345]   | 5908 | 272.5 | 874 | S[405]   | 5068 | 272.5 | 934 | S[465]   | 4228 | 272.5 |
| 755 | S[286]   | 6734 | 417.5 | 815 | S[346]   | 5894 | 417.5 | 875 | S[406]   | 5054 | 417.5 | 935 | S[466]   | 4214 | 417.5 |
| 756 | S[287]   | 6720 | 272.5 | 816 | S[347]   | 5880 | 272.5 | 876 | S[407]   | 5040 | 272.5 | 936 | S[467]   | 4200 | 272.5 |
| 757 | S[288]   | 6706 | 417.5 | 817 | S[348]   | 5866 | 417.5 | 877 | S[408]   | 5026 | 417.5 | 937 | S[468]   | 4186 | 417.5 |
| 758 | S[289]   | 6692 | 272.5 | 818 | S[349]   | 5852 | 272.5 | 878 | S[409]   | 5012 | 272.5 | 938 | S[469]   | 4172 | 272.5 |
| 759 | S[290]   | 6678 | 417.5 | 819 | S[350]   | 5838 | 417.5 | 879 | S[410]   | 4998 | 417.5 | 939 | S[470]   | 4158 | 417.5 |
| 760 | S[291]   | 6664 | 272.5 | 820 | S[351]   | 5824 | 272.5 | 880 | S[411]   | 4984 | 272.5 | 940 | S[471]   | 4144 | 272.5 |
| 761 | S[292]   | 6650 | 417.5 | 821 | S[352]   | 5810 | 417.5 | 881 | S[412]   | 4970 | 417.5 | 941 | S[472]   | 4130 | 417.5 |
| 762 | S[293]   | 6636 | 272.5 | 822 | S[353]   | 5796 | 272.5 | 882 | S[413]   | 4956 | 272.5 | 942 | S[473]   | 4116 | 272.5 |
| 763 | S[294]   | 6622 | 417.5 | 823 | S[354]   | 5782 | 417.5 | 883 | S[414]   | 4942 | 417.5 | 943 | S[474]   | 4102 | 417.5 |
| 764 | S[295]   | 6608 | 272.5 | 824 | S[355]   | 5768 | 272.5 | 884 | S[415]   | 4928 | 272.5 | 944 | S[475]   | 4088 | 272.5 |
| 765 | S[296]   | 6594 | 417.5 | 825 | S[356]   | 5754 | 417.5 | 885 | S[416]   | 4914 | 417.5 | 945 | S[476]   | 4074 | 417.5 |
| 766 | S[297]   | 6580 | 272.5 | 826 | S[357]   | 5740 | 272.5 | 886 | S[417]   | 4900 | 272.5 | 946 | S[477]   | 4060 | 272.5 |
| 767 | S[298]   | 6566 | 417.5 | 827 | S[358]   | 5726 | 417.5 | 887 | S[418]   | 4886 | 417.5 | 947 | S[478]   | 4046 | 417.5 |
| 768 | S[299]   | 6552 | 272.5 | 828 | S[359]   | 5712 | 272.5 | 888 | S[419]   | 4872 | 272.5 | 948 | S[479]   | 4032 | 272.5 |
| 769 | S[300]   | 6538 | 417.5 | 829 | S[360]   | 5698 | 417.5 | 889 | S[420]   | 4858 | 417.5 | 949 | S[480]   | 4018 | 417.5 |
| 770 | S[301]   | 6524 | 272.5 | 830 | S[361]   | 5684 | 272.5 | 890 | S[421]   | 4844 | 272.5 | 950 | S[481]   | 4004 | 272.5 |
| 771 | S[302]   | 6510 | 417.5 | 831 | S[362]   | 5670 | 417.5 | 891 | S[422]   | 4830 | 417.5 | 951 | S[482]   | 3990 | 417.5 |
| 772 | S[303]   | 6496 | 272.5 | 832 | S[363]   | 5656 | 272.5 | 892 | S[423]   | 4816 | 272.5 | 952 | S[483]   | 3976 | 272.5 |
| 773 | S[304]   | 6482 | 417.5 | 833 | S[364]   | 5642 | 417.5 | 893 | S[424]   | 4802 | 417.5 | 953 | S[484]   | 3962 | 417.5 |
| 774 | S[305]   | 6468 | 272.5 | 834 | S[365]   | 5628 | 272.5 | 894 | S[425]   | 4788 | 272.5 | 954 | S[485]   | 3948 | 272.5 |
| 775 | S[306]   | 6454 | 417.5 | 835 | S[366]   | 5614 | 417.5 | 895 | S[426]   | 4774 | 417.5 | 955 | S[486]   | 3934 | 417.5 |
| 776 | S[307]   | 6440 | 272.5 | 836 | S[367]   | 5600 | 272.5 | 896 | S[427]   | 4760 | 272.5 | 956 | S[487]   | 3920 | 272.5 |
| 777 | S[308]   | 6426 | 417.5 | 837 | S[368]   | 5586 | 417.5 | 897 | S[428]   | 4746 | 417.5 | 957 | S[488]   | 3906 | 417.5 |
| 778 | S[309]   | 6412 | 272.5 | 838 | S[369]   | 5572 | 272.5 | 898 | S[429]   | 4732 | 272.5 | 958 | S[489]   | 3892 | 272.5 |
| 779 | S[310]   | 6398 | 417.5 | 839 | S[370]   | 5558 | 417.5 | 899 | S[430]   | 4718 | 417.5 | 959 | S[490]   | 3878 | 417.5 |
| 780 | S[311]   | 6384 | 272.5 | 840 | S[371]   | 5544 | 272.5 | 900 | S[431]   | 4704 | 272.5 | 960 | S[491]   | 3864 | 272.5 |



| No.  | Pad Name | X    | Y     | No.  | Pad Name | X    | Y     | No.  | Pad Name | X    | Y     | No.  | Pad Name  | X    | Y     |
|------|----------|------|-------|------|----------|------|-------|------|----------|------|-------|------|-----------|------|-------|
| 961  | S[492]   | 3850 | 417.5 | 1021 | S[552]   | 3010 | 417.5 | 1081 | S[612]   | 2170 | 417.5 | 1141 | S[672]    | 1330 | 417.5 |
| 962  | S[493]   | 3836 | 272.5 | 1022 | S[553]   | 2996 | 272.5 | 1082 | S[613]   | 2156 | 272.5 | 1142 | S[673]    | 1316 | 272.5 |
| 963  | S[494]   | 3822 | 417.5 | 1023 | S[554]   | 2982 | 417.5 | 1083 | S[614]   | 2142 | 417.5 | 1143 | S[674]    | 1302 | 417.5 |
| 964  | S[495]   | 3808 | 272.5 | 1024 | S[555]   | 2968 | 272.5 | 1084 | S[615]   | 2128 | 272.5 | 1144 | S[675]    | 1288 | 272.5 |
| 965  | S[496]   | 3794 | 417.5 | 1025 | S[556]   | 2954 | 417.5 | 1085 | S[616]   | 2114 | 417.5 | 1145 | S[676]    | 1274 | 417.5 |
| 966  | S[497]   | 3780 | 272.5 | 1026 | S[557]   | 2940 | 272.5 | 1086 | S[617]   | 2100 | 272.5 | 1146 | S[677]    | 1260 | 272.5 |
| 967  | S[498]   | 3766 | 417.5 | 1027 | S[558]   | 2926 | 417.5 | 1087 | S[618]   | 2086 | 417.5 | 1147 | S[678]    | 1246 | 417.5 |
| 968  | S[499]   | 3752 | 272.5 | 1028 | S[559]   | 2912 | 272.5 | 1088 | S[619]   | 2072 | 272.5 | 1148 | S[679]    | 1232 | 272.5 |
| 969  | S[500]   | 3738 | 417.5 | 1029 | S[560]   | 2898 | 417.5 | 1089 | S[620]   | 2058 | 417.5 | 1149 | S[680]    | 1218 | 417.5 |
| 970  | S[501]   | 3724 | 272.5 | 1030 | S[561]   | 2884 | 272.5 | 1090 | S[621]   | 2044 | 272.5 | 1150 | S[681]    | 1204 | 272.5 |
| 971  | S[502]   | 3710 | 417.5 | 1031 | S[562]   | 2870 | 417.5 | 1091 | S[622]   | 2030 | 417.5 | 1151 | S[682]    | 1190 | 417.5 |
| 972  | S[503]   | 3696 | 272.5 | 1032 | S[563]   | 2856 | 272.5 | 1092 | S[623]   | 2016 | 272.5 | 1152 | S[683]    | 1176 | 272.5 |
| 973  | S[504]   | 3682 | 417.5 | 1033 | S[564]   | 2842 | 417.5 | 1093 | S[624]   | 2002 | 417.5 | 1153 | S[684]    | 1162 | 417.5 |
| 974  | S[505]   | 3668 | 272.5 | 1034 | S[565]   | 2828 | 272.5 | 1094 | S[625]   | 1988 | 272.5 | 1154 | S[685]    | 1148 | 272.5 |
| 975  | S[506]   | 3654 | 417.5 | 1035 | S[566]   | 2814 | 417.5 | 1095 | S[626]   | 1974 | 417.5 | 1155 | S[686]    | 1134 | 417.5 |
| 976  | S[507]   | 3640 | 272.5 | 1036 | S[567]   | 2800 | 272.5 | 1096 | S[627]   | 1960 | 272.5 | 1156 | S[687]    | 1120 | 272.5 |
| 977  | S[508]   | 3626 | 417.5 | 1037 | S[568]   | 2786 | 417.5 | 1097 | S[628]   | 1946 | 417.5 | 1157 | S[688]    | 1106 | 417.5 |
| 978  | S[509]   | 3612 | 272.5 | 1038 | S[569]   | 2772 | 272.5 | 1098 | S[629]   | 1932 | 272.5 | 1158 | S[689]    | 1092 | 272.5 |
| 979  | S[510]   | 3598 | 417.5 | 1039 | S[570]   | 2758 | 417.5 | 1099 | S[630]   | 1918 | 417.5 | 1159 | S[690]    | 1078 | 417.5 |
| 980  | S[511]   | 3584 | 272.5 | 1040 | S[571]   | 2744 | 272.5 | 1100 | S[631]   | 1904 | 272.5 | 1160 | S[691]    | 1064 | 272.5 |
| 981  | S[512]   | 3570 | 417.5 | 1041 | S[572]   | 2730 | 417.5 | 1101 | S[632]   | 1890 | 417.5 | 1161 | S[692]    | 1050 | 417.5 |
| 982  | S[513]   | 3556 | 272.5 | 1042 | S[573]   | 2716 | 272.5 | 1102 | S[633]   | 1876 | 272.5 | 1162 | S[693]    | 1036 | 272.5 |
| 983  | S[514]   | 3542 | 417.5 | 1043 | S[574]   | 2702 | 417.5 | 1103 | S[634]   | 1862 | 417.5 | 1163 | S[694]    | 1022 | 417.5 |
| 984  | S[515]   | 3528 | 272.5 | 1044 | S[575]   | 2688 | 272.5 | 1104 | S[635]   | 1848 | 272.5 | 1164 | S[695]    | 1008 | 272.5 |
| 985  | S[516]   | 3514 | 417.5 | 1045 | S[576]   | 2674 | 417.5 | 1105 | S[636]   | 1834 | 417.5 | 1165 | S[696]    | 994  | 417.5 |
| 986  | S[517]   | 3500 | 272.5 | 1046 | S[577]   | 2660 | 272.5 | 1106 | S[637]   | 1820 | 272.5 | 1166 | S[697]    | 980  | 272.5 |
| 987  | S[518]   | 3486 | 417.5 | 1047 | S[578]   | 2646 | 417.5 | 1107 | S[638]   | 1806 | 417.5 | 1167 | S[698]    | 966  | 417.5 |
| 988  | S[519]   | 3472 | 272.5 | 1048 | S[579]   | 2632 | 272.5 | 1108 | S[639]   | 1792 | 272.5 | 1168 | S[699]    | 952  | 272.5 |
| 989  | S[520]   | 3458 | 417.5 | 1049 | S[580]   | 2618 | 417.5 | 1109 | S[640]   | 1778 | 417.5 | 1169 | S[700]    | 938  | 417.5 |
| 990  | S[521]   | 3444 | 272.5 | 1050 | S[581]   | 2604 | 272.5 | 1110 | S[641]   | 1764 | 272.5 | 1170 | S[701]    | 924  | 272.5 |
| 991  | S[522]   | 3430 | 417.5 | 1051 | S[582]   | 2590 | 417.5 | 1111 | S[642]   | 1750 | 417.5 | 1171 | S[702]    | 910  | 417.5 |
| 992  | S[523]   | 3416 | 272.5 | 1052 | S[583]   | 2576 | 272.5 | 1112 | S[643]   | 1736 | 272.5 | 1172 | S[703]    | 896  | 272.5 |
| 993  | S[524]   | 3402 | 417.5 | 1053 | S[584]   | 2562 | 417.5 | 1113 | S[644]   | 1722 | 417.5 | 1173 | S[704]    | 882  | 417.5 |
| 994  | S[525]   | 3388 | 272.5 | 1054 | S[585]   | 2548 | 272.5 | 1114 | S[645]   | 1708 | 272.5 | 1174 | S[705]    | 868  | 272.5 |
| 995  | S[526]   | 3374 | 417.5 | 1055 | S[586]   | 2534 | 417.5 | 1115 | S[646]   | 1694 | 417.5 | 1175 | S[706]    | 854  | 417.5 |
| 996  | S[527]   | 3360 | 272.5 | 1056 | S[587]   | 2520 | 272.5 | 1116 | S[647]   | 1680 | 272.5 | 1176 | S[707]    | 840  | 272.5 |
| 997  | S[528]   | 3346 | 417.5 | 1057 | S[588]   | 2506 | 417.5 | 1117 | S[648]   | 1666 | 417.5 | 1177 | S[708]    | 826  | 417.5 |
| 998  | S[529]   | 3332 | 272.5 | 1058 | S[589]   | 2492 | 272.5 | 1118 | S[649]   | 1652 | 272.5 | 1178 | S[709]    | 812  | 272.5 |
| 999  | S[530]   | 3318 | 417.5 | 1059 | S[590]   | 2478 | 417.5 | 1119 | S[650]   | 1638 | 417.5 | 1179 | S[710]    | 798  | 417.5 |
| 1000 | S[531]   | 3304 | 272.5 | 1060 | S[591]   | 2464 | 272.5 | 1120 | S[651]   | 1624 | 272.5 | 1180 | S[711]    | 784  | 272.5 |
| 1001 | S[532]   | 3290 | 417.5 | 1061 | S[592]   | 2450 | 417.5 | 1121 | S[652]   | 1610 | 417.5 | 1181 | S[712]    | 770  | 417.5 |
| 1002 | S[533]   | 3276 | 272.5 | 1062 | S[593]   | 2436 | 272.5 | 1122 | S[653]   | 1596 | 272.5 | 1182 | S[713]    | 756  | 272.5 |
| 1003 | S[534]   | 3262 | 417.5 | 1063 | S[594]   | 2422 | 417.5 | 1123 | S[654]   | 1582 | 417.5 | 1183 | S[714]    | 742  | 417.5 |
| 1004 | S[535]   | 3248 | 272.5 | 1064 | S[595]   | 2408 | 272.5 | 1124 | S[655]   | 1568 | 272.5 | 1184 | S[715]    | 728  | 272.5 |
| 1005 | S[536]   | 3234 | 417.5 | 1065 | S[596]   | 2394 | 417.5 | 1125 | S[656]   | 1554 | 417.5 | 1185 | S[716]    | 714  | 417.5 |
| 1006 | S[537]   | 3220 | 272.5 | 1066 | S[597]   | 2380 | 272.5 | 1126 | S[657]   | 1540 | 272.5 | 1186 | S[717]    | 700  | 272.5 |
| 1007 | S[538]   | 3206 | 417.5 | 1067 | S[598]   | 2366 | 417.5 | 1127 | S[658]   | 1526 | 417.5 | 1187 | S[718]    | 686  | 417.5 |
| 1008 | S[539]   | 3192 | 272.5 | 1068 | S[599]   | 2352 | 272.5 | 1128 | S[659]   | 1512 | 272.5 | 1188 | S[719]    | 672  | 272.5 |
| 1009 | S[540]   | 3178 | 417.5 | 1069 | S[600]   | 2338 | 417.5 | 1129 | S[660]   | 1498 | 417.5 | 1189 | S[720]    | 658  | 417.5 |
| 1010 | S[541]   | 3164 | 272.5 | 1070 | S[601]   | 2324 | 272.5 | 1130 | S[661]   | 1484 | 272.5 | 1190 | VSSIDUM9  | 644  | 272.5 |
| 1011 | S[542]   | 3150 | 417.5 | 1071 | S[602]   | 2310 | 417.5 | 1131 | S[662]   | 1470 | 417.5 | 1191 | VSSIDUM10 | 630  | 417.5 |
| 1012 | S[543]   | 3136 | 272.5 | 1072 | S[603]   | 2296 | 272.5 | 1132 | S[663]   | 1456 | 272.5 | 1192 | VSSIDUM11 | 616  | 272.5 |
| 1013 | S[544]   | 3122 | 417.5 | 1073 | S[604]   | 2282 | 417.5 | 1133 | S[664]   | 1442 | 417.5 | 1193 | VSSIDUM12 | 602  | 417.5 |
| 1014 | S[545]   | 3108 | 272.5 | 1074 | S[605]   | 2268 | 272.5 | 1134 | S[665]   | 1428 | 272.5 | 1194 | VSSIDUM13 | 588  | 272.5 |
| 1015 | S[546]   | 3094 | 417.5 | 1075 | S[606]   | 2254 | 417.5 | 1135 | S[666]   | 1414 | 417.5 | 1195 | VSSIDUM14 | 574  | 417.5 |
| 1016 | S[547]   | 3080 | 272.5 | 1076 | S[607]   | 2240 | 272.5 | 1136 | S[667]   | 1400 | 272.5 | 1196 | VSSIDUM16 | 546  | 417.5 |
| 1017 | S[548]   | 3066 | 417.5 | 1077 | S[608]   | 2226 | 417.5 | 1137 | S[668]   | 1386 | 417.5 | 1197 | VSSIDUM20 | 490  | 417.5 |
| 1018 | S[549]   | 3052 | 272.5 | 1078 | S[609]   | 2212 | 272.5 | 1138 | S[669]   | 1372 | 272.5 | 1198 | VSSIDUM21 | 476  | 272.5 |
| 1019 | S[550]   | 3038 | 417.5 | 1079 | S[610]   | 2198 | 417.5 | 1139 | S[670]   | 1358 | 417.5 | 1199 | VSSIDUM22 | 462  | 417.5 |
| 1020 | S[551]   | 3024 | 272.5 | 1080 | S[611]   | 2184 | 272.5 | 1140 | S[671]   | 1344 | 272.5 | 1200 | VSSIDUM23 | 448  | 272.5 |

| No.  | Pad Name  | X    | Y     | No.  | Pad Name | X     | Y     | No.  | Pad Name | X     | Y     | No.  | Pad Name | X     | Y     |
|------|-----------|------|-------|------|----------|-------|-------|------|----------|-------|-------|------|----------|-------|-------|
| 1201 | VSSIDUM24 | 434  | 417.5 | 1261 | S[747]   | -406  | 417.5 | 1321 | S[807]   | -1246 | 417.5 | 1381 | S[867]   | -2086 | 417.5 |
| 1202 | VSSIDUM25 | 420  | 272.5 | 1262 | S[748]   | -420  | 272.5 | 1322 | S[808]   | -1260 | 272.5 | 1382 | S[868]   | -2100 | 272.5 |
| 1203 | VSSIDUM26 | 406  | 417.5 | 1263 | S[749]   | -434  | 417.5 | 1323 | S[809]   | -1274 | 417.5 | 1383 | S[869]   | -2114 | 417.5 |
| 1204 | VSSIDUM27 | 392  | 272.5 | 1264 | S[750]   | -448  | 272.5 | 1324 | S[810]   | -1288 | 272.5 | 1384 | S[870]   | -2128 | 272.5 |
| 1205 | VSSIDUM28 | 378  | 417.5 | 1265 | S[751]   | -462  | 417.5 | 1325 | S[811]   | -1302 | 417.5 | 1385 | S[871]   | -2142 | 417.5 |
| 1206 | VSSIDUM29 | 364  | 272.5 | 1266 | S[752]   | -476  | 272.5 | 1326 | S[812]   | -1316 | 272.5 | 1386 | S[872]   | -2156 | 272.5 |
| 1207 | VSSIDUM30 | 350  | 417.5 | 1267 | S[753]   | -490  | 417.5 | 1327 | S[813]   | -1330 | 417.5 | 1387 | S[873]   | -2170 | 417.5 |
| 1208 | VSSIDUM31 | 336  | 272.5 | 1268 | S[754]   | -504  | 272.5 | 1328 | S[814]   | -1344 | 272.5 | 1388 | S[874]   | -2184 | 272.5 |
| 1209 | VSSIDUM32 | 322  | 417.5 | 1269 | S[755]   | -518  | 417.5 | 1329 | S[815]   | -1358 | 417.5 | 1389 | S[875]   | -2198 | 417.5 |
| 1210 | VSSIDUM33 | 308  | 272.5 | 1270 | S[756]   | -532  | 272.5 | 1330 | S[816]   | -1372 | 272.5 | 1390 | S[876]   | -2212 | 272.5 |
| 1211 | VSSIDUM34 | 294  | 417.5 | 1271 | S[757]   | -546  | 417.5 | 1331 | S[817]   | -1386 | 417.5 | 1391 | S[877]   | -2226 | 417.5 |
| 1212 | VSSIDUM35 | 280  | 272.5 | 1272 | S[758]   | -560  | 272.5 | 1332 | S[818]   | -1400 | 272.5 | 1392 | S[878]   | -2240 | 272.5 |
| 1213 | VSSIDUM36 | 266  | 417.5 | 1273 | S[759]   | -574  | 417.5 | 1333 | S[819]   | -1414 | 417.5 | 1393 | S[879]   | -2254 | 417.5 |
| 1214 | VSSIDUM37 | 252  | 272.5 | 1274 | S[760]   | -588  | 272.5 | 1334 | S[820]   | -1428 | 272.5 | 1394 | S[880]   | -2268 | 272.5 |
| 1215 | VSSIDUM38 | 238  | 417.5 | 1275 | S[761]   | -602  | 417.5 | 1335 | S[821]   | -1442 | 417.5 | 1395 | S[881]   | -2282 | 417.5 |
| 1216 | VSSIDUM39 | 224  | 272.5 | 1276 | S[762]   | -616  | 272.5 | 1336 | S[822]   | -1456 | 272.5 | 1396 | S[882]   | -2296 | 272.5 |
| 1217 | VSSIDUM40 | 210  | 417.5 | 1277 | S[763]   | -630  | 417.5 | 1337 | S[823]   | -1470 | 417.5 | 1397 | S[883]   | -2310 | 417.5 |
| 1218 | VSSIDUM41 | 196  | 272.5 | 1278 | S[764]   | -644  | 272.5 | 1338 | S[824]   | -1484 | 272.5 | 1398 | S[884]   | -2324 | 272.5 |
| 1219 | VSSIDUM42 | 182  | 417.5 | 1279 | S[765]   | -658  | 417.5 | 1339 | S[825]   | -1498 | 417.5 | 1399 | S[885]   | -2338 | 417.5 |
| 1220 | VSSIDUM43 | 168  | 272.5 | 1280 | S[766]   | -672  | 272.5 | 1340 | S[826]   | -1512 | 272.5 | 1400 | S[886]   | -2352 | 272.5 |
| 1221 | VSSIDUM44 | 154  | 417.5 | 1281 | S[767]   | -686  | 417.5 | 1341 | S[827]   | -1526 | 417.5 | 1401 | S[887]   | -2366 | 417.5 |
| 1222 | VSSIDUM45 | 140  | 272.5 | 1282 | S[768]   | -700  | 272.5 | 1342 | S[828]   | -1540 | 272.5 | 1402 | S[888]   | -2380 | 272.5 |
| 1223 | VSSIDUM46 | 126  | 417.5 | 1283 | S[769]   | -714  | 417.5 | 1343 | S[829]   | -1554 | 417.5 | 1403 | S[889]   | -2394 | 417.5 |
| 1224 | VSSIDUM47 | 112  | 272.5 | 1284 | S[770]   | -728  | 272.5 | 1344 | S[830]   | -1568 | 272.5 | 1404 | S[890]   | -2408 | 272.5 |
| 1225 | VSSIDUM48 | 98   | 417.5 | 1285 | S[771]   | -742  | 417.5 | 1345 | S[831]   | -1582 | 417.5 | 1405 | S[891]   | -2422 | 417.5 |
| 1226 | VSSIDUM49 | 84   | 272.5 | 1286 | S[772]   | -756  | 272.5 | 1346 | S[832]   | -1596 | 272.5 | 1406 | S[892]   | -2436 | 272.5 |
| 1227 | VSSIDUM50 | 70   | 417.5 | 1287 | S[773]   | -770  | 417.5 | 1347 | S[833]   | -1610 | 417.5 | 1407 | S[893]   | -2450 | 417.5 |
| 1228 | VSSIDUM51 | 56   | 272.5 | 1288 | S[774]   | -784  | 272.5 | 1348 | S[834]   | -1624 | 272.5 | 1408 | S[894]   | -2464 | 272.5 |
| 1229 | VSSIDUM52 | 42   | 417.5 | 1289 | S[775]   | -798  | 417.5 | 1349 | S[835]   | -1638 | 417.5 | 1409 | S[895]   | -2478 | 417.5 |
| 1230 | VSSIDUM53 | 28   | 272.5 | 1290 | S[776]   | -812  | 272.5 | 1350 | S[836]   | -1652 | 272.5 | 1410 | S[896]   | -2492 | 272.5 |
| 1231 | VSSIDUM54 | 14   | 417.5 | 1291 | S[777]   | -826  | 417.5 | 1351 | S[837]   | -1666 | 417.5 | 1411 | S[897]   | -2506 | 417.5 |
| 1232 | VSSIDUM55 | 0    | 272.5 | 1292 | S[778]   | -840  | 272.5 | 1352 | S[838]   | -1680 | 272.5 | 1412 | S[898]   | -2520 | 272.5 |
| 1233 | VSSIDUM56 | -14  | 417.5 | 1293 | S[779]   | -854  | 417.5 | 1353 | S[839]   | -1694 | 417.5 | 1413 | S[899]   | -2534 | 417.5 |
| 1234 | VSSIDUM57 | -28  | 272.5 | 1294 | S[780]   | -868  | 272.5 | 1354 | S[840]   | -1708 | 272.5 | 1414 | S[900]   | -2548 | 272.5 |
| 1235 | S[721]    | -42  | 417.5 | 1295 | S[781]   | -882  | 417.5 | 1355 | S[841]   | -1722 | 417.5 | 1415 | S[901]   | -2562 | 417.5 |
| 1236 | S[722]    | -56  | 272.5 | 1296 | S[782]   | -896  | 272.5 | 1356 | S[842]   | -1736 | 272.5 | 1416 | S[902]   | -2576 | 272.5 |
| 1237 | S[723]    | -70  | 417.5 | 1297 | S[783]   | -910  | 417.5 | 1357 | S[843]   | -1750 | 417.5 | 1417 | S[903]   | -2590 | 417.5 |
| 1238 | S[724]    | -84  | 272.5 | 1298 | S[784]   | -924  | 272.5 | 1358 | S[844]   | -1764 | 272.5 | 1418 | S[904]   | -2604 | 272.5 |
| 1239 | S[725]    | -98  | 417.5 | 1299 | S[785]   | -938  | 417.5 | 1359 | S[845]   | -1778 | 417.5 | 1419 | S[905]   | -2618 | 417.5 |
| 1240 | S[726]    | -112 | 272.5 | 1300 | S[786]   | -952  | 272.5 | 1360 | S[846]   | -1792 | 272.5 | 1420 | S[906]   | -2632 | 272.5 |
| 1241 | S[727]    | -126 | 417.5 | 1301 | S[787]   | -966  | 417.5 | 1361 | S[847]   | -1806 | 417.5 | 1421 | S[907]   | -2646 | 417.5 |
| 1242 | S[728]    | -140 | 272.5 | 1302 | S[788]   | -980  | 272.5 | 1362 | S[848]   | -1820 | 272.5 | 1422 | S[908]   | -2660 | 272.5 |
| 1243 | S[729]    | -154 | 417.5 | 1303 | S[789]   | -994  | 417.5 | 1363 | S[849]   | -1834 | 417.5 | 1423 | S[909]   | -2674 | 417.5 |
| 1244 | S[730]    | -168 | 272.5 | 1304 | S[790]   | -1008 | 272.5 | 1364 | S[850]   | -1848 | 272.5 | 1424 | S[910]   | -2688 | 272.5 |
| 1245 | S[731]    | -182 | 417.5 | 1305 | S[791]   | -1022 | 417.5 | 1365 | S[851]   | -1862 | 417.5 | 1425 | S[911]   | -2702 | 417.5 |
| 1246 | S[732]    | -196 | 272.5 | 1306 | S[792]   | -1036 | 272.5 | 1366 | S[852]   | -1876 | 272.5 | 1426 | S[912]   | -2716 | 272.5 |
| 1247 | S[733]    | -210 | 417.5 | 1307 | S[793]   | -1050 | 417.5 | 1367 | S[853]   | -1890 | 417.5 | 1427 | S[913]   | -2730 | 417.5 |
| 1248 | S[734]    | -224 | 272.5 | 1308 | S[794]   | -1064 | 272.5 | 1368 | S[854]   | -1904 | 272.5 | 1428 | S[914]   | -2744 | 272.5 |
| 1249 | S[735]    | -238 | 417.5 | 1309 | S[795]   | -1078 | 417.5 | 1369 | S[855]   | -1918 | 417.5 | 1429 | S[915]   | -2758 | 417.5 |
| 1250 | S[736]    | -252 | 272.5 | 1310 | S[796]   | -1092 | 272.5 | 1370 | S[856]   | -1932 | 272.5 | 1430 | S[916]   | -2772 | 272.5 |
| 1251 | S[737]    | -266 | 417.5 | 1311 | S[797]   | -1106 | 417.5 | 1371 | S[857]   | -1946 | 417.5 | 1431 | S[917]   | -2786 | 417.5 |
| 1252 | S[738]    | -280 | 272.5 | 1312 | S[798]   | -1120 | 272.5 | 1372 | S[858]   | -1960 | 272.5 | 1432 | S[918]   | -2800 | 272.5 |
| 1253 | S[739]    | -294 | 417.5 | 1313 | S[799]   | -1134 | 417.5 | 1373 | S[859]   | -1974 | 417.5 | 1433 | S[919]   | -2814 | 417.5 |
| 1254 | S[740]    | -308 | 272.5 | 1314 | S[800]   | -1148 | 272.5 | 1374 | S[860]   | -1988 | 272.5 | 1434 | S[920]   | -2828 | 272.5 |
| 1255 | S[741]    | -322 | 417.5 | 1315 | S[801]   | -1162 | 417.5 | 1375 | S[861]   | -2002 | 417.5 | 1435 | S[921]   | -2842 | 417.5 |
| 1256 | S[742]    | -336 | 272.5 | 1316 | S[802]   | -1176 | 272.5 | 1376 | S[862]   | -2016 | 272.5 | 1436 | S[922]   | -2856 | 272.5 |
| 1257 | S[743]    | -350 | 417.5 | 1317 | S[803]   | -1190 | 417.5 | 1377 | S[863]   | -2030 | 417.5 | 1437 | S[923]   | -2870 | 417.5 |
| 1258 | S[744]    | -364 | 272.5 | 1318 | S[804]   | -1204 | 272.5 | 1378 | S[864]   | -2044 | 272.5 | 1438 | S[924]   | -2884 | 272.5 |
| 1259 | S[745]    | -378 | 417.5 | 1319 | S[805]   | -1218 | 417.5 | 1379 | S[865]   | -2058 | 417.5 | 1439 | S[925]   | -2898 | 417.5 |
| 1260 | S[746]    | -392 | 272.5 | 1320 | S[806]   | -1232 | 272.5 | 1380 | S[866]   | -2072 | 272.5 | 1440 | S[926]   | -2912 | 272.5 |

| No.  | Pad Name | X     | Y     | No.  | Pad Name | X     | Y     | No.  | Pad Name | X     | Y     | No.  | Pad Name | X     | Y     |
|------|----------|-------|-------|------|----------|-------|-------|------|----------|-------|-------|------|----------|-------|-------|
| 1441 | S[927]   | -2926 | 417.5 | 1501 | S[987]   | -3766 | 417.5 | 1561 | S[1047]  | -4606 | 417.5 | 1621 | S[1107]  | -5446 | 417.5 |
| 1442 | S[928]   | -2940 | 272.5 | 1502 | S[988]   | -3780 | 272.5 | 1562 | S[1048]  | -4620 | 272.5 | 1622 | S[1108]  | -5460 | 272.5 |
| 1443 | S[929]   | -2954 | 417.5 | 1503 | S[989]   | -3794 | 417.5 | 1563 | S[1049]  | -4634 | 417.5 | 1623 | S[1109]  | -5474 | 417.5 |
| 1444 | S[930]   | -2968 | 272.5 | 1504 | S[990]   | -3808 | 272.5 | 1564 | S[1050]  | -4648 | 272.5 | 1624 | S[1110]  | -5488 | 272.5 |
| 1445 | S[931]   | -2982 | 417.5 | 1505 | S[991]   | -3822 | 417.5 | 1565 | S[1051]  | -4662 | 417.5 | 1625 | S[1111]  | -5502 | 417.5 |
| 1446 | S[932]   | -2996 | 272.5 | 1506 | S[992]   | -3836 | 272.5 | 1566 | S[1052]  | -4676 | 272.5 | 1626 | S[1112]  | -5516 | 272.5 |
| 1447 | S[933]   | -3010 | 417.5 | 1507 | S[993]   | -3850 | 417.5 | 1567 | S[1053]  | -4690 | 417.5 | 1627 | S[1113]  | -5530 | 417.5 |
| 1448 | S[934]   | -3024 | 272.5 | 1508 | S[994]   | -3864 | 272.5 | 1568 | S[1054]  | -4704 | 272.5 | 1628 | S[1114]  | -5544 | 272.5 |
| 1449 | S[935]   | -3038 | 417.5 | 1509 | S[995]   | -3878 | 417.5 | 1569 | S[1055]  | -4718 | 417.5 | 1629 | S[1115]  | -5558 | 417.5 |
| 1450 | S[936]   | -3052 | 272.5 | 1510 | S[996]   | -3892 | 272.5 | 1570 | S[1056]  | -4732 | 272.5 | 1630 | S[1116]  | -5572 | 272.5 |
| 1451 | S[937]   | -3066 | 417.5 | 1511 | S[997]   | -3906 | 417.5 | 1571 | S[1057]  | -4746 | 417.5 | 1631 | S[1117]  | -5586 | 417.5 |
| 1452 | S[938]   | -3080 | 272.5 | 1512 | S[998]   | -3920 | 272.5 | 1572 | S[1058]  | -4760 | 272.5 | 1632 | S[1118]  | -5600 | 272.5 |
| 1453 | S[939]   | -3094 | 417.5 | 1513 | S[999]   | -3934 | 417.5 | 1573 | S[1059]  | -4774 | 417.5 | 1633 | S[1119]  | -5614 | 417.5 |
| 1454 | S[940]   | -3108 | 272.5 | 1514 | S[1000]  | -3948 | 272.5 | 1574 | S[1060]  | -4788 | 272.5 | 1634 | S[1120]  | -5628 | 272.5 |
| 1455 | S[941]   | -3122 | 417.5 | 1515 | S[1001]  | -3962 | 417.5 | 1575 | S[1061]  | -4802 | 417.5 | 1635 | S[1121]  | -5642 | 417.5 |
| 1456 | S[942]   | -3136 | 272.5 | 1516 | S[1002]  | -3976 | 272.5 | 1576 | S[1062]  | -4816 | 272.5 | 1636 | S[1122]  | -5656 | 272.5 |
| 1457 | S[943]   | -3150 | 417.5 | 1517 | S[1003]  | -3990 | 417.5 | 1577 | S[1063]  | -4830 | 417.5 | 1637 | S[1123]  | -5670 | 417.5 |
| 1458 | S[944]   | -3164 | 272.5 | 1518 | S[1004]  | -4004 | 272.5 | 1578 | S[1064]  | -4844 | 272.5 | 1638 | S[1124]  | -5684 | 272.5 |
| 1459 | S[945]   | -3178 | 417.5 | 1519 | S[1005]  | -4018 | 417.5 | 1579 | S[1065]  | -4858 | 417.5 | 1639 | S[1125]  | -5698 | 417.5 |
| 1460 | S[946]   | -3192 | 272.5 | 1520 | S[1006]  | -4032 | 272.5 | 1580 | S[1066]  | -4872 | 272.5 | 1640 | S[1126]  | -5712 | 272.5 |
| 1461 | S[947]   | -3206 | 417.5 | 1521 | S[1007]  | -4046 | 417.5 | 1581 | S[1067]  | -4886 | 417.5 | 1641 | S[1127]  | -5726 | 417.5 |
| 1462 | S[948]   | -3220 | 272.5 | 1522 | S[1008]  | -4060 | 272.5 | 1582 | S[1068]  | -4900 | 272.5 | 1642 | S[1128]  | -5740 | 272.5 |
| 1463 | S[949]   | -3234 | 417.5 | 1523 | S[1009]  | -4074 | 417.5 | 1583 | S[1069]  | -4914 | 417.5 | 1643 | S[1129]  | -5754 | 417.5 |
| 1464 | S[950]   | -3248 | 272.5 | 1524 | S[1010]  | -4088 | 272.5 | 1584 | S[1070]  | -4928 | 272.5 | 1644 | S[1130]  | -5768 | 272.5 |
| 1465 | S[951]   | -3262 | 417.5 | 1525 | S[1011]  | -4102 | 417.5 | 1585 | S[1071]  | -4942 | 417.5 | 1645 | S[1131]  | -5782 | 417.5 |
| 1466 | S[952]   | -3276 | 272.5 | 1526 | S[1012]  | -4116 | 272.5 | 1586 | S[1072]  | -4956 | 272.5 | 1646 | S[1132]  | -5796 | 272.5 |
| 1467 | S[953]   | -3290 | 417.5 | 1527 | S[1013]  | -4130 | 417.5 | 1587 | S[1073]  | -4970 | 417.5 | 1647 | S[1133]  | -5810 | 417.5 |
| 1468 | S[954]   | -3304 | 272.5 | 1528 | S[1014]  | -4144 | 272.5 | 1588 | S[1074]  | -4984 | 272.5 | 1648 | S[1134]  | -5824 | 272.5 |
| 1469 | S[955]   | -3318 | 417.5 | 1529 | S[1015]  | -4158 | 417.5 | 1589 | S[1075]  | -4998 | 417.5 | 1649 | S[1135]  | -5838 | 417.5 |
| 1470 | S[956]   | -3332 | 272.5 | 1530 | S[1016]  | -4172 | 272.5 | 1590 | S[1076]  | -5012 | 272.5 | 1650 | S[1136]  | -5852 | 272.5 |
| 1471 | S[957]   | -3346 | 417.5 | 1531 | S[1017]  | -4186 | 417.5 | 1591 | S[1077]  | -5026 | 417.5 | 1651 | S[1137]  | -5866 | 417.5 |
| 1472 | S[958]   | -3360 | 272.5 | 1532 | S[1018]  | -4200 | 272.5 | 1592 | S[1078]  | -5040 | 272.5 | 1652 | S[1138]  | -5880 | 272.5 |
| 1473 | S[959]   | -3374 | 417.5 | 1533 | S[1019]  | -4214 | 417.5 | 1593 | S[1079]  | -5054 | 417.5 | 1653 | S[1139]  | -5894 | 417.5 |
| 1474 | S[960]   | -3388 | 272.5 | 1534 | S[1020]  | -4228 | 272.5 | 1594 | S[1080]  | -5068 | 272.5 | 1654 | S[1140]  | -5908 | 272.5 |
| 1475 | S[961]   | -3402 | 417.5 | 1535 | S[1021]  | -4242 | 417.5 | 1595 | S[1081]  | -5082 | 417.5 | 1655 | S[1141]  | -5922 | 417.5 |
| 1476 | S[962]   | -3416 | 272.5 | 1536 | S[1022]  | -4256 | 272.5 | 1596 | S[1082]  | -5096 | 272.5 | 1656 | S[1142]  | -5936 | 272.5 |
| 1477 | S[963]   | -3430 | 417.5 | 1537 | S[1023]  | -4270 | 417.5 | 1597 | S[1083]  | -5110 | 417.5 | 1657 | S[1143]  | -5950 | 417.5 |
| 1478 | S[964]   | -3444 | 272.5 | 1538 | S[1024]  | -4284 | 272.5 | 1598 | S[1084]  | -5124 | 272.5 | 1658 | S[1144]  | -5964 | 272.5 |
| 1479 | S[965]   | -3458 | 417.5 | 1539 | S[1025]  | -4298 | 417.5 | 1599 | S[1085]  | -5138 | 417.5 | 1659 | S[1145]  | -5978 | 417.5 |
| 1480 | S[966]   | -3472 | 272.5 | 1540 | S[1026]  | -4312 | 272.5 | 1600 | S[1086]  | -5152 | 272.5 | 1660 | S[1146]  | -5992 | 272.5 |
| 1481 | S[967]   | -3486 | 417.5 | 1541 | S[1027]  | -4326 | 417.5 | 1601 | S[1087]  | -5166 | 417.5 | 1661 | S[1147]  | -6006 | 417.5 |
| 1482 | S[968]   | -3500 | 272.5 | 1542 | S[1028]  | -4340 | 272.5 | 1602 | S[1088]  | -5180 | 272.5 | 1662 | S[1148]  | -6020 | 272.5 |
| 1483 | S[969]   | -3514 | 417.5 | 1543 | S[1029]  | -4354 | 417.5 | 1603 | S[1089]  | -5194 | 417.5 | 1663 | S[1149]  | -6034 | 417.5 |
| 1484 | S[970]   | -3528 | 272.5 | 1544 | S[1030]  | -4368 | 272.5 | 1604 | S[1090]  | -5208 | 272.5 | 1664 | S[1150]  | -6048 | 272.5 |
| 1485 | S[971]   | -3542 | 417.5 | 1545 | S[1031]  | -4382 | 417.5 | 1605 | S[1091]  | -5222 | 417.5 | 1665 | S[1151]  | -6062 | 417.5 |
| 1486 | S[972]   | -3556 | 272.5 | 1546 | S[1032]  | -4396 | 272.5 | 1606 | S[1092]  | -5236 | 272.5 | 1666 | S[1152]  | -6076 | 272.5 |
| 1487 | S[973]   | -3570 | 417.5 | 1547 | S[1033]  | -4410 | 417.5 | 1607 | S[1093]  | -5250 | 417.5 | 1667 | S[1153]  | -6090 | 417.5 |
| 1488 | S[974]   | -3584 | 272.5 | 1548 | S[1034]  | -4424 | 272.5 | 1608 | S[1094]  | -5264 | 272.5 | 1668 | S[1154]  | -6104 | 272.5 |
| 1489 | S[975]   | -3598 | 417.5 | 1549 | S[1035]  | -4438 | 417.5 | 1609 | S[1095]  | -5278 | 417.5 | 1669 | S[1155]  | -6118 | 417.5 |
| 1490 | S[976]   | -3612 | 272.5 | 1550 | S[1036]  | -4452 | 272.5 | 1610 | S[1096]  | -5292 | 272.5 | 1670 | S[1156]  | -6132 | 272.5 |
| 1491 | S[977]   | -3626 | 417.5 | 1551 | S[1037]  | -4466 | 417.5 | 1611 | S[1097]  | -5306 | 417.5 | 1671 | S[1157]  | -6146 | 417.5 |
| 1492 | S[978]   | -3640 | 272.5 | 1552 | S[1038]  | -4480 | 272.5 | 1612 | S[1098]  | -5320 | 272.5 | 1672 | S[1158]  | -6160 | 272.5 |
| 1493 | S[979]   | -3654 | 417.5 | 1553 | S[1039]  | -4494 | 417.5 | 1613 | S[1099]  | -5334 | 417.5 | 1673 | S[1159]  | -6174 | 417.5 |
| 1494 | S[980]   | -3668 | 272.5 | 1554 | S[1040]  | -4508 | 272.5 | 1614 | S[1100]  | -5348 | 272.5 | 1674 | S[1160]  | -6188 | 272.5 |
| 1495 | S[981]   | -3682 | 417.5 | 1555 | S[1041]  | -4522 | 417.5 | 1615 | S[1101]  | -5362 | 417.5 | 1675 | S[1161]  | -6202 | 417.5 |
| 1496 | S[982]   | -3696 | 272.5 | 1556 | S[1042]  | -4536 | 272.5 | 1616 | S[1102]  | -5376 | 272.5 | 1676 | S[1162]  | -6216 | 272.5 |
| 1497 | S[983]   | -3710 | 417.5 | 1557 | S[1043]  | -4550 | 417.5 | 1617 | S[1103]  | -5390 | 417.5 | 1677 | S[1163]  | -6230 | 417.5 |
| 1498 | S[984]   | -3724 | 272.5 | 1558 | S[1044]  | -4564 | 272.5 | 1618 | S[1104]  | -5404 | 272.5 | 1678 | S[1164]  | -6244 | 272.5 |
| 1499 | S[985]   | -3738 | 417.5 | 1559 | S[1045]  | -4578 | 417.5 | 1619 | S[1105]  | -5418 | 417.5 | 1679 | S[1165]  | -6258 | 417.5 |
| 1500 | S[986]   | -3752 | 272.5 | 1560 | S[1046]  | -4592 | 272.5 | 1620 | S[1106]  | -5432 | 272.5 | 1680 | S[1166]  | -6272 | 272.5 |

| No.  | Pad Name | X     | Y     | No.  | Pad Name | X     | Y     | No.  | Pad Name | X     | Y     | No.  | Pad Name | X     | Y     |
|------|----------|-------|-------|------|----------|-------|-------|------|----------|-------|-------|------|----------|-------|-------|
| 1681 | S[1167]  | -6286 | 417.5 | 1741 | S[1227]  | -7126 | 417.5 | 1801 | S[1287]  | -7966 | 417.5 | 1861 | S[1347]  | -8806 | 417.5 |
| 1682 | S[1168]  | -6300 | 272.5 | 1742 | S[1228]  | -7140 | 272.5 | 1802 | S[1288]  | -7980 | 272.5 | 1862 | S[1348]  | -8820 | 272.5 |
| 1683 | S[1169]  | -6314 | 417.5 | 1743 | S[1229]  | -7154 | 417.5 | 1803 | S[1289]  | -7994 | 417.5 | 1863 | S[1349]  | -8834 | 417.5 |
| 1684 | S[1170]  | -6328 | 272.5 | 1744 | S[1230]  | -7168 | 272.5 | 1804 | S[1290]  | -8008 | 272.5 | 1864 | S[1350]  | -8848 | 272.5 |
| 1685 | S[1171]  | -6342 | 417.5 | 1745 | S[1231]  | -7182 | 417.5 | 1805 | S[1291]  | -8022 | 417.5 | 1865 | S[1351]  | -8862 | 417.5 |
| 1686 | S[1172]  | -6356 | 272.5 | 1746 | S[1232]  | -7196 | 272.5 | 1806 | S[1292]  | -8036 | 272.5 | 1866 | S[1352]  | -8876 | 272.5 |
| 1687 | S[1173]  | -6370 | 417.5 | 1747 | S[1233]  | -7210 | 417.5 | 1807 | S[1293]  | -8050 | 417.5 | 1867 | S[1353]  | -8890 | 417.5 |
| 1688 | S[1174]  | -6384 | 272.5 | 1748 | S[1234]  | -7224 | 272.5 | 1808 | S[1294]  | -8064 | 272.5 | 1868 | S[1354]  | -8904 | 272.5 |
| 1689 | S[1175]  | -6398 | 417.5 | 1749 | S[1235]  | -7238 | 417.5 | 1809 | S[1295]  | -8078 | 417.5 | 1869 | S[1355]  | -8918 | 417.5 |
| 1690 | S[1176]  | -6412 | 272.5 | 1750 | S[1236]  | -7252 | 272.5 | 1810 | S[1296]  | -8092 | 272.5 | 1870 | S[1356]  | -8932 | 272.5 |
| 1691 | S[1177]  | -6426 | 417.5 | 1751 | S[1237]  | -7266 | 417.5 | 1811 | S[1297]  | -8106 | 417.5 | 1871 | S[1357]  | -8946 | 417.5 |
| 1692 | S[1178]  | -6440 | 272.5 | 1752 | S[1238]  | -7280 | 272.5 | 1812 | S[1298]  | -8120 | 272.5 | 1872 | S[1358]  | -8960 | 272.5 |
| 1693 | S[1179]  | -6454 | 417.5 | 1753 | S[1239]  | -7294 | 417.5 | 1813 | S[1299]  | -8134 | 417.5 | 1873 | S[1359]  | -8974 | 417.5 |
| 1694 | S[1180]  | -6468 | 272.5 | 1754 | S[1240]  | -7308 | 272.5 | 1814 | S[1300]  | -8148 | 272.5 | 1874 | S[1360]  | -8988 | 272.5 |
| 1695 | S[1181]  | -6482 | 417.5 | 1755 | S[1241]  | -7322 | 417.5 | 1815 | S[1301]  | -8162 | 417.5 | 1875 | S[1361]  | -9002 | 417.5 |
| 1696 | S[1182]  | -6496 | 272.5 | 1756 | S[1242]  | -7336 | 272.5 | 1816 | S[1302]  | -8176 | 272.5 | 1876 | S[1362]  | -9016 | 272.5 |
| 1697 | S[1183]  | -6510 | 417.5 | 1757 | S[1243]  | -7350 | 417.5 | 1817 | S[1303]  | -8190 | 417.5 | 1877 | S[1363]  | -9030 | 417.5 |
| 1698 | S[1184]  | -6524 | 272.5 | 1758 | S[1244]  | -7364 | 272.5 | 1818 | S[1304]  | -8204 | 272.5 | 1878 | S[1364]  | -9044 | 272.5 |
| 1699 | S[1185]  | -6538 | 417.5 | 1759 | S[1245]  | -7378 | 417.5 | 1819 | S[1305]  | -8218 | 417.5 | 1879 | S[1365]  | -9058 | 417.5 |
| 1700 | S[1186]  | -6552 | 272.5 | 1760 | S[1246]  | -7392 | 272.5 | 1820 | S[1306]  | -8232 | 272.5 | 1880 | S[1366]  | -9072 | 272.5 |
| 1701 | S[1187]  | -6566 | 417.5 | 1761 | S[1247]  | -7406 | 417.5 | 1821 | S[1307]  | -8246 | 417.5 | 1881 | S[1367]  | -9086 | 417.5 |
| 1702 | S[1188]  | -6580 | 272.5 | 1762 | S[1248]  | -7420 | 272.5 | 1822 | S[1308]  | -8260 | 272.5 | 1882 | S[1368]  | -9100 | 272.5 |
| 1703 | S[1189]  | -6594 | 417.5 | 1763 | S[1249]  | -7434 | 417.5 | 1823 | S[1309]  | -8274 | 417.5 | 1883 | S[1369]  | -9114 | 417.5 |
| 1704 | S[1190]  | -6608 | 272.5 | 1764 | S[1250]  | -7448 | 272.5 | 1824 | S[1310]  | -8288 | 272.5 | 1884 | S[1370]  | -9128 | 272.5 |
| 1705 | S[1191]  | -6622 | 417.5 | 1765 | S[1251]  | -7462 | 417.5 | 1825 | S[1311]  | -8302 | 417.5 | 1885 | S[1371]  | -9142 | 417.5 |
| 1706 | S[1192]  | -6636 | 272.5 | 1766 | S[1252]  | -7476 | 272.5 | 1826 | S[1312]  | -8316 | 272.5 | 1886 | S[1372]  | -9156 | 272.5 |
| 1707 | S[1193]  | -6650 | 417.5 | 1767 | S[1253]  | -7490 | 417.5 | 1827 | S[1313]  | -8330 | 417.5 | 1887 | S[1373]  | -9170 | 417.5 |
| 1708 | S[1194]  | -6664 | 272.5 | 1768 | S[1254]  | -7504 | 272.5 | 1828 | S[1314]  | -8344 | 272.5 | 1888 | S[1374]  | -9184 | 272.5 |
| 1709 | S[1195]  | -6678 | 417.5 | 1769 | S[1255]  | -7518 | 417.5 | 1829 | S[1315]  | -8358 | 417.5 | 1889 | S[1375]  | -9198 | 417.5 |
| 1710 | S[1196]  | -6692 | 272.5 | 1770 | S[1256]  | -7532 | 272.5 | 1830 | S[1316]  | -8372 | 272.5 | 1890 | S[1376]  | -9212 | 272.5 |
| 1711 | S[1197]  | -6706 | 417.5 | 1771 | S[1257]  | -7546 | 417.5 | 1831 | S[1317]  | -8386 | 417.5 | 1891 | S[1377]  | -9226 | 417.5 |
| 1712 | S[1198]  | -6720 | 272.5 | 1772 | S[1258]  | -7560 | 272.5 | 1832 | S[1318]  | -8400 | 272.5 | 1892 | S[1378]  | -9240 | 272.5 |
| 1713 | S[1199]  | -6734 | 417.5 | 1773 | S[1259]  | -7574 | 417.5 | 1833 | S[1319]  | -8414 | 417.5 | 1893 | S[1379]  | -9254 | 417.5 |
| 1714 | S[1200]  | -6748 | 272.5 | 1774 | S[1260]  | -7588 | 272.5 | 1834 | S[1320]  | -8428 | 272.5 | 1894 | S[1380]  | -9268 | 272.5 |
| 1715 | S[1201]  | -6762 | 417.5 | 1775 | S[1261]  | -7602 | 417.5 | 1835 | S[1321]  | -8442 | 417.5 | 1895 | S[1381]  | -9282 | 417.5 |
| 1716 | S[1202]  | -6776 | 272.5 | 1776 | S[1262]  | -7616 | 272.5 | 1836 | S[1322]  | -8456 | 272.5 | 1896 | S[1382]  | -9296 | 272.5 |
| 1717 | S[1203]  | -6790 | 417.5 | 1777 | S[1263]  | -7630 | 417.5 | 1837 | S[1323]  | -8470 | 417.5 | 1897 | S[1383]  | -9310 | 417.5 |
| 1718 | S[1204]  | -6804 | 272.5 | 1778 | S[1264]  | -7644 | 272.5 | 1838 | S[1324]  | -8484 | 272.5 | 1898 | S[1384]  | -9324 | 272.5 |
| 1719 | S[1205]  | -6818 | 417.5 | 1779 | S[1265]  | -7658 | 417.5 | 1839 | S[1325]  | -8498 | 417.5 | 1899 | S[1385]  | -9338 | 417.5 |
| 1720 | S[1206]  | -6832 | 272.5 | 1780 | S[1266]  | -7672 | 272.5 | 1840 | S[1326]  | -8512 | 272.5 | 1900 | S[1386]  | -9352 | 272.5 |
| 1721 | S[1207]  | -6846 | 417.5 | 1781 | S[1267]  | -7686 | 417.5 | 1841 | S[1327]  | -8526 | 417.5 | 1901 | S[1387]  | -9366 | 417.5 |
| 1722 | S[1208]  | -6860 | 272.5 | 1782 | S[1268]  | -7700 | 272.5 | 1842 | S[1328]  | -8540 | 272.5 | 1902 | S[1388]  | -9380 | 272.5 |
| 1723 | S[1209]  | -6874 | 417.5 | 1783 | S[1269]  | -7714 | 417.5 | 1843 | S[1329]  | -8554 | 417.5 | 1903 | S[1389]  | -9394 | 417.5 |
| 1724 | S[1210]  | -6888 | 272.5 | 1784 | S[1270]  | -7728 | 272.5 | 1844 | S[1330]  | -8568 | 272.5 | 1904 | S[1390]  | -9408 | 272.5 |
| 1725 | S[1211]  | -6902 | 417.5 | 1785 | S[1271]  | -7742 | 417.5 | 1845 | S[1331]  | -8582 | 417.5 | 1905 | S[1391]  | -9422 | 417.5 |
| 1726 | S[1212]  | -6916 | 272.5 | 1786 | S[1272]  | -7756 | 272.5 | 1846 | S[1332]  | -8596 | 272.5 | 1906 | S[1392]  | -9436 | 272.5 |
| 1727 | S[1213]  | -6930 | 417.5 | 1787 | S[1273]  | -7770 | 417.5 | 1847 | S[1333]  | -8610 | 417.5 | 1907 | S[1393]  | -9450 | 417.5 |
| 1728 | S[1214]  | -6944 | 272.5 | 1788 | S[1274]  | -7784 | 272.5 | 1848 | S[1334]  | -8624 | 272.5 | 1908 | S[1394]  | -9464 | 272.5 |
| 1729 | S[1215]  | -6958 | 417.5 | 1789 | S[1275]  | -7798 | 417.5 | 1849 | S[1335]  | -8638 | 417.5 | 1909 | S[1395]  | -9478 | 417.5 |
| 1730 | S[1216]  | -6972 | 272.5 | 1790 | S[1276]  | -7812 | 272.5 | 1850 | S[1336]  | -8652 | 272.5 | 1910 | S[1396]  | -9492 | 272.5 |
| 1731 | S[1217]  | -6986 | 417.5 | 1791 | S[1277]  | -7826 | 417.5 | 1851 | S[1337]  | -8666 | 417.5 | 1911 | S[1397]  | -9506 | 417.5 |
| 1732 | S[1218]  | -7000 | 272.5 | 1792 | S[1278]  | -7840 | 272.5 | 1852 | S[1338]  | -8680 | 272.5 | 1912 | S[1398]  | -9520 | 272.5 |
| 1733 | S[1219]  | -7014 | 417.5 | 1793 | S[1279]  | -7854 | 417.5 | 1853 | S[1339]  | -8694 | 417.5 | 1913 | S[1399]  | -9534 | 417.5 |
| 1734 | S[1220]  | -7028 | 272.5 | 1794 | S[1280]  | -7868 | 272.5 | 1854 | S[1340]  | -8708 | 272.5 | 1914 | S[1400]  | -9548 | 272.5 |
| 1735 | S[1221]  | -7042 | 417.5 | 1795 | S[1281]  | -7882 | 417.5 | 1855 | S[1341]  | -8722 | 417.5 | 1915 | S[1401]  | -9562 | 417.5 |
| 1736 | S[1222]  | -7056 | 272.5 | 1796 | S[1282]  | -7896 | 272.5 | 1856 | S[1342]  | -8736 | 272.5 | 1916 | S[1402]  | -9576 | 272.5 |
| 1737 | S[1223]  | -7070 | 417.5 | 1797 | S[1283]  | -7910 | 417.5 | 1857 | S[1343]  | -8750 | 417.5 | 1917 | S[1403]  | -9590 | 417.5 |
| 1738 | S[1224]  | -7084 | 272.5 | 1798 | S[1284]  | -7924 | 272.5 | 1858 | S[1344]  | -8764 | 272.5 | 1918 | S[1404]  | -9604 | 272.5 |
| 1739 | S[1225]  | -7098 | 417.5 | 1799 | S[1285]  | -7938 | 417.5 | 1859 | S[1345]  | -8778 | 417.5 | 1919 | S[1405]  | -9618 | 417.5 |
| 1740 | S[1226]  | -7112 | 272.5 | 1800 | S[1286]  | -7952 | 272.5 | 1860 | S[1346]  | -8792 | 272.5 | 1920 | S[1406]  | -9632 | 272.5 |



| No.  | Pad Name  | X      | Y     | No.  | Pad Name   | X      | Y     | No.            | Pad Name   | X      | Y     | No. | Pad Name | X | Y |
|------|-----------|--------|-------|------|------------|--------|-------|----------------|------------|--------|-------|-----|----------|---|---|
| 1921 | S[1407]   | -9646  | 417.5 | 1981 | VSSIDUM65  | -10486 | 417.5 | 2041           | GOUT[27]   | -11326 | 417.5 |     |          |   |   |
| 1922 | S[1408]   | -9660  | 272.5 | 1982 | VSSIDUM66  | -10500 | 272.5 | 2042           | GOUT[28]   | -11340 | 272.5 |     |          |   |   |
| 1923 | S[1409]   | -9674  | 417.5 | 1983 | VSSIDUM67  | -10514 | 417.5 | 2043           | GOUT[28]   | -11354 | 417.5 |     |          |   |   |
| 1924 | S[1410]   | -9688  | 272.5 | 1984 | VSSIDUM68  | -10528 | 272.5 | 2044           | GOUT[29]   | -11368 | 272.5 |     |          |   |   |
| 1925 | S[1411]   | -9702  | 417.5 | 1985 | VSSIDUM69  | -10542 | 417.5 | 2045           | GOUT[29]   | -11382 | 417.5 |     |          |   |   |
| 1926 | S[1412]   | -9716  | 272.5 | 1986 | VSSIDUM70  | -10556 | 272.5 | 2046           | GOUT[30]   | -11396 | 272.5 |     |          |   |   |
| 1927 | S[1413]   | -9730  | 417.5 | 1987 | VSSIDUM71  | -10570 | 417.5 | 2047           | GOUT[30]   | -11410 | 417.5 |     |          |   |   |
| 1928 | S[1414]   | -9744  | 272.5 | 1988 | VSSIDUM72  | -10584 | 272.5 | 2048           | VGLO       | -11424 | 272.5 |     |          |   |   |
| 1929 | S[1415]   | -9758  | 417.5 | 1989 | VSSIDUM73  | -10598 | 417.5 | 2049           | VGLO       | -11438 | 417.5 |     |          |   |   |
| 1930 | S[1416]   | -9772  | 272.5 | 1990 | VSSIDUM74  | -10612 | 272.5 | 2050           | VGLO       | -11452 | 272.5 |     |          |   |   |
| 1931 | S[1417]   | -9786  | 417.5 | 1991 | VSSIDUM75  | -10626 | 417.5 | 2051           | VRGH       | -11466 | 417.5 |     |          |   |   |
| 1932 | S[1418]   | -9800  | 272.5 | 1992 | VSSIDUM76  | -10640 | 272.5 | 2052           | VRGH       | -11480 | 272.5 |     |          |   |   |
| 1933 | S[1419]   | -9814  | 417.5 | 1993 | VSSIDUM77  | -10654 | 417.5 | 2053           | VRGH       | -11494 | 417.5 |     |          |   |   |
| 1934 | S[1420]   | -9828  | 272.5 | 1994 | VSSIDUM78  | -10668 | 272.5 | 2054           | LVGL_L     | -11508 | 272.5 |     |          |   |   |
| 1935 | S[1421]   | -9842  | 417.5 | 1995 | VSSIDUM79  | -10682 | 417.5 | 2055           | LVGL_L     | -11522 | 417.5 |     |          |   |   |
| 1936 | S[1422]   | -9856  | 272.5 | 1996 | VSSIDUM80  | -10696 | 272.5 | 2056           | LVGL_L     | -11536 | 272.5 |     |          |   |   |
| 1937 | S[1423]   | -9870  | 417.5 | 1997 | VSSIDUM81  | -10710 | 417.5 | 2057           | GOUT[31]   | -11550 | 417.5 |     |          |   |   |
| 1938 | S[1424]   | -9884  | 272.5 | 1998 | VSSIDUM82  | -10724 | 272.5 | 2058           | GOUT[31]   | -11564 | 272.5 |     |          |   |   |
| 1939 | S[1425]   | -9898  | 417.5 | 1999 | VSSIDUM83  | -10738 | 417.5 | 2059           | GOUT[32]   | -11578 | 417.5 |     |          |   |   |
| 1940 | S[1426]   | -9912  | 272.5 | 2000 | VSSIDUM84  | -10752 | 272.5 | 2060           | GOUT[32]   | -11592 | 272.5 |     |          |   |   |
| 1941 | S[1427]   | -9926  | 417.5 | 2001 | VSSIDUM85  | -10766 | 417.5 | 2061           | VGLO       | -11606 | 417.5 |     |          |   |   |
| 1942 | S[1428]   | -9940  | 272.5 | 2002 | VSSIDUM86  | -10780 | 272.5 | 2062           | VGLO       | -11620 | 272.5 |     |          |   |   |
| 1943 | S[1429]   | -9954  | 417.5 | 2003 | VSSIDUM87  | -10794 | 417.5 | 2063           | VGLO       | -11634 | 417.5 |     |          |   |   |
| 1944 | S[1430]   | -9968  | 272.5 | 2004 | VSSIDUM88  | -10808 | 272.5 | 2064           | VGHO       | -11648 | 272.5 |     |          |   |   |
| 1945 | S[1431]   | -9982  | 417.5 | 2005 | VSSIDUM89  | -10822 | 417.5 | 2065           | VGHO       | -11662 | 417.5 |     |          |   |   |
| 1946 | S[1432]   | -9996  | 272.5 | 2006 | VSSIDUM90  | -10836 | 272.5 | 2066           | VGHO       | -11676 | 272.5 |     |          |   |   |
| 1947 | S[1433]   | -10010 | 417.5 | 2007 | VSSIDUM91  | -10850 | 417.5 | 2067           | PADA4      | -11690 | 417.5 |     |          |   |   |
| 1948 | S[1434]   | -10024 | 272.5 | 2008 | VSSIDUM92  | -10864 | 272.5 | 2068           | PADB4      | -11704 | 272.5 |     |          |   |   |
| 1949 | S[1435]   | -10038 | 417.5 | 2009 | VSSIDUM93  | -10878 | 417.5 | 2069           | VSSIDUM104 | -11718 | 417.5 |     |          |   |   |
| 1950 | S[1436]   | -10052 | 272.5 | 2010 | VSSIDUM94  | -10892 | 272.5 | 2070           | VSSIDUM105 | -11732 | 272.5 |     |          |   |   |
| 1951 | S[1437]   | -10066 | 417.5 | 2011 | VSSIDUM95  | -10906 | 417.5 | 2071           | VSSIDUM106 | -11746 | 417.5 |     |          |   |   |
| 1952 | S[1438]   | -10080 | 272.5 | 2012 | VSSIDUM96  | -10920 | 272.5 |                |            |        |       |     |          |   |   |
| 1953 | S[1439]   | -10094 | 417.5 | 2013 | VSSIDUM97  | -10934 | 417.5 |                |            |        |       |     |          |   |   |
| 1954 | S[1440]   | -10108 | 272.5 | 2014 | VSSIDUM98  | -10948 | 272.5 |                |            |        |       |     |          |   |   |
| 1955 | S[1441]   | -10122 | 417.5 | 2015 | VSSIDUM99  | -10962 | 417.5 |                |            |        |       |     |          |   |   |
| 1956 | SDUM3     | -10136 | 272.5 | 2016 | VSSIDUM100 | -10976 | 272.5 |                |            |        |       |     |          |   |   |
| 1957 | VSSIDUM58 | -10150 | 417.5 | 2017 | VSSIDUM101 | -10990 | 417.5 |                |            |        |       |     |          |   |   |
| 1958 | VSSIDUM59 | -10164 | 272.5 | 2018 | VSSIDUM102 | -11004 | 272.5 |                |            |        |       |     |          |   |   |
| 1959 | VGLO      | -10178 | 417.5 | 2019 | VSSIDUM103 | -11018 | 417.5 |                |            |        |       |     |          |   |   |
| 1960 | VGLO      | -10192 | 272.5 | 2020 | GOUT[17]   | -11032 | 272.5 |                |            |        |       |     |          |   |   |
| 1961 | VGLO      | -10206 | 417.5 | 2021 | GOUT[17]   | -11046 | 417.5 |                |            |        |       |     |          |   |   |
| 1962 | VGLO      | -10220 | 272.5 | 2022 | GOUT[18]   | -11060 | 272.5 |                |            |        |       |     |          |   |   |
| 1963 | VGLO      | -10234 | 417.5 | 2023 | GOUT[18]   | -11074 | 417.5 |                |            |        |       |     |          |   |   |
| 1964 | VGLO      | -10248 | 272.5 | 2024 | GOUT[19]   | -11088 | 272.5 |                |            |        |       |     |          |   |   |
| 1965 | VGLO      | -10262 | 417.5 | 2025 | GOUT[19]   | -11102 | 417.5 | Alignment Mark | X-axis     | Y-axis |       |     |          |   |   |
| 1966 | VGLO      | -10276 | 272.5 | 2026 | GOUT[20]   | -11116 | 272.5 | ALMART_R_T     | 11870      | 400    |       |     |          |   |   |
| 1967 | VGLO      | -10290 | 417.5 | 2027 | GOUT[20]   | -11130 | 417.5 | ALMART_L_T     | -11870     | 400    |       |     |          |   |   |
| 1968 | VGHDUM    | -10304 | 272.5 | 2028 | GOUT[21]   | -11144 | 272.5 |                |            |        |       |     |          |   |   |
| 1969 | VGHDUM    | -10318 | 417.5 | 2029 | GOUT[21]   | -11158 | 417.5 |                |            |        |       |     |          |   |   |
| 1970 | VGHO      | -10332 | 272.5 | 2030 | GOUT[22]   | -11172 | 272.5 |                |            |        |       |     |          |   |   |
| 1971 | VGHO      | -10346 | 417.5 | 2031 | GOUT[22]   | -11186 | 417.5 |                |            |        |       |     |          |   |   |
| 1972 | VGHO      | -10360 | 272.5 | 2032 | GOUT[23]   | -11200 | 272.5 |                |            |        |       |     |          |   |   |
| 1973 | VGHO      | -10374 | 417.5 | 2033 | GOUT[23]   | -11214 | 417.5 |                |            |        |       |     |          |   |   |
| 1974 | VGHO      | -10388 | 272.5 | 2034 | GOUT[24]   | -11228 | 272.5 |                |            |        |       |     |          |   |   |
| 1975 | VGHO      | -10402 | 417.5 | 2035 | GOUT[24]   | -11242 | 417.5 |                |            |        |       |     |          |   |   |
| 1976 | VSSIDUM60 | -10416 | 272.5 | 2036 | GOUT[25]   | -11256 | 272.5 |                |            |        |       |     |          |   |   |
| 1977 | VSSIDUM61 | -10430 | 417.5 | 2037 | GOUT[25]   | -11270 | 417.5 |                |            |        |       |     |          |   |   |
| 1978 | VSSIDUM62 | -10444 | 272.5 | 2038 | GOUT[26]   | -11284 | 272.5 |                |            |        |       |     |          |   |   |
| 1979 | VSSIDUM63 | -10458 | 417.5 | 2039 | GOUT[26]   | -11298 | 417.5 |                |            |        |       |     |          |   |   |
| 1980 | VSSIDUM64 | -10472 | 272.5 | 2040 | GOUT[27]   | -11312 | 272.5 |                |            |        |       |     |          |   |   |

## 4. System Interface

### 4.1. DBI Type B Parallel Interface

The ILI9806H supports an 8-/9-/16-/18-/24-bit MPU DBI Type B parallel interface. The chip-select CSX (active low) is used to enable or disable the ILI9806H chip. The RESX (active low) is an external reset signal, the WRX is parallel data write strobe, the RDX is parallel data read strobe, and DB [23:0] is parallel data bus.

The ILI9806H latches the input data at the rising edge of the WRX signal. The DCX is the signal for data/command selection. When DCX = 1, DB [23:0] bits are RAM data or command parameters. When DCX = 0, DB [23:0] bits are commands. The DBI Type B bi-directional interface is used for communication between the MPU controller and LCD driver chip. The selection of the parallel interface is shown in Table 8.

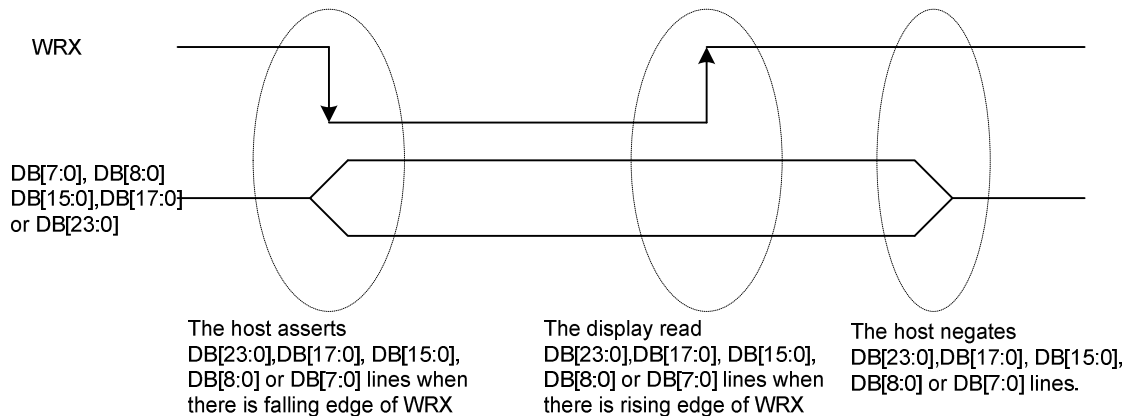
**Table 8: DBI Type B Parallel Interface**

| IM3 | IM2 | IM1 | IM0 | MPU-Interface Mode                 | WRX | RDX | DCX | Function                         |
|-----|-----|-----|-----|------------------------------------|-----|-----|-----|----------------------------------|
| 0   | 0   | 0   | 0   | DBI Type B<br>8-bit bus interface  |     | "H" | "L" | Write command code.              |
|     |     |     |     |                                    | "H" |     | "H" | Read internal status.            |
|     |     |     |     |                                    |     | "H" | "H" | Write parameter or display data. |
|     |     |     |     |                                    | "H" |     | "H" | Reads parameter or display data. |
| 1   | 1   | 0   | 0   | DBI Type B<br>9-bit bus interface  |     | "H" | "L" | Write command code.              |
|     |     |     |     |                                    | "H" |     | "H" | Read internal status.            |
|     |     |     |     |                                    |     | "H" | "H" | Write parameter or display data. |
|     |     |     |     |                                    | "H" |     | "H" | Reads parameter or display data. |
| 0   | 0   | 0   | 1   | DBI Type B<br>16-bit bus interface |     | "H" | "L" | Write command code.              |
|     |     |     |     |                                    | "H" |     | "H" | Read internal status.            |
|     |     |     |     |                                    |     | "H" | "H" | Write parameter or display data. |
|     |     |     |     |                                    | "H" |     | "H" | Reads parameter or display data. |
| 1   | 1   | 0   | 1   | DBI Type B<br>18-bit bus interface |     | "H" | "L" | Write command code.              |
|     |     |     |     |                                    | "H" |     | "H" | Read internal status.            |
|     |     |     |     |                                    |     | "H" | "H" | Write parameter or display data. |
|     |     |     |     |                                    | "H" |     | "H" | Reads parameter or display data. |
| 0   | 0   | 1   | 0   | DBI Type B<br>24-bit bus interface |     | "H" | "L" | Write command code.              |
|     |     |     |     |                                    | "H" |     | "H" | Read internal status.            |
|     |     |     |     |                                    |     | "H" | "H" | Write parameter or display data. |
|     |     |     |     |                                    | "H" |     | "H" | Reads parameter or display data. |

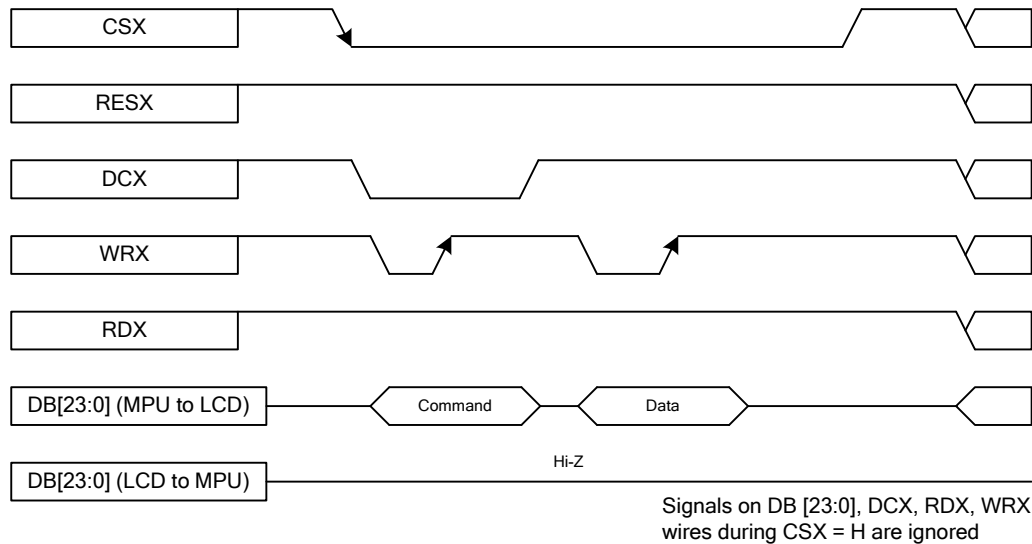
## Write Cycle Sequence

The WRX signal is driven from high to low then pulled back to high during the write cycle. The host processor provides information while the display module captures the information from the host processor on the rising edge of the WRX. When the DCX signal is driven to low level, the input data on the interface is interpreted as command information. The DCX signal can also be pulled to high level when the data is RAM data or command parameter.

Figure 2 shows the write cycle of the DBI Type B interface.



**Figure 2: DBI Type B Write Cycle<sup>Note</sup>**



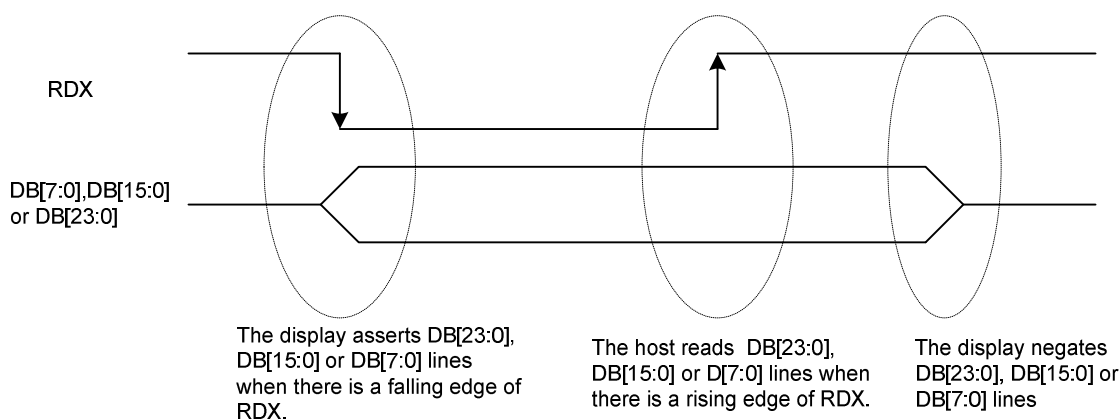
**Figure 3: DBI Type B Write Cycle Sequence**

<sup>Note</sup> WRX is an unsynchronized signal, which can be terminated when not in use.

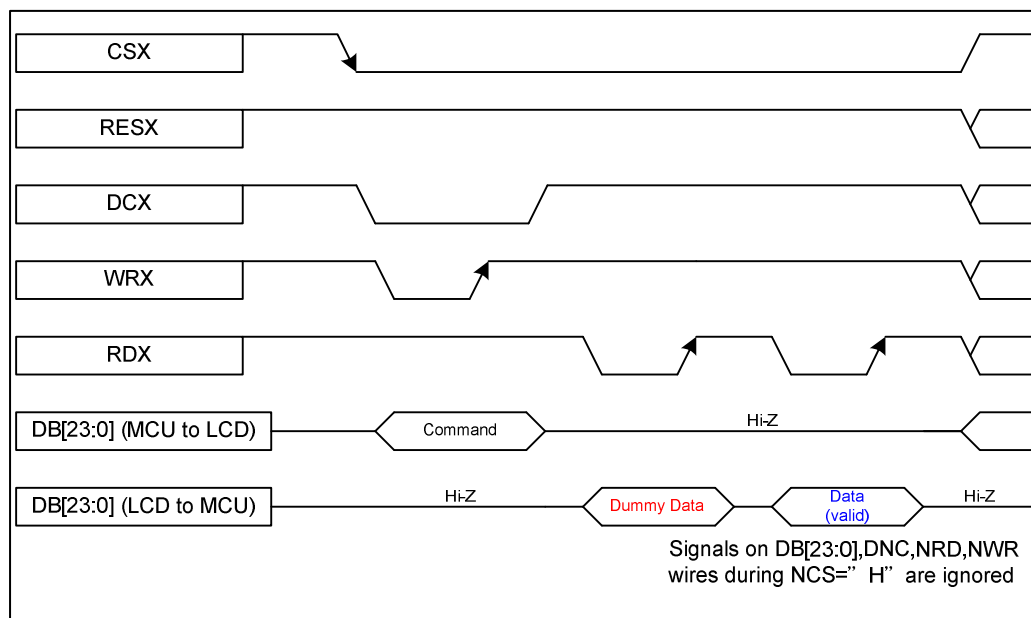
## Read Cycle Sequence

The RDX signal is driven from high to low and then pulled back to high during the read cycle. The display module provides information to the host processor while the host processor reads the display module information on the rising edge of the RDX signal. When the DCX signal is driven to low level, the input data on the interface is interpreted as internal status or parameter data. The DCX signal also can be pulled to high level when the data is RAM data or a command parameter data.

Figure 4 shows the read cycle of the DBI Type B interface.



**Figure 4: DBI Type B Read Cycle** <sup>Note 1</sup>



<sup>Note 1</sup> RDX is an unsynchronized signal, which can be terminated when not in use.

**Figure 5: DBI Type B Read Cycle Sequence**<sup>Note 2</sup>

## DBI Type B Interface Set Table

24-bit data bus DB [23:0] interface, IM [3:0] = 0010

|                         | Register  | DB23 | DB22 | DB21 | DB20 | DB19 | DB18 | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9 | DB8 | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|-------------------------|-----------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|------|------|------|------|------|------|------|------|
| Command/Parameter Write | 2Ch / 3Ch |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
| Command/Parameter Read  | 2Eh / 3Eh |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |

|                          | Set_pixel_format | DB23 | DB22 | DB21 | DB20 | DB19 | DB18 | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|--------------------------|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 24bpp Frame Memory Write | 3'h7             | R[7] | R[6] | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | G[7] | G[6] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[7] | B[6] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |
| Frame Memory Read        | *                | r[7] | r[6] | r[5] | r[4] | r[3] | r[2] | r[1] | r[0] | g[7] | g[6] | g[5] | g[4] | g[3] | g[2] | g[1] | g[0] | b[7] | b[6] | b[5] | b[4] | b[3] | b[2] | b[1] | b[0] |

**Figure 6: DBI Type B 24-bit Data Bus**

18-bit data bus DB [17:0] interface, IM [3:0] = 1101

|                         | Register  | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9 | DB8 | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|-------------------------|-----------|------|------|------|------|------|------|------|------|-----|-----|------|------|------|------|------|------|------|------|
| Command/Parameter Write | 2Ch / 3Ch |      |      |      |      |      |      |      |      |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
| Command/Parameter Read  | 2Eh / 3Eh |      |      |      |      |      |      |      |      |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |

|                          | Set_pixel_format | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|--------------------------|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 18bpp Frame Memory Write | 3'h5             |      |      | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] |

|                          | Set_pixel_format | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|--------------------------|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 18bpp Frame Memory Write | 3'h6             | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |

|                          |                  | First Transfer |         |         | Second Transfer |         |         | Third Transfer |         |         |
|--------------------------|------------------|----------------|---------|---------|-----------------|---------|---------|----------------|---------|---------|
|                          | Set_pixel_format | DB[17:10]      | DB[9:8] | DB[7:0] | DB[17:10]       | DB[9:8] | DB[7:0] | DB[17:10]      | DB[9:8] | DB[7:0] |
| 18bpp Frame Memory Write | 3'h7             | R1[7:0]        |         | G1[7:0] | B1[7:0]         |         | R2[7:0] | G2[7:0]        |         | B2[7:0] |
| Frame Memory Read        | *                | r1[7:0]        |         | g1[7:0] | b1[7:0]         |         | r2[7:0] | g2[7:0]        |         | b2[7:0] |

**Figure 7: DBI Type B 18-bit Data Bus**

<sup>Note 2</sup> Read Data is only valid when the DCX input is pulled high. If the DCX signal is driven low during the read cycle then the display information outputs will be High-Z.

### 16-bit data bus DB [15:0] interface, IM [3:0] = 0001

|                         | Set_pixel_format | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9 | DB8 | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|-------------------------|------------------|------|------|------|------|------|------|-----|-----|------|------|------|------|------|------|------|------|
| Command/Parameter Write | 2Ch / 3Ch        |      |      |      |      |      |      |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
| Command/Parameter Read  | 2Eh / 3Eh        |      |      |      |      |      |      |     |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |

|                          | Set_pixel_format | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|--------------------------|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 16bpp Frame Memory Write | 3h5              | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] |

|                          |                  | First Transfer |         |         |         | Second Transfer |         |         |         | Third Transfer |         |         |         |
|--------------------------|------------------|----------------|---------|---------|---------|-----------------|---------|---------|---------|----------------|---------|---------|---------|
|                          | Set_pixel_format | DB[15:10]      | DB[9:8] | DB[7:2] | DB[1:0] | DB[15:10]       | DB[9:8] | DB[7:2] | DB[1:0] | DB[15:10]      | DB[9:8] | DB[7:2] | DB[1:0] |
| 16bpp Frame Memory Write | 3h6              | R1[5:0]        |         | G1[5:0] |         | B1[5:0]         |         | R2[5:0] |         | G2[5:0]        |         | B2[5:0] |         |

|                          |                  | First Transfer |         |  |  | Second Transfer |         |  |  | Third Transfer |         |  |  |
|--------------------------|------------------|----------------|---------|--|--|-----------------|---------|--|--|----------------|---------|--|--|
|                          | Set_pixel_format | DB[15:8]       | DB[7:0] |  |  | DB[15:8]        | DB[7:0] |  |  | DB[15:8]       | DB[7:0] |  |  |
| 16bpp Frame Memory Write | 3h7              | R1[7:0]        | G1[7:0] |  |  | B1[7:0]         | R2[7:0] |  |  | G2[7:0]        | B2[7:0] |  |  |
| Frame Memory Read        | *                | r1[7:0]        | g1[7:0] |  |  | b1[7:0]         | r2[7:0] |  |  | g2[7:0]        | b2[7:0] |  |  |

**Figure 8: DBI Type B 16-bit Data Bus**

### 9-bit data bus DB [8:0] interface, IM [3:0] = 1100

|                         | Register  | DB8 | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|-------------------------|-----------|-----|------|------|------|------|------|------|------|------|
| Command/Parameter Write | 2Ch / 3Ch |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
| Command/Parameter Read  | 2Eh / 3Eh |     | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |

|                         |                  | First Transfer |      |      |      |      |      |      |      |     |      | Second Transfer |      |      |      |      |      |      |     |  |  |
|-------------------------|------------------|----------------|------|------|------|------|------|------|------|-----|------|-----------------|------|------|------|------|------|------|-----|--|--|
| 9bpp Frame Memory Write | Set_pixel_format | DB8            | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0 | DB8  | DB7             | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0 |  |  |
|                         | 3'h5             | R[4]           | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] |     | G[2] | G[1]            | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] |     |  |  |

|                         |                  | First Transfer |      |      |      |      |      |      |      |      |      | Second Transfer |      |      |      |      |      |      |      |  |  |
|-------------------------|------------------|----------------|------|------|------|------|------|------|------|------|------|-----------------|------|------|------|------|------|------|------|--|--|
| 9bpp Frame Memory Write | Set_pixel_format | DB8            | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  | DB8  | DB7             | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |  |  |
|                         | 3'h6             | R[5]           | R[4] | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2] | G[1]            | G[0] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |  |  |

|                         |                  | First Transfer |     |     |     |     |     |     |     |     |     | Second Transfer |         |     |     |     |     |     |     |     |     | Third Transfer |     |         |     |     |     |     |  |  |  |  |  |  |
|-------------------------|------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----------------|---------|-----|-----|-----|-----|-----|-----|-----|-----|----------------|-----|---------|-----|-----|-----|-----|--|--|--|--|--|--|
|                         | Set_pixel_format | DB8            | DB7 | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | DB8 | DB7             | DB6     | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | DB8 | DB7 | DB6            | DB5 | DB4     | DB3 | DB2 | DB1 | DB0 |  |  |  |  |  |  |
| 9bpp Frame Memory Write | 3h7              | R1[7:0]        |     |     |     |     |     |     |     |     |     |                 | G1[7:0] |     |     |     |     |     |     |     |     |                |     | B1[7:0] |     |     |     |     |  |  |  |  |  |  |
| Frame Memory Read       | *                | r1[7:0]        |     |     |     |     |     |     |     |     |     |                 | g1[7:0] |     |     |     |     |     |     |     |     |                |     | b1[7:0] |     |     |     |     |  |  |  |  |  |  |

**Figure 9: DBI Type B 9-bit Data Bus**

8-bit data bus DB [7:0] interface, IM [3:0] = 0000

|                         | Register  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|-------------------------|-----------|------|------|------|------|------|------|------|------|
| Command/Parameter Write | 2Ch / 3Ch | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |
| Command/Parameter Read  | 2Eh / 3Eh | D[7] | D[6] | D[5] | D[4] | D[3] | D[2] | D[1] | D[0] |

|                         |                  | First Transfer |      |      |      |      |      |      |      | Second Transfer |      |      |      |      |      |      |      |
|-------------------------|------------------|----------------|------|------|------|------|------|------|------|-----------------|------|------|------|------|------|------|------|
| 8bpp Frame Memory Write | Set_pixel_format | DB7            | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  | DB7             | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|                         | 3h5              | R[4]           | R[3] | R[2] | R[1] | R[0] | G[5] | G[4] | G[3] | G[2]            | G[1] | G[0] | B[4] | B[3] | B[2] | B[1] | B[0] |

|                         |                  | First Transfer |      |      |      |      |      |     |     | Second Transfer |      |      |      |      |      |     |     | Third Transfer |      |      |      |      |      |     |     |
|-------------------------|------------------|----------------|------|------|------|------|------|-----|-----|-----------------|------|------|------|------|------|-----|-----|----------------|------|------|------|------|------|-----|-----|
| 8bpp Frame Memory Write | Set_pixel_format | DB7            | DB6  | DB5  | DB4  | DB3  | DB2  | DB1 | DB0 | DB7             | DB6  | DB5  | DB4  | DB3  | DB2  | DB1 | DB0 | DB7            | DB6  | DB5  | DB4  | DB3  | DB2  | DB1 | DB0 |
|                         | 3h6              | R[5]           | R[4] | R[3] | R[2] | R[1] | R[0] |     |     | G[5]            | G[4] | G[3] | G[2] | G[1] | G[0] |     |     | B[5]           | B[4] | B[3] | B[2] | B[1] | B[0] |     |     |

|                         |                  | First Transfer |     |     |     |     |     |     |     | Second Transfer |     |     |     |     |     |     |     | Third Transfer |     |     |     |     |     |     |     |
|-------------------------|------------------|----------------|-----|-----|-----|-----|-----|-----|-----|-----------------|-----|-----|-----|-----|-----|-----|-----|----------------|-----|-----|-----|-----|-----|-----|-----|
| 8bpp Frame Memory Write | Set_pixel_format | DB7            | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | DB7             | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 | DB7            | DB6 | DB5 | DB4 | DB3 | DB2 | DB1 | DB0 |
|                         | 3h7              | R1[7:0]        |     |     |     |     |     |     |     | G1[7:0]         |     |     |     |     |     |     |     | B1[7:0]        |     |     |     |     |     |     |     |
| Frame Memory Read       | *                | r1[7:0]        |     |     |     |     |     |     |     | g1[7:0]         |     |     |     |     |     |     |     | b1[7:0]        |     |     |     |     |     |     |     |

**Figure 10: DBI Type B 8-bit Data Bus**



## 4.2. DBI Type C Serial Interface

The selection of this interface is done by the IM [3:0] pins. See Table 9.

**Table 9: DBI Type C Serial Interface**

| IM3 | IM2 | IM1 | IM0 | DBI Type C Mode         | CSX | SDA | SCL                                                                               | Function                                       |
|-----|-----|-----|-----|-------------------------|-----|-----|-----------------------------------------------------------------------------------|------------------------------------------------|
| 0   | 0   | 1   | 1   | 3-line serial interface | “L” | -   |  | Read/Write command, parameter or display data. |
| 0   | 1   | 0   | 0   |                         |     |     |                                                                                   |                                                |
| 1   | 0   | 1   | 1   | 3-line serial interface | “L” | -   |  | Read/Write command, parameter or display data. |

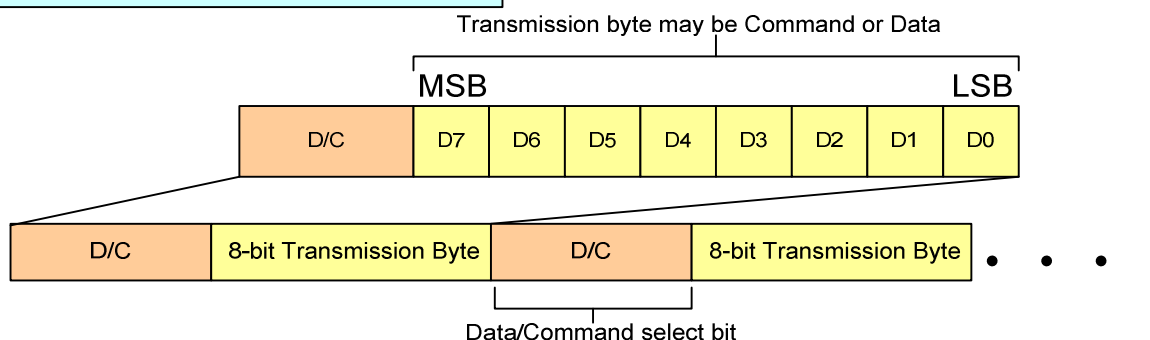
The ILI9806H uses a 3-line 9-bit serial interface for communication between the host and the ILI9806H. The 3-line serial interface consists of the chip enable input (CSX), the serial clock input (SCL), and serial data Input/Output (SDA). If the data bus (DB [23:0]) is not used for the DPI interface data transfer, the unused pins are unaffected. The Serial clock (SCL) is used only for the interface with the MPU, so it can be stopped when no communication is necessary.

### Write Cycle Sequence

In the Write Mode of the interface, the host writes commands and data to the ILI9806H. The 3-line serial data packet contains a D/C (data/command) select bit and a transmission byte. If the D/C bit is “low”, the transmission byte is interpreted as a command byte. If the D/C bit is “high”, the transmission byte is stored in the GRAM as display data, or stored in the command register as a parameter data.

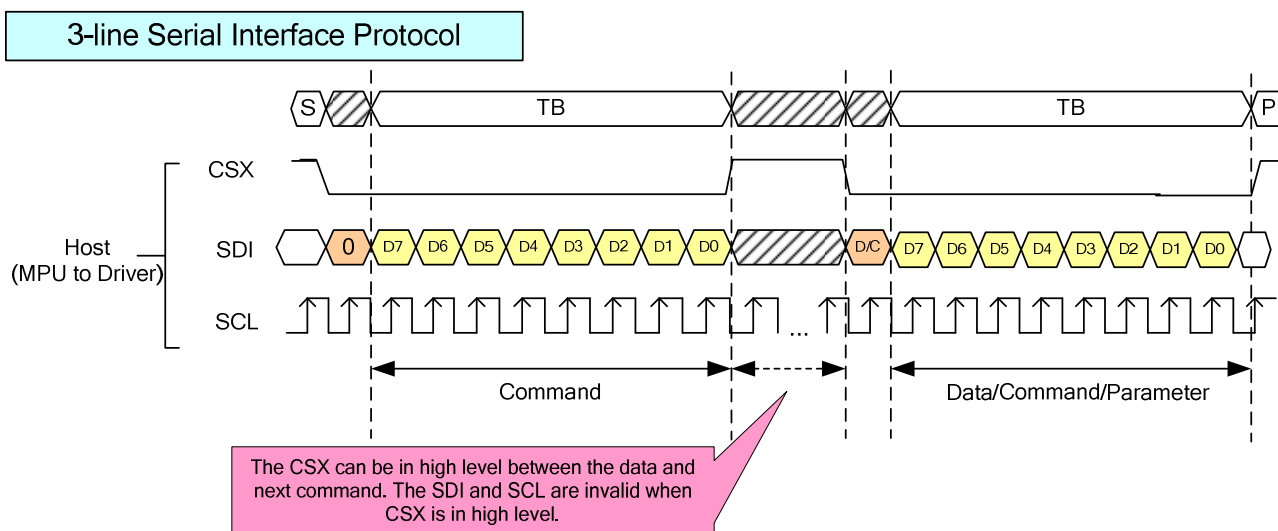
Any instruction can be sent in any order to the ILI9806H and the MSB is transmitted first. The serial interface is initialized when the CSX status is high. In this state, SCL clock pulse and SDI data have no effect. A falling edge on CSX enables the serial interface and indicates the start of data transmission. See below for the detail of data format for 3-line serial interface.

#### 3-line Serial Interface Data Format



**Figure 11: DBI Type C Data Format**

The host drives the CSX pin to low and setting the D/C bit on the SDI pin. The bit is read by the ILI9806H on the first rising edge of the SCL signal. On the next falling edge of the SCL, the MSB data bit (D7) is set on the SDI pin by the host. On the next falling edge of the SCL, the next bit (D6) is set on the SDI pin. The 3-line serial interface writes sequences as described in the Figure 12 below.

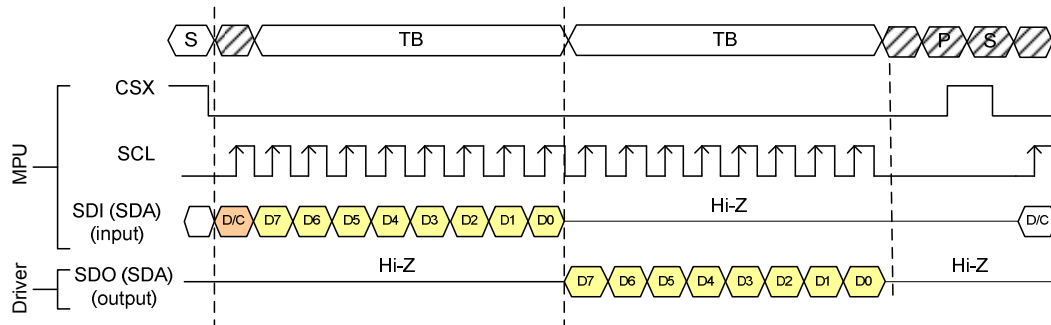


**Figure 12: DBI Type C Protocol (Rising edge example)**

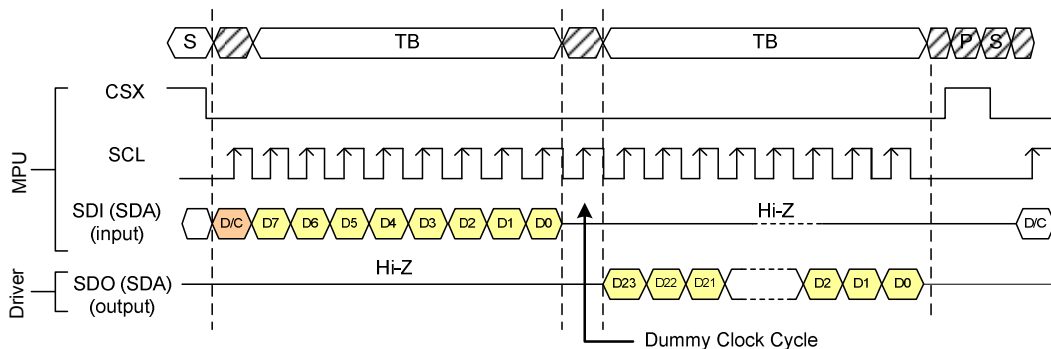
## Read Cycle Sequence

In the Read Mode of the interface, the host reads the register value from the ILI9806H. The host sends a command (Read ID or register command), then a byte is (bytes are) transmitted in the opposite direction. The ILI9806H samples the SDI (input data) at the rising edge of the SCL (serial clock), and shifts SDO (output data) at the falling edge of the SCL (serial clock). The read mode has three types of transmitted command data (8-/24-/32-bit) according to the command code.

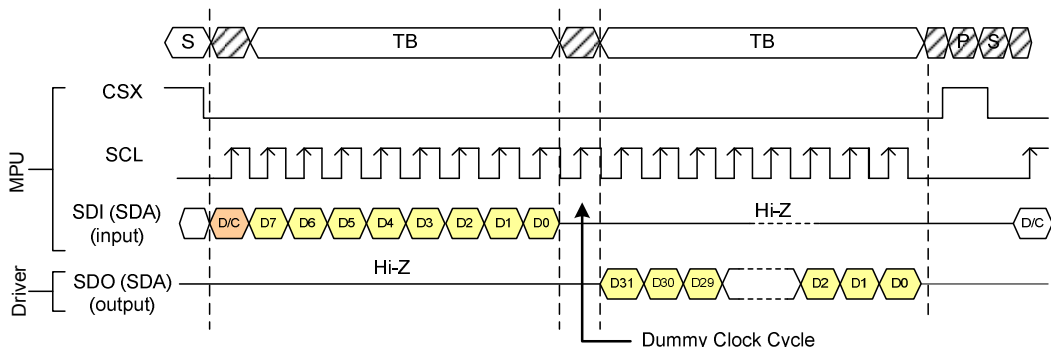
3-line Serial Protocol (for RDID2/RDID3/0Ah/0Bh/0Ch/0Dh/0Eh/0Fh command: 8-bit read)



3-line Serial Protocol (for RDDID command: 24-bit read)



3-line Serial Protocol (for RDDST command: 32-bit read)



3-line Serial Protocol (for extended command read example -read 4 parameter 24-bit )

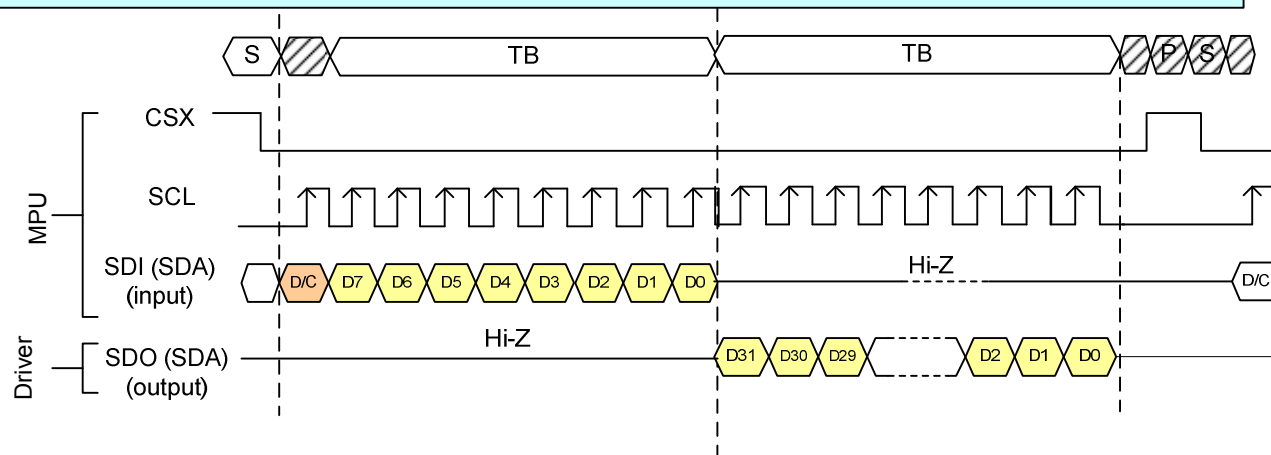
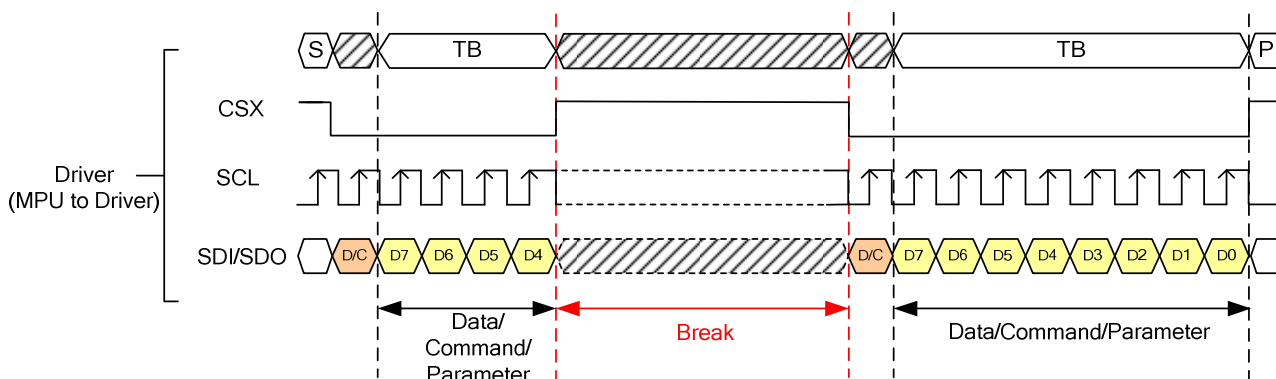


Figure 13: DBI Type C Read Cycle Sequence (Rising edge example)

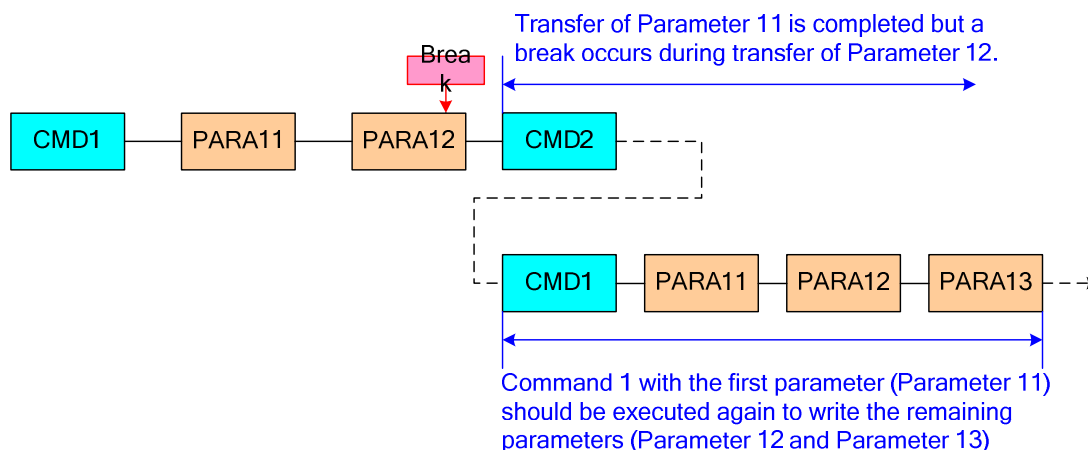
### 4.3. Data Transfer Break and Recovery

If data transmission is interrupted by the CSX pulse while transferring a Command, Frame Memory data or multiple parameter command before Bit D0 of the byte has been completed, then the driver will reject the previous bits and reset the interface so it will be ready to receive the same byte re-transmitted when the chip select pin (CSX) is activated again.



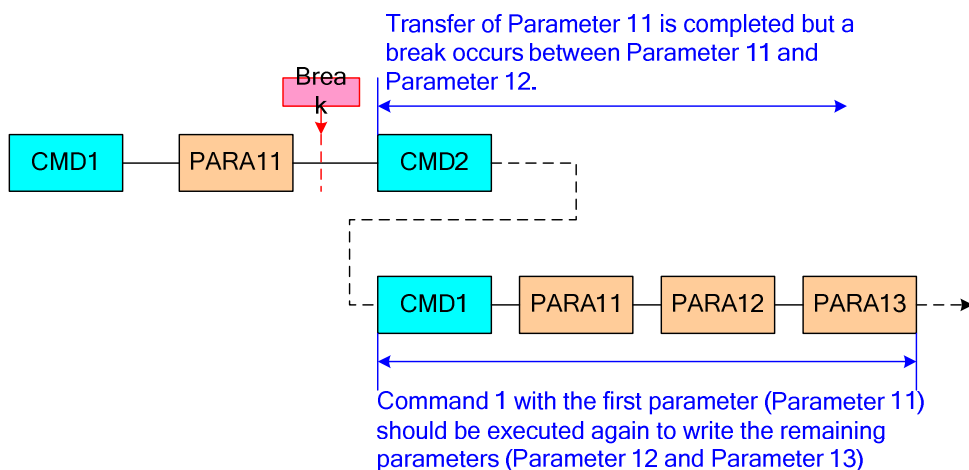
**Figure 14: Data Transfer Break and Recovery (Rising edge example)**

If there is a break when transmitting a command with multiple parameters and the host initiates transfer of a new command, the parameters that were successfully transferred are stored and the incomplete parameter data where the break occurred is dropped. The interface is ready to receive the next byte as shown in the figure below.



**Figure 15: Data Transfer Break - Case 1**

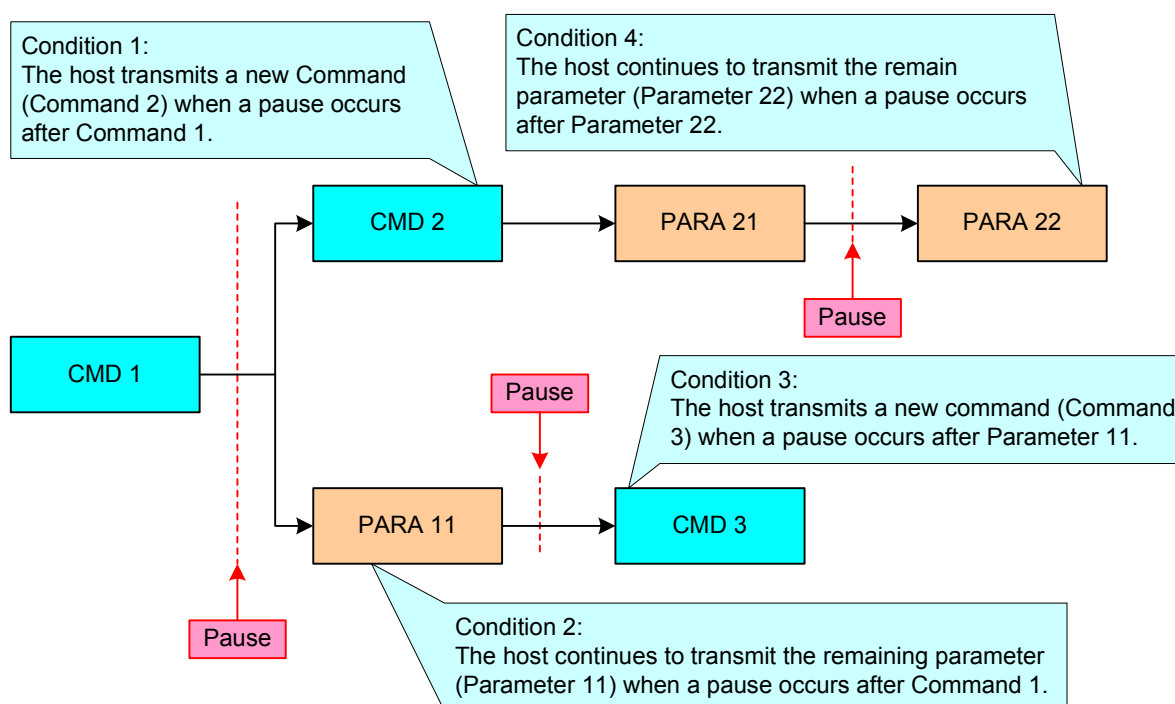
If a command with multiple parameters is sent and a break occurs when a new command is sent before all the parameters are transferred, then the parameters that were successfully sent are stored and the remaining parameters of that command remain at the previous value.



**Figure 16: Data Transfer Break - Case 2**

## 4.4. Data Transfer Pause

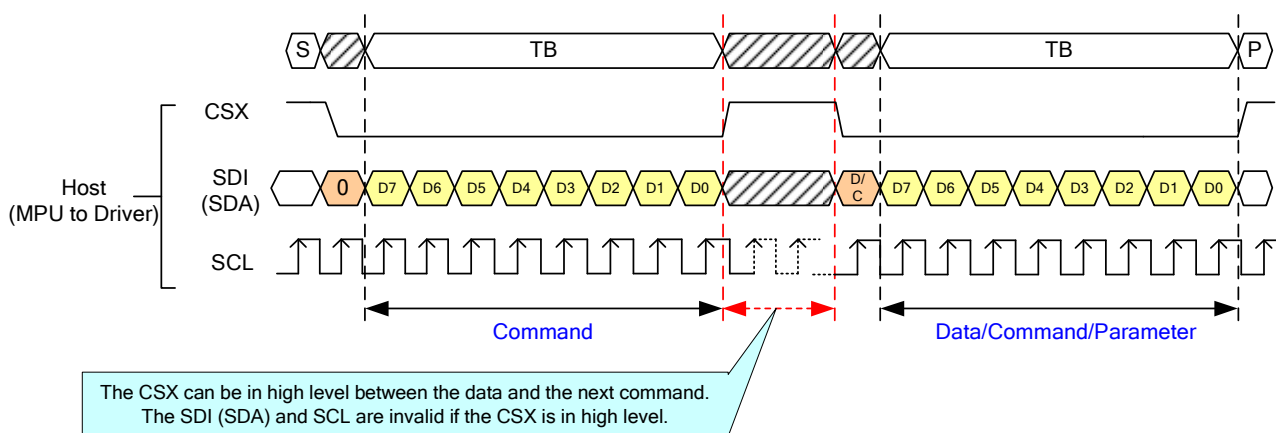
Transferring a Command, Frame Memory Data, or Multiple Parameter Data might invoke a pause in the data transmission. If the Chip Select pin (CSX) is released after a whole byte of a Frame Memory Data or Multiple Parameter Data has been completed, then the ILI9806H will wait and continue the Frame Memory Data or Parameter Data Transmission from the point where it was paused. If the Chip Select pin is released after a whole byte of a command has been completely transmitted, then the display module will receive either the command's parameters or a new command when the Chip Select Line is enabled again, as shown below.



**Figure 17: Data Transfer Pause**



## Serial Interface Pause

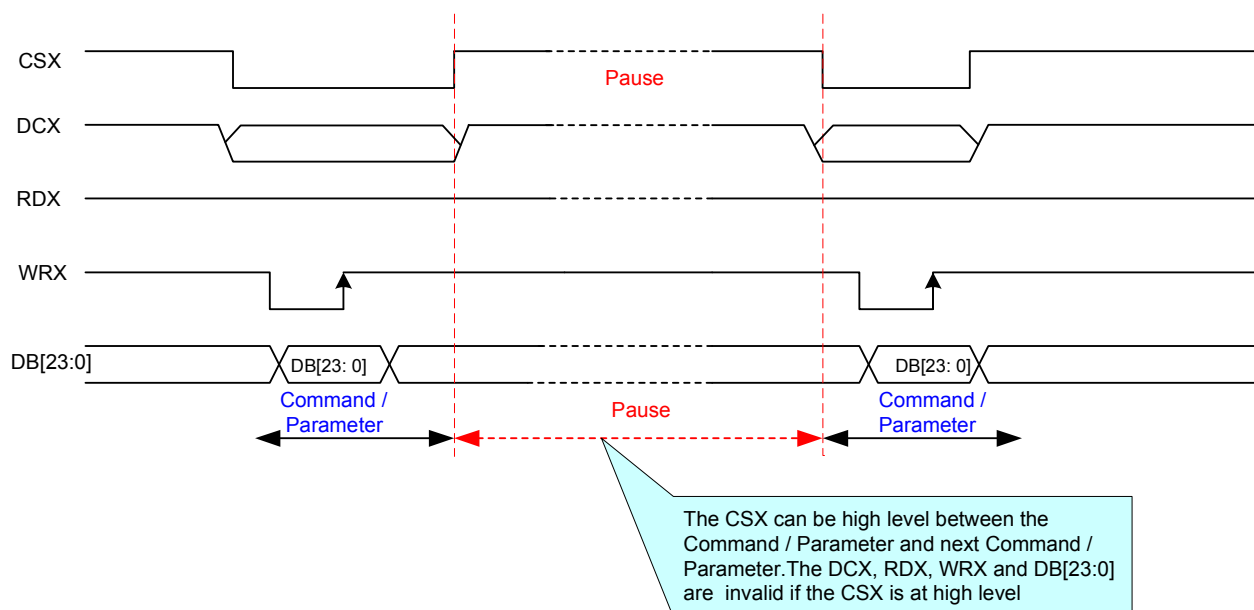


**Figure 18: DBI Type C Data Transfer Pause(Rising edge example)**

This applies to the following 4 conditions:

- 1) Command-Pause-Command
- 2) Command-Pause-Parameter
- 3) Parameter-Pause-Command
- 4) Parameter-Pause-Parameter

## Parallel Interface Pause



**Figure 19: DBI Type B Data Transfer Pause**

This applies to the following 4 conditions:

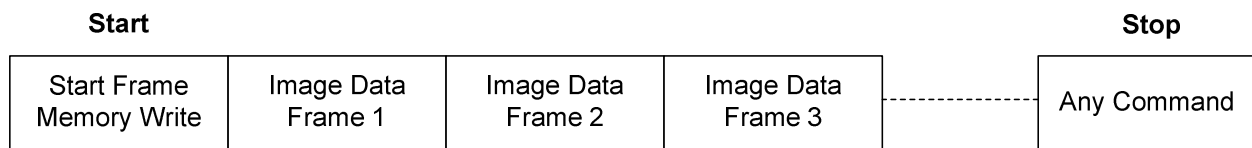
- 1) Command-Pause-Command
- 2) Command-Pause-Parameter
- 3) Parameter-Pause-Command
- 4) Parameter-Pause-Parameter

## Data Transfer Mode

The ILI9806H provides five different types of color depth: 8-bit/per pixel, 9-bit/per pixel, 16-bit/per pixel, 18-bit/per pixel, and 24-bit/pixel. The data format is described for each interface. Data can be downloaded to the Frame Memory by 2 methods<sup>Note</sup>.

### Method 1

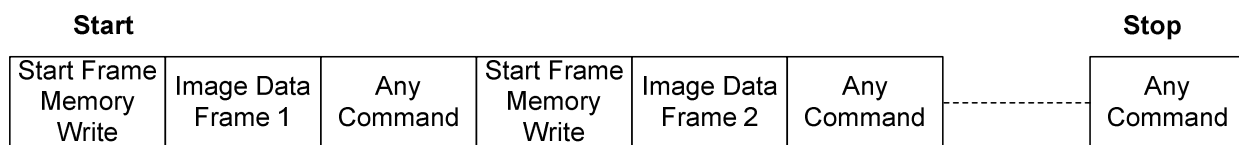
The Image data is sent to the Frame Memory in the successive Frame writing, each time the Frame Memory is filled by image data, the Frame Memory pointer is reset to the start point and the next Frame is written.



**Figure 20: Data Transfer Mode - Method 1**

### Method 2

Image Data is sent and at the end of each Frame Memory download, a command is sent to stop the Frame Memory Writing. Then Start Memory Write command is sent, and a new Frame is downloaded.



**Figure 21: Data Transfer Mode - Method 2**

<sup>Note</sup> 1. These apply to all data transfer Color modes on both serial and parallel interfaces.

2. The Frame Memory can contain both odd and even number of pixels for both methods. Only complete pixel data will be stored in the Frame Memory.

## 4.5. DPI (RGB) Interface

The DPI can display moving pictures by two ways: rewrite into the GRAM and transmit directly to the shift register. The selection is set by the register BPGRAM and RM bit. The RM bit selects an interface for the access operation of the Frame Memory. For the DPI, RM should be set as 1.

| BPGRAM | Display data path |
|--------|-------------------|
| 0      | Write into Memory |

| RM | Interface for RAM access |
|----|--------------------------|
| 0  | System interface         |
| 1  | RGB interface            |

The DM bit selects the clock operation mode. It allows switching between display operations in synchronization with the internal oscillation clock. If DM = 1, the external PCLK cannot be stopped unless it enters the Sleep In mode.

| DM | RGB interface operating clock selection |
|----|-----------------------------------------|
| 0  | Internal system clock                   |
| 1  | RGB interface PCLK (Dot clock)          |

## DPI Interface Selection

The DPI interface is operated with VS, HS, DE, PCLK, and DB [23:0] lines. It supports several pixel formats that can be selected by DPI [2:0] bits in Pixel Format Set (R3Ah) command. The selection of a given interface is done by DPI [2:0], as shown in the Table 10 and Figure 22.

**Table 10: DPI Interface Selection**

| DPI [2:0] |   |   | DPI (RGB) Interface Mode | Used Pins                                         |
|-----------|---|---|--------------------------|---------------------------------------------------|
| 1         | 0 | 1 | 16-bit RGB interface     | VS, HS, DE, PCLK, DB [20:16], DB [13:8], DB [4:0] |
| 1         | 1 | 0 | 18-bit RGB interface     | VS, HS, DE, PCLK, DB [21:16], DB [13:8], DB [5:0] |
| 1         | 1 | 1 | 24-bit RGB interface     | VS, HS, DE, PCLK, DB [23:0]                       |
| Other     |   |   | Setting prohibited       |                                                   |

16-bit DPI interface connection: set pixel format DPI[2:0]=3'h5

|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |     |     |     |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|------|------|------|------|------|
| DB23 | DB22 | DB21 | DB20 | DB19 | DB18 | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7 | DB6 | DB5 | DB4  | DB3  | DB2  | DB1  | DB0  |
|      |      |      | R[4] | R[3] | R[2] | R[1] | R[0] |      |      | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] |     |     |     | B[4] | B[3] | B[2] | B[1] | B[0] |

18-bit DPI interface connection: set pixel format DPI[2:0]=3'h6

| DB23 | DB22 | DB21 | DB20 | DB19 | DB18 | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7 | DB6 | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|------|------|------|------|------|------|
|      |      | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] |      |      | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] |     |     | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |

24-bit DPI interface connection: set pixel format DPI[2:0]=3'h7

| 24-bit RGB color data (24-bit color format) [24:0] |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|----------------------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| DB23                                               | DB22 | DB21 | DB20 | DB19 | DB18 | DB17 | DB16 | DB15 | DB14 | DB13 | DB12 | DB11 | DB10 | DB9  | DB8  | DB7  | DB6  | DB5  | DB4  | DB3  | DB2  | DB1  | DB0  |
|                                                    | R[6] | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | G[7] | G[6] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[7] | B[6] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |

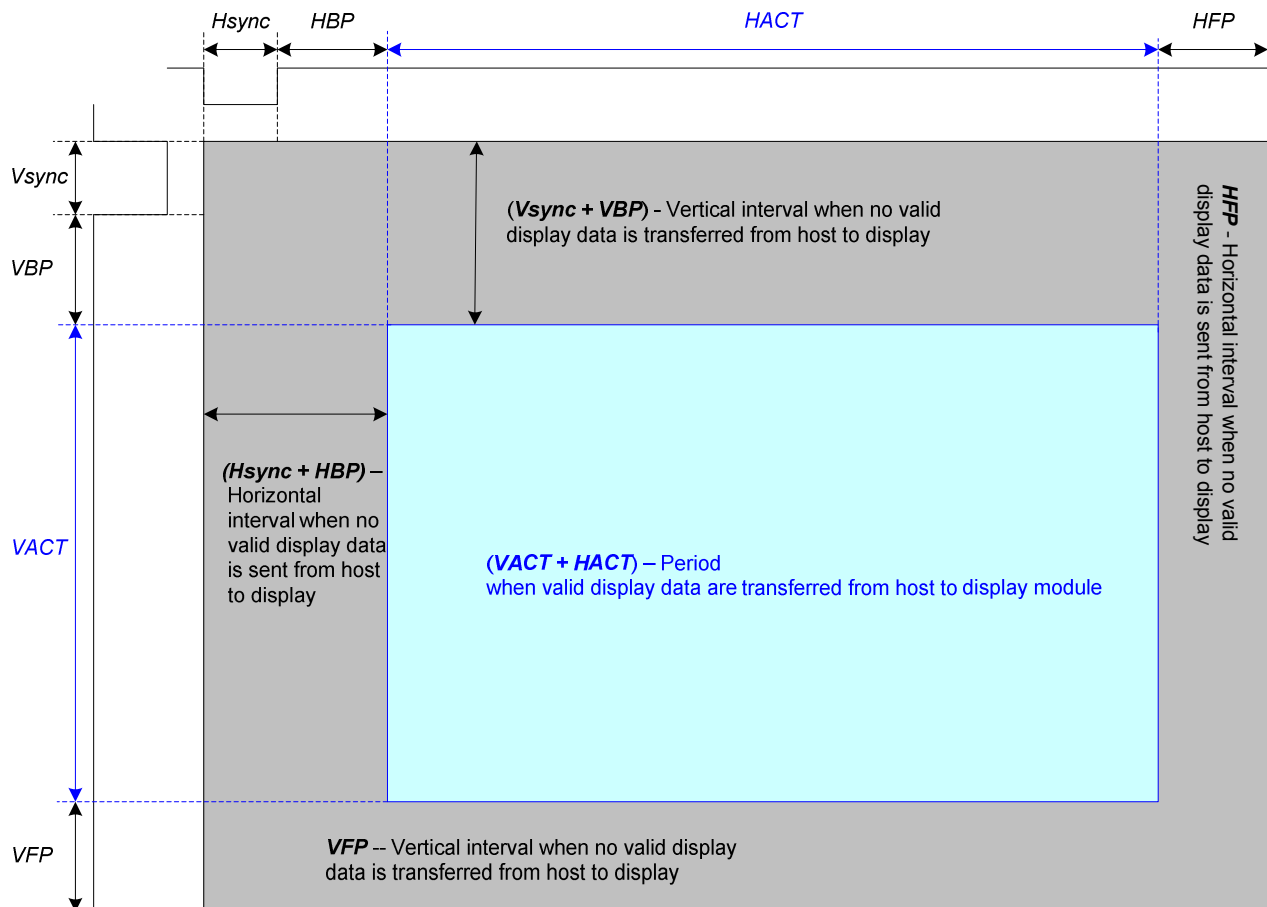
**Figure 22: DPI Interface 16/18/24-bit Pixel Format Selection**

The Pixel clock (PCLK) runs all the time without stop, and it is used to enter VS, HS, DE, and DB [23:0] states when there is a rising edge of the PCLK. The PCLK cannot be used as the internal clock for other functions of the display module.

Vertical synchronization (VS) is used to indicate when a new frame of the display is received. This is a low enable and its state is read to the display module by the rising edge of the PCLK signal.

Horizontal synchronization (HS) is used to indicate when a new line of the frame is received. This is a low enable and its state is read to the display module by the rising edge of the PCLK signal.

Data Enable (DE) is used to indicate when the RGB information that should be transferred to the display is received. This is a high enable and its state is read to the display module by the rising edge of the PCLK signal. DB [23:0] are used to indicate what is the information of the image that is transferred to the display (when DE = 0 (low) and there is a rising edge of PCLK). DB [23:0] can be 0 (low) or 1 (high). These lines are read by the rising edge of the PCLK signal. In RGB interface modes, the input display data is written to the GRAM first then outputs the corresponding source voltage according to the gray data from the GRAM.

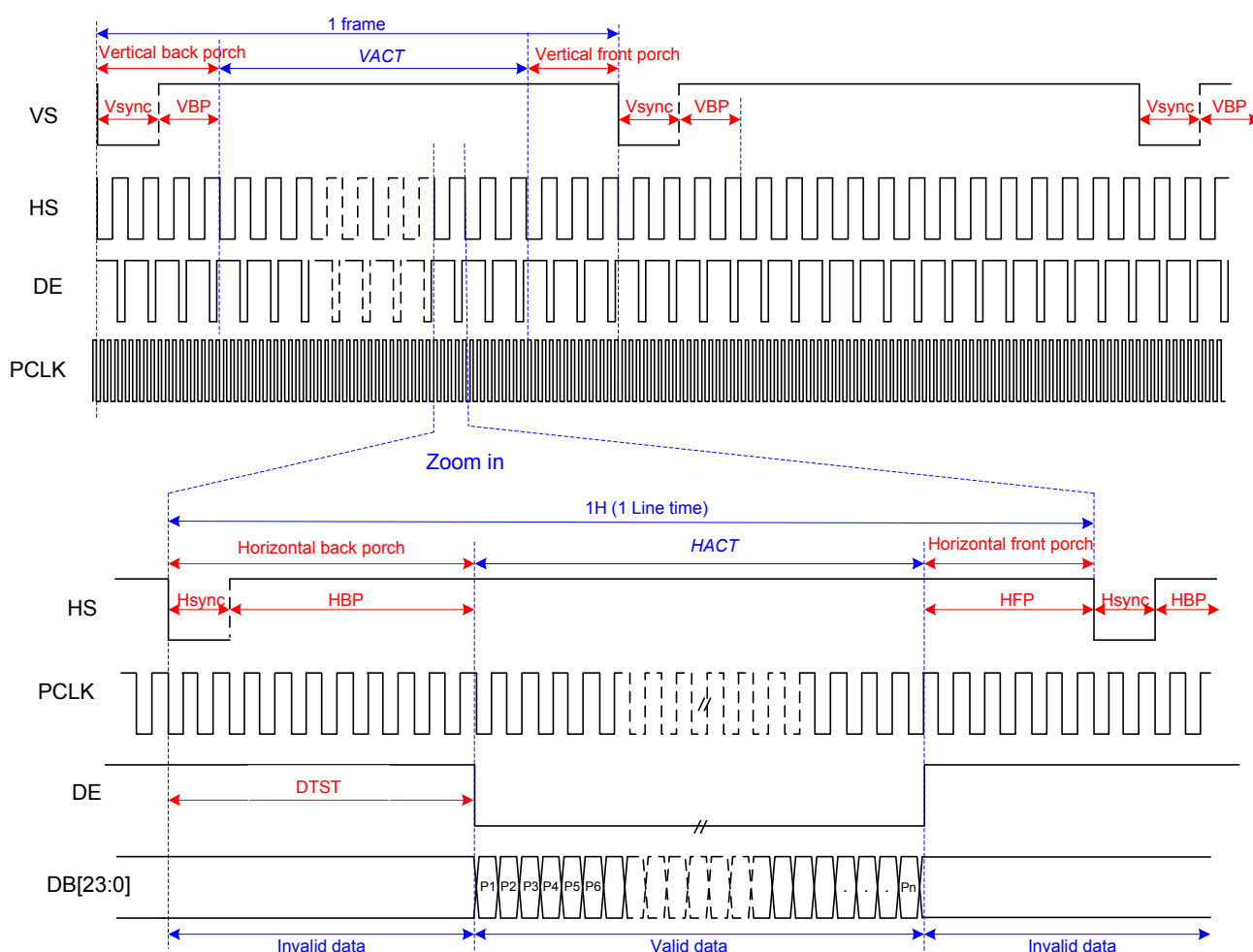


**Figure 23: General DPI Timing Diagram**

## DPI Interface Timing

The timing chart of 24-/18-/16-bit DPI interface mode is illustrated in Figure 24.

| Parameters                 | Symbols | Condition | Min. | Typ. | Max. | Units |
|----------------------------|---------|-----------|------|------|------|-------|
| Horizontal Synchronization | Hsync   |           | 2    | 2    | -    | PCLK  |
| Horizontal Back Porch      | HBP     |           | 4    | 10   | -    | PCLK  |
| Horizontal Address         | HACT    |           | -    | 480  | -    | PCLK  |
| Horizontal Front Porch     | HFP     |           | 50   | 60   | -    | PCLK  |
| Vertical Synchronization   | Vsync   |           | 2    | 2    | 255  | Line  |
| Vertical Back Porch        | VBP     |           | 3    | 3    | 255  | Line  |
| Vertical Address           | VACT    |           | -    | 864  | -    | Line  |
| Vertical Front Porch       | VFP     |           | 2    | 10   | 255  | Line  |



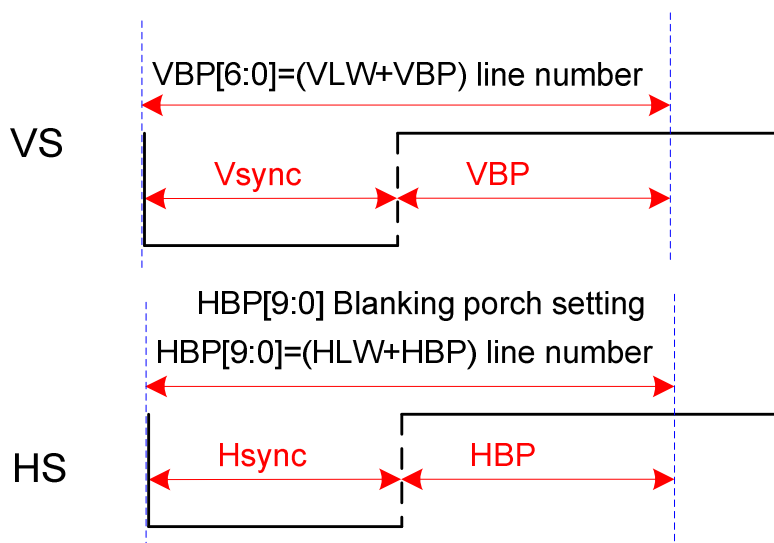


Figure 24: DPI Interface Timing diagram<sup>Note</sup>

Constraint1: Vertical back porch : Minimum VLW  $\geq 2$  H , VBP  $\geq 2$ , VFP  $\geq 6$

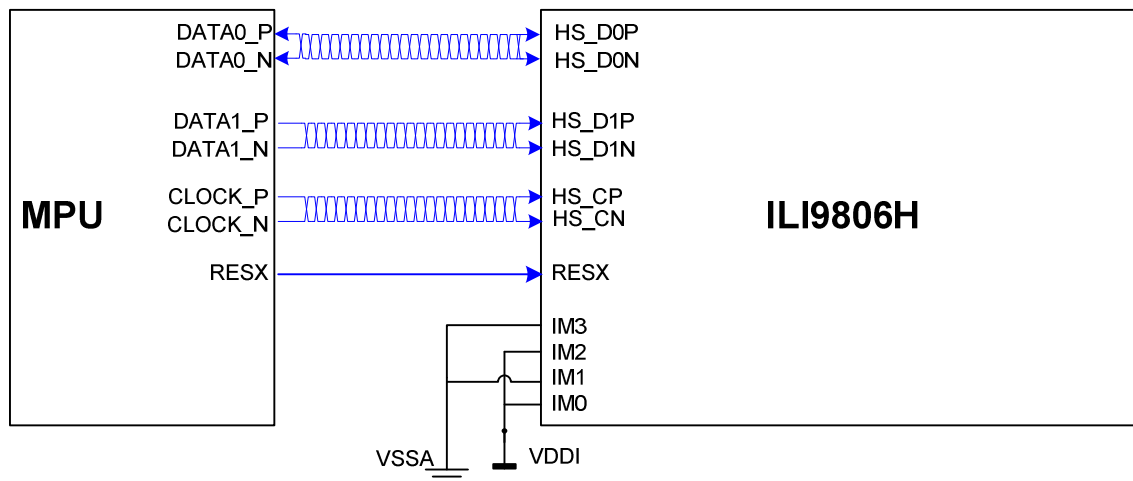
Constraint2: Horizontal porch: Minimum HLW  $\geq 2$  clocks , HBP  $\geq 2$  clocks, HFP  $\geq 2$  clocks

Constraint3: VSPL = 0, HSPL = 0, DPL = 0, and EPL = 0 of Interface Mode Control B0h command.

## 4.6. DSI System Interface

### General Description

The MIPI DSI is enabled or disabled by the external IM [3:0] pin.



**Figure 25: DSI System Interface Diagram (Diagram is MIPI DSI interface setting)**

| IM3 | IM2 | IM1 | IM0 | MPU Interface      | Data Pin in Use                                  |
|-----|-----|-----|-----|--------------------|--------------------------------------------------|
| 0   | 1   | 0   | 1   | MIPI DSI interface | HS_CP, HS_CN<br>HS_D0P, HS_D0N<br>HS_D1P, HS_D1N |

The communication is separated into two different levels between the MPU and the display module:

- Low level communication is done on the interface level.
- High level communication is done on the packet level.



## Interface Level Communication

### General

The display module uses data and clock lane differential pairs for DSI (DSI-2M). Both differential lane pairs can be driven to the Low Power (LP) or High Speed (HS) mode.

Low Power mode means that each line of the differential pair is used in the single ended mode, a differential receiver is disable (a termination resistor of the receiver is disable), and it can be driven into a low power mode.

High Speed mode means that differential pairs (the termination resistor of the receiver is enable) are not used in the single ended mode.

Different modes and protocols are used in each mode when information is to be transferred from the MPU to the display module and vice versa.

The State Codes of the High Speed (HS) and Low Power (LP) lane pair are defined below.

**Table 11: High Speed and Low-Power Lane Pair State Codes**

| Lane Pair State Code | Line DC Voltage Levels |           | High Speed (HS)  | Low Power    |          |
|----------------------|------------------------|-----------|------------------|--------------|----------|
|                      | DATA_P                 | DATA_N    | Burst Mode       | CLOCK_P      | CLOCK_N  |
| HS-0                 | Low (HS)               | High (HS) | Differential – 0 | Note 1       | Note 1   |
| HS-1                 | High (HS)              | Low (HS)  | Differential – 1 | Note 1       | Note 1   |
| LP-00                | Low (LP)               | Low (LP)  | Not Defined      | Bridge       | Space    |
| LP-01                | Low (LP)               | High (LP) | Not Defined      | HS – Request | Mark - 0 |
| LP-10                | High (LP)              | Low (LP)  | Not Defined      | LP - Request | Mark - 1 |
| LP-11                | High (LP)              | High (LP) | Not Defined      | Stop         | Note 2   |

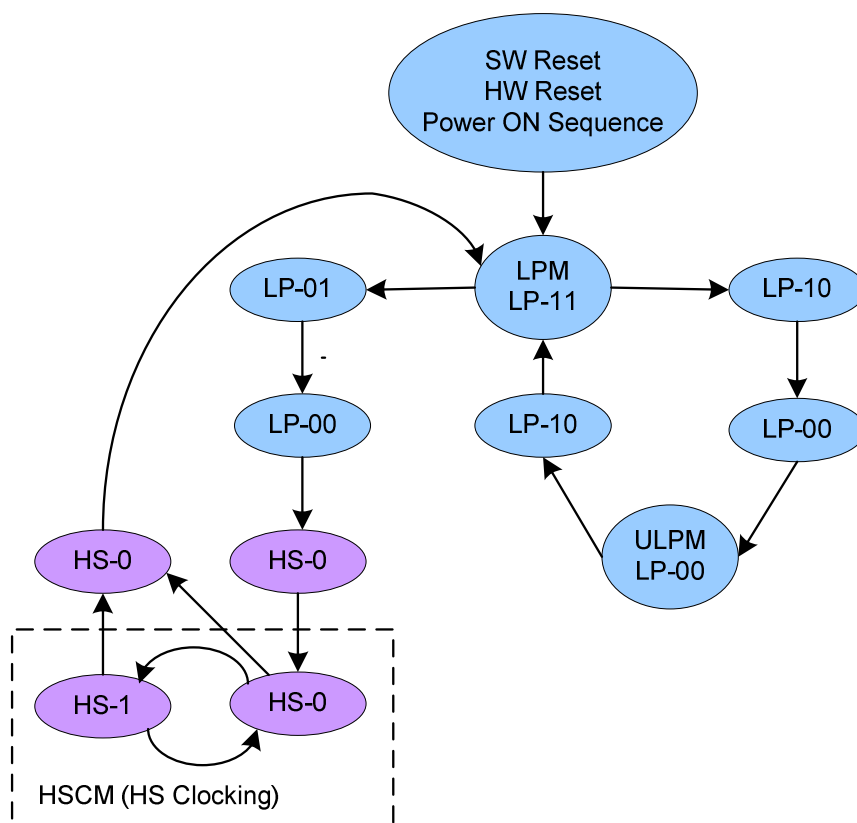
*Note 1* Low-Power Receivers (LP-Rx) of the lane pair will check the LP-00 state code when the Lane Pair is in the High Speed (HS) mode.

*Note 2* If Low-Power Receivers (LP-Rx) of the lane pair recognizes the LP-11 state code, the lane pair returns to the LP-11 of the Control Mode.

## DSI-CLK Lanes

DSI-CLK+/- lanes can be driven into three different power modes: Low Power Mode (LPM), Ultra Low Power Mode (ULPM), or High Speed Clock Mode (HSCM). Clock lanes are in the single ended mode (LP = Low Power) when entering or leaving the Low Power Mode (LPM) or Ultra Low Power Mode (ULPM). Likewise, clock lanes are in the single ended mode (LP = Low Power) when entering in or leaving the High Speed Clock Mode (HSCM). These entering and leaving protocols use clock lanes in the single ended mode to generate an entering or leaving sequence.

The principal flow chart of the different power modes of clock lanes is illustrated below.



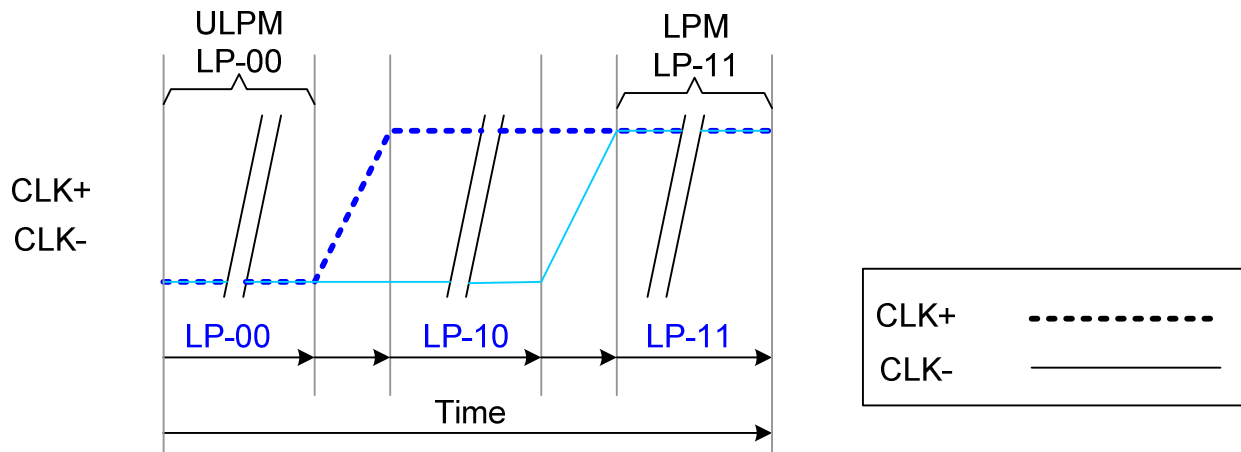
**Figure 26: Power Modes of Clock Lanes**

## Low Power Mode (LPM)

When DSI-CLK lanes enter the LP-11 State Code, DSI-CLK+/- lanes can be driven to the Low Power Mode (LPM) in three different ways:

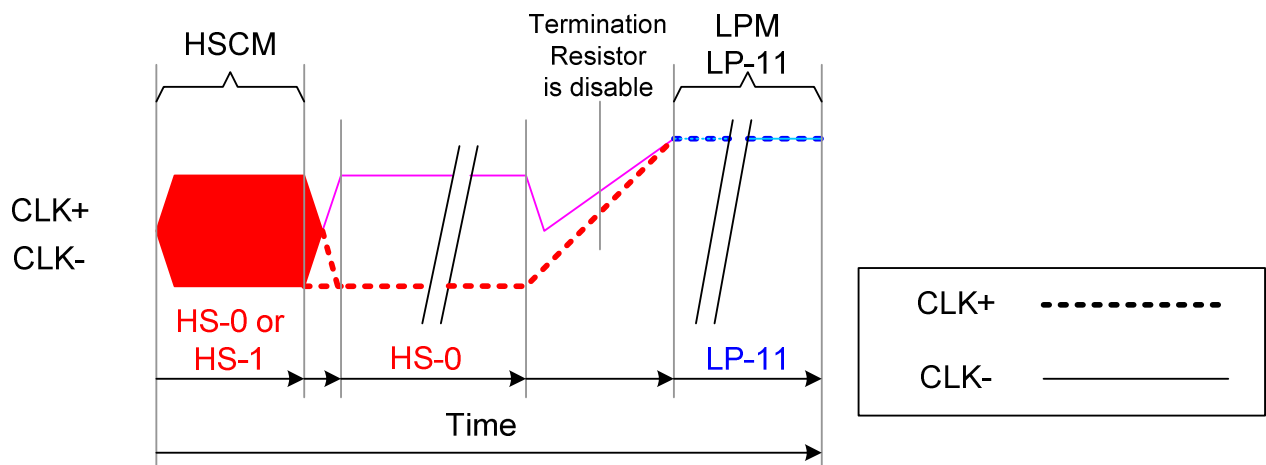
- 1) After SW Reset, HW Reset or Power On Sequence => LP-11
- 2) After DSI-CLK+/- lanes leave the Ultra Low Power Mode (ULPM, LP-00 State Code) => LP-10 => LP-11 (LPM)

The sequence is illustrated below.



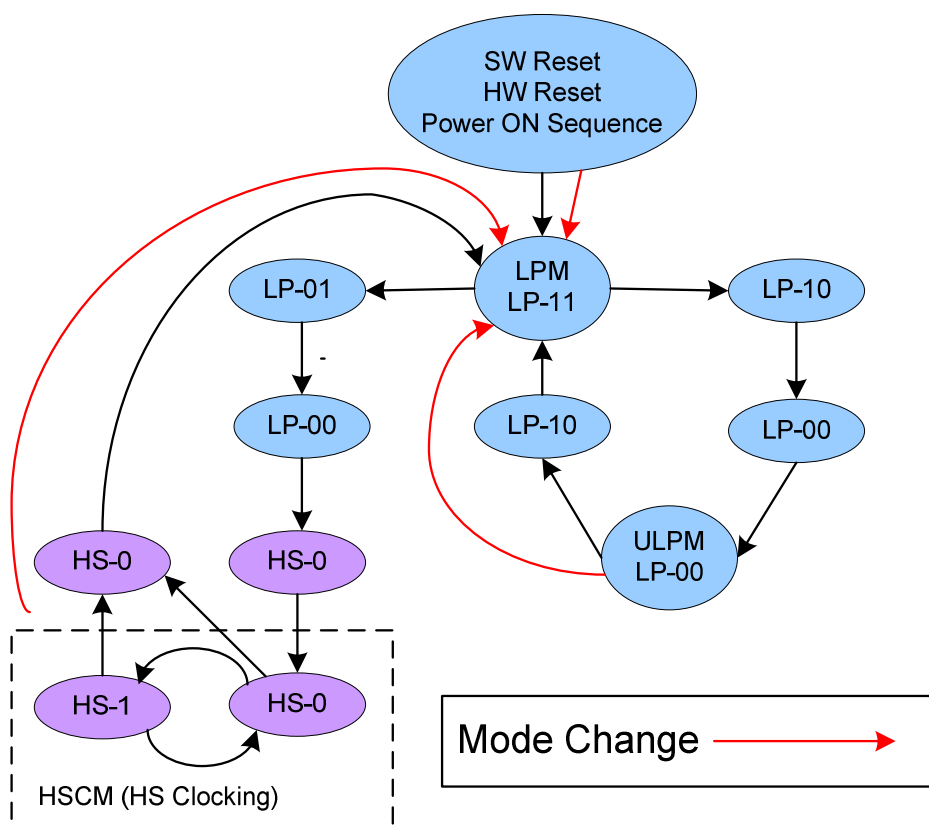
**Figure 27: From ULPM to LPM**

- 3) After DSI-CLK+/- lanes leave the High Speed Clock Mode (HSCM, HS-0 or HS-1 State Code) => HS-0 => LP-11 (LPM). The sequence is illustrated below.



**Figure 28: From High Speed Clock Mode (HSCM) to LPM**

All the changes of the three modes are illustrated in the flow chart below.



**Figure 29: All the Changes of the Three Modes to the LPM**

## Ultra Low Power Mode (ULPM)

DSI-CLK+/- lanes can be driven to the Ultra Low power Mode (ULPM) when DSI-CLK lanes enter the LP-00 State Code. The only possibility is from the Low Power Mode (LPM, LP-11 State Code) => LP-10 => LP-00 (ULPM).

The sequence is illustrated below.

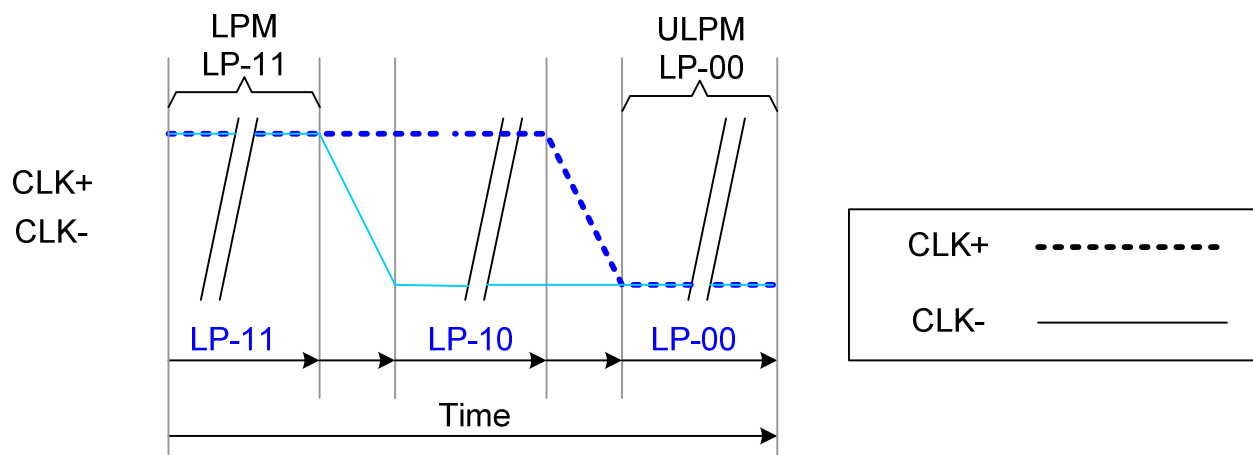


Figure 30: From LPM to ULPM

The mode change is illustrated below.

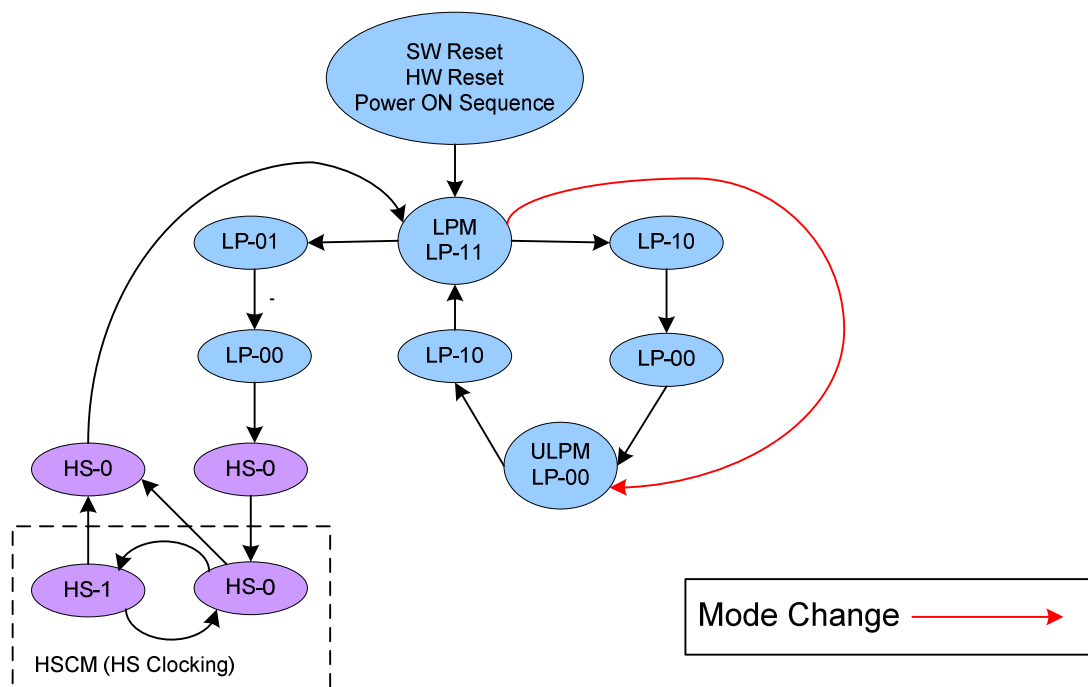
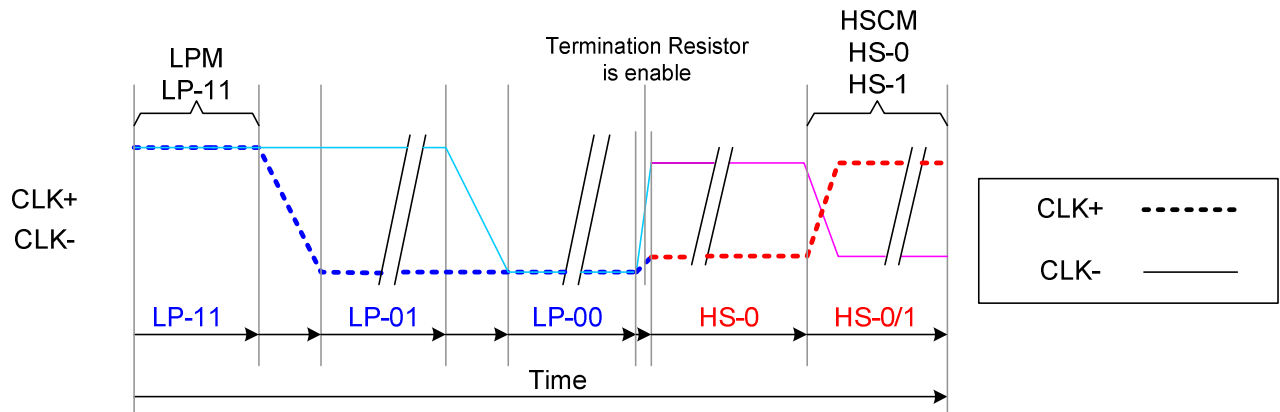


Figure 31: Mode Change from LPM to ULPM

## High-Speed Clock Mode (HSCM)

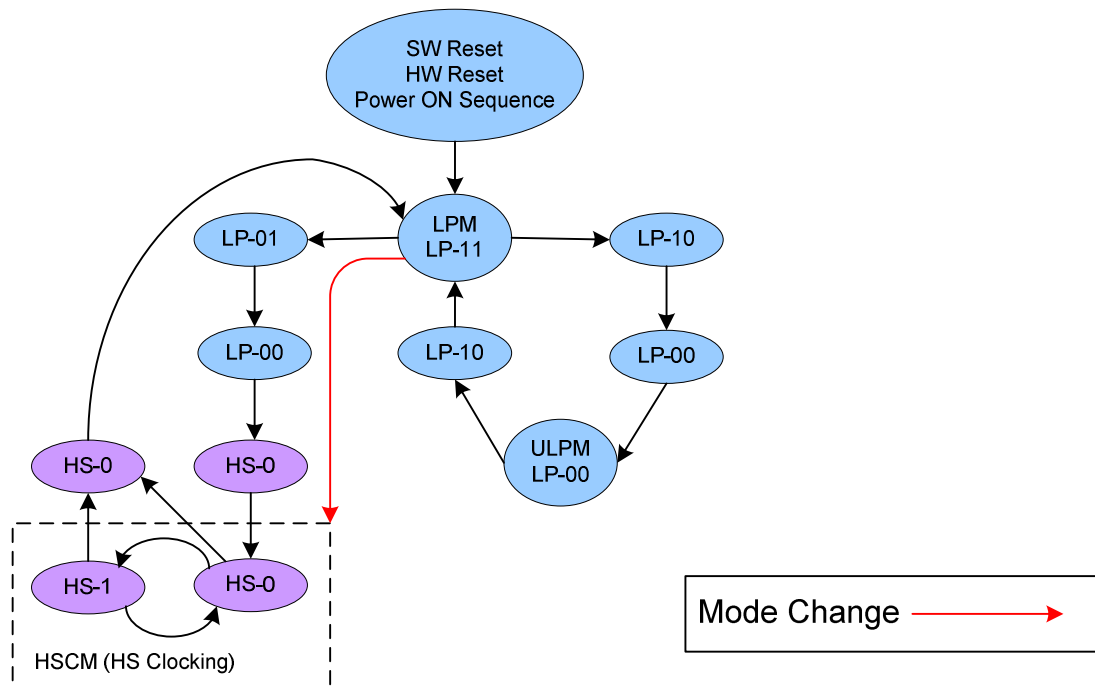
DSI-CLK+/- lanes can be driven to the High Speed Clock Mode (HSCM) when DSI-CLK lanes start to work between HS-0 and HS-1 State Codes.

The only entering possibility is from the Low Power Mode (LPM, LP-11 State Code) => LP-01 => LP-00 => HS-0 => HS-0/1 (HSCM). The sequence is illustrated below.



**Figure 32: From LPM to HSCM**

The mode change is illustrated below.

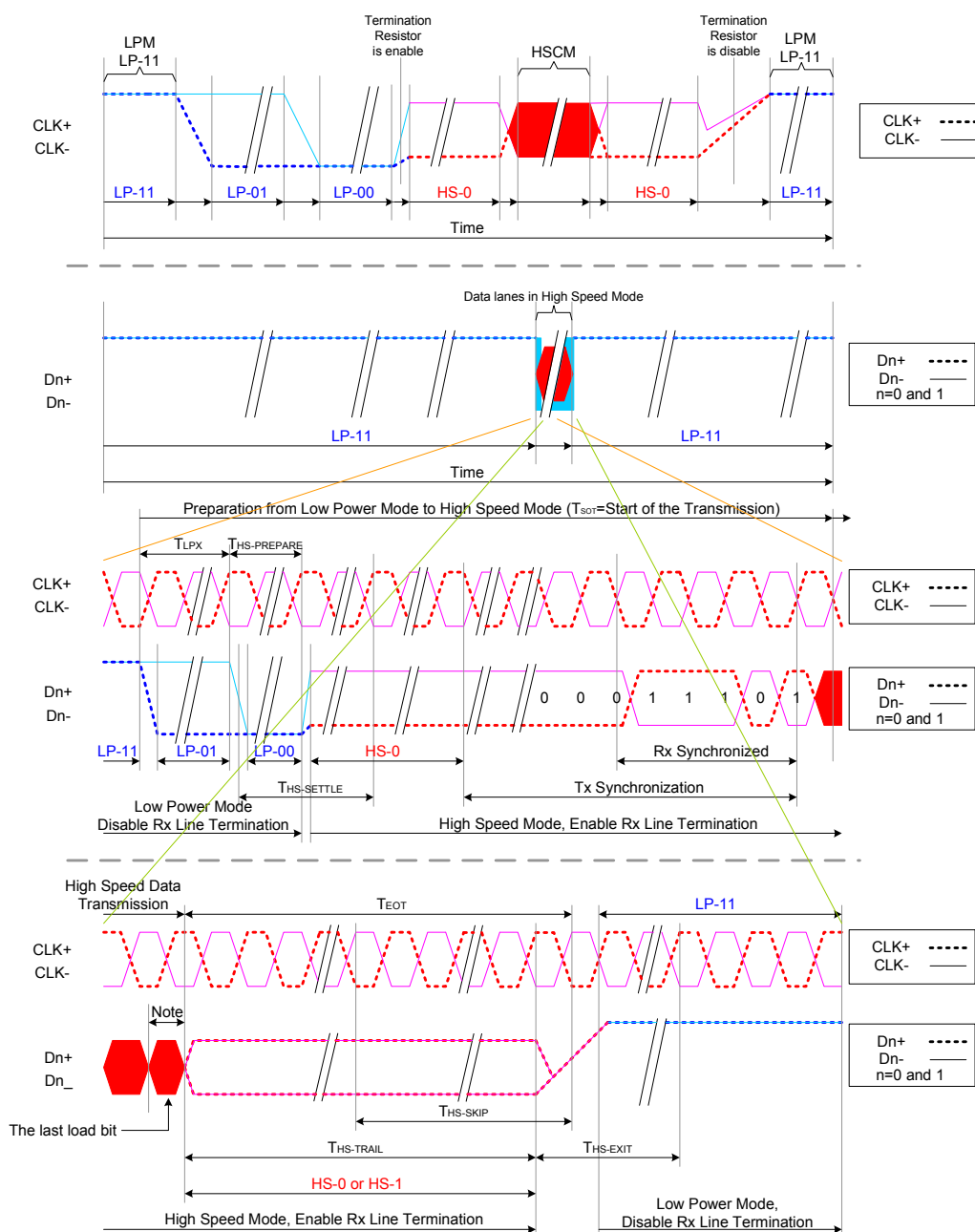


**Figure 33: Mode Change from LPM to HSCM**

The high speed clock (DSI-CLK+/-) starts before high speed data is sent via DSI-D1+/- or DSI-D0+/- lanes. The high speed clock continues clocking after the high speed data sending is stopped.

The burst of the high speed clock consists of:

- Even number of transitions
- Start state is HS-0
- End state is HS-0



**Figure 34: High Speed Clock Burst**<sup>Note</sup>

<sup>Note</sup> 1. If the last load bit is HS-0, the transmitter changes from HS-0 to HS-1.  
2. If the last load bit is HS-1, the transmitter changes from HS-1 to HS-0.

## DSI-D1 and DSI-D0 Data Lanes

### General

DSI-D1+/- and DSI-D0+/- Data Lanes can be driven to different modes:

- Escape Mode (only DSI-D0+/- data lanes are used)
- High-Speed Data Transmission (DSI-D1+/- and DSI-D0+/- data lanes are used)
- Bus Turnaround Request (only DSI-D0+/- data lanes are used)

These modes and their entering codes are defined in the following table.

**Table 12: Entering and Leaving Sequences**<sup>Note</sup>

| Mode                         | Entering Mode Sequence                | Leaving Mode Sequence          |
|------------------------------|---------------------------------------|--------------------------------|
| Escape Mode                  | LP-11 → LP-10 → LP-00 → LP-01 → LP-00 | LP-00 → LP-10 → LP-11 (Mark-1) |
| High-Speed Data Transmission | LP-11 → LP-01 → LP-00 → HS-0          | (HS-0 or HS-1) → LP-11         |
| Bus Turnaround Request       | LP-11 → LP-10 → LP-00 → LP-10 → LP-00 | Hi-Z                           |

<sup>Note</sup> 1. DSI-D1+/- and DSI-D0+/- data lanes are used.  
2. See more information in the chapter of Bus Turnaround.



## Escape Modes

DSI-D0+/- data lanes can be used in different Escape Modes when data lanes are in the Low Power (LP) mode.

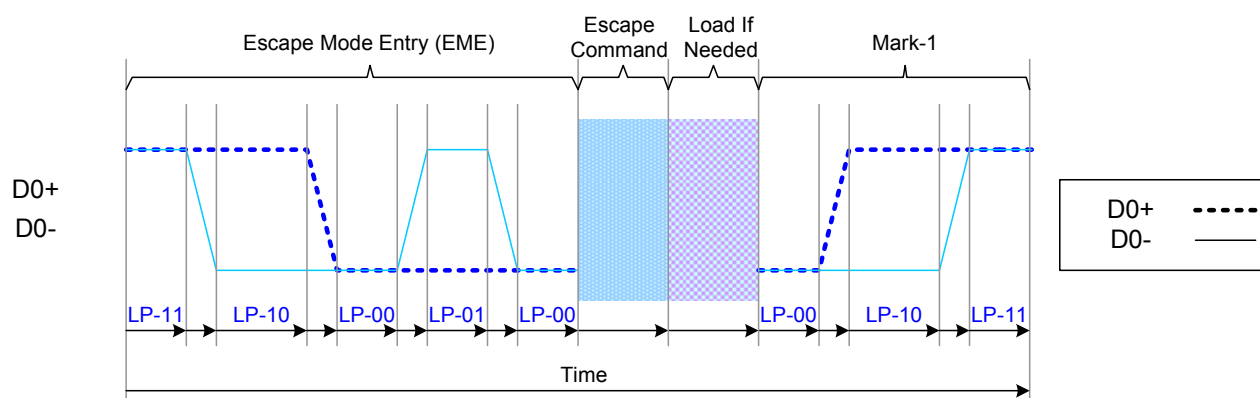
These Escape Modes are used to:

- Send “Low-Power Data Transmission” (LPDT) from the MPU to the display module,
- Drive data lanes to “Ultra-Low Power State” (ULPS),
- Indicate “Remote Application Reset” (RAR), which can reset the display module,
- Indicate “Tearing Effect” (TEE), which is used to transmit a TE line event from the display module to the MPU,
- Indicate “Acknowledge” (ACK), which is used to transmit a non-error event from the display module to the MPU.

The basic sequence of the Escape Mode is as follows:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Escape Command (EC), which is coded when one of the data lanes changes from low-to-high-to-low, then this changed data lane presents the value of the current data bit (DSI-D0+ = 1, DSI-D0- = 0). For example, when DSI-D0- changes from low-to-high-to-low, the receiver latches a data bit, which value is the logical 0. The receiver uses this low-to-high-to-low transition for its internal clock.
- A load if necessary
- Exit Escape (Mark-1) LP-00 => LP-10 => LP-11
- End: LP-11

This basic construction is illustrated below:



**Figure 35: General Escape Mode Sequence**

A total of eight Escape Commands (EC) are divided into two types: Mode and Trigger, as described in Table 13: Escape Commands.

An example of a Mode type Escape Command is Ultra-Low Power Mode, where the MPU instructs the display module to enter its Ultra-Low Power Mode.

An example of a Trigger type Escape Command is Tearing Effect. In this case, the MPU has already instructed the display module to provide this trigger and is waiting for a response. The display module then sends a TE trigger (TEE) on the next V-sync event.

Escape commands are defined in the table below.

**Table 13: Escape Commands<sup>Note</sup>**

| Escape command                 | Command Type Mode/Trigger | Entry command Pattern<br>(First Bit → Last Bit Transmitted) | Dn | D0 |
|--------------------------------|---------------------------|-------------------------------------------------------------|----|----|
| Low-Power Data Transmission    | Mode                      | 1110 0001 b                                                 | -  | X  |
| Ultra-Low Power Mode           | Mode                      | 0001 1110 b                                                 | X  | X  |
| Undefined-1, <sup>Note 1</sup> | Mode                      | 1001 1111 b                                                 | -  | -  |
| Undefined-2, <sup>Note 1</sup> | Mode                      | 1101 1110 b                                                 | -  | -  |
| Remote Application Reset       | Trigger                   | 0110 0010 b                                                 | -  | X  |
| Tearing Effect                 | Trigger                   | 0101 1101 b                                                 | -  | X  |
| Acknowledge                    | Trigger                   | 0010 0001 b                                                 | -  | X  |
| Unknown-5, <sup>Note 1</sup>   | Trigger                   | 1010 0000 b                                                 | -  | -  |

<sup>Note</sup> 1. This Escape command is not implemented in the display module.  
2. n = 1  
3. x = Supported  
4. - = Not Supported

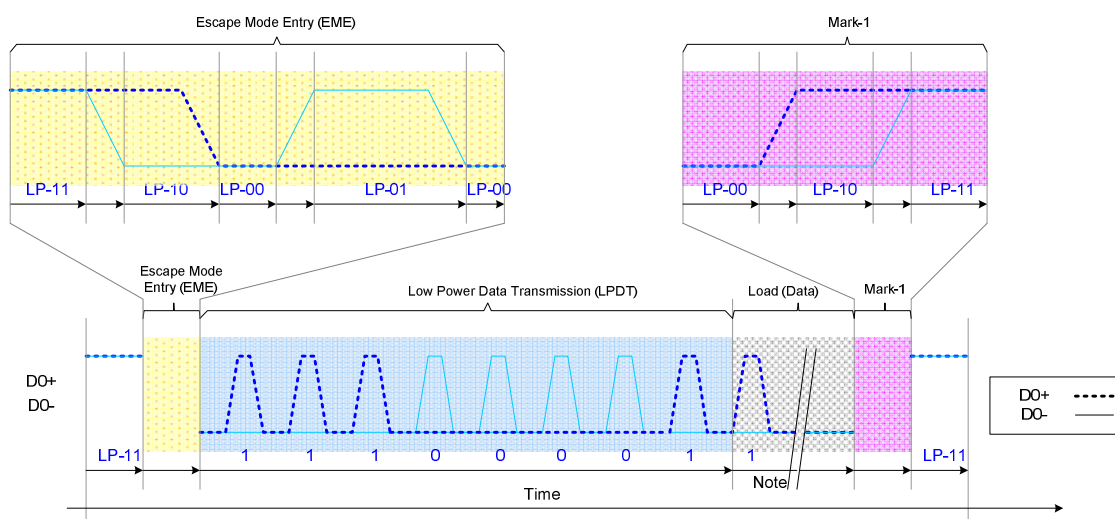
## Low-Power Data Transmission (LPDT)

The MPU can send data to the display module in the Low-Power Data Transmission (LPDT) mode when data lanes enter the Escape Mode and Low-Power Data Transmission (LPDT) command is sent to the display module. The display module uses the same sequence as which it sends data to the MPU.

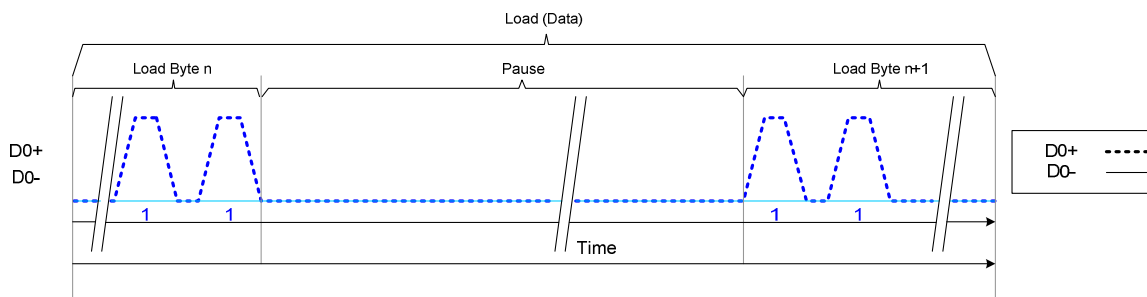
The Low Power Data Transmission (LPDT) uses the following sequence:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Low-Power Data Transmission (LPDT) command in the Escape Mode: 1110 0001 (first to last bit)
- Load (Data):
  - One or more bytes (8 bit)
  - Data lanes are in the pause mode when data lanes are stopped (both lanes are low) between bytes
- Mark-1: LP-00 => LP-10 => LP-11
- End: LP-11

This sequence is illustrated below for reference purpose:



**Figure 36: Low-Power Data Transmission (LPDT)**<sup>Note</sup>



**Figure 37: Pause (Example)**

<sup>Note</sup> In this example, load (Data) presents that the first bit is the logical 1.

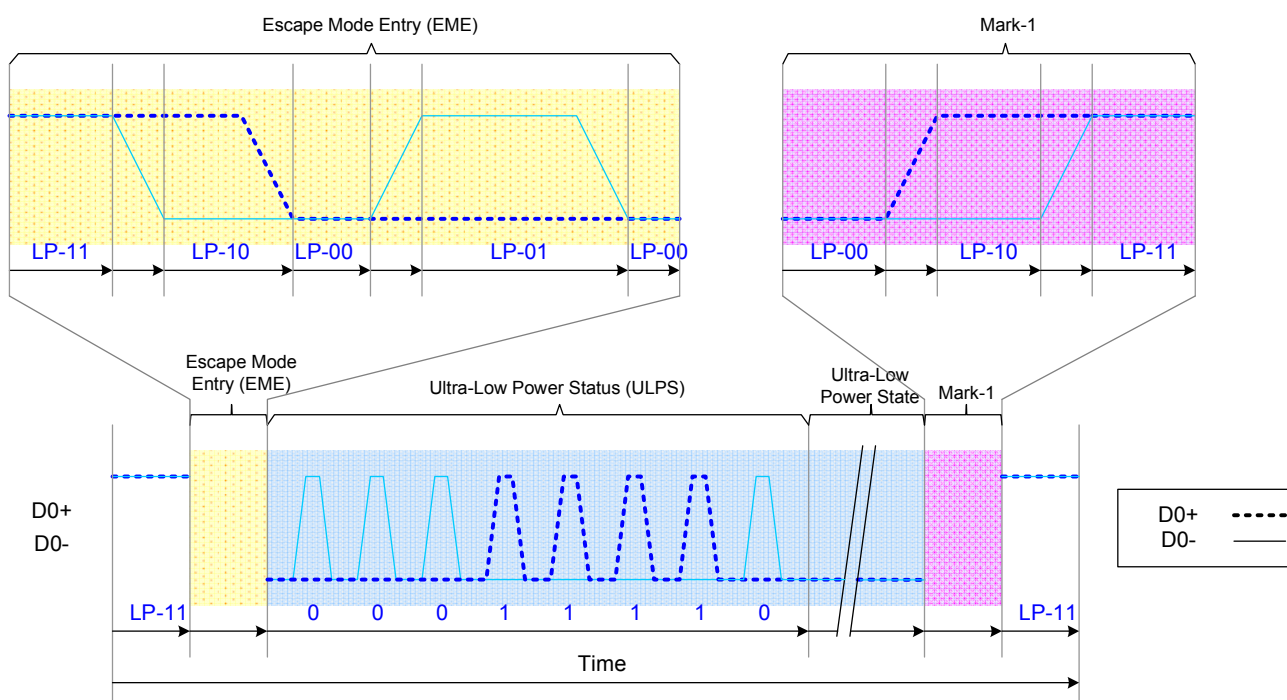
## Ultra-Low Power State (ULPS)

The MPU can force data lanes get into the Ultra-Low Power State (ULPS) mode when data lanes enter the Escape Mode.

The Ultra-Low Power State (ULPS) uses the following sequence:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Ultra-Low Power State (ULPS) command in the Escape Mode: 0001 1110 (first to last bit)
- Ultra-Low Power State (ULPS) when the MPU keeps data lanes low
- Mark-1: LP-00 => LP-10 => LP-11
- End: LP-11

This sequence is illustrated below for reference purpose:



**Figure 38: Ultra-Low Power State (ULPS)**

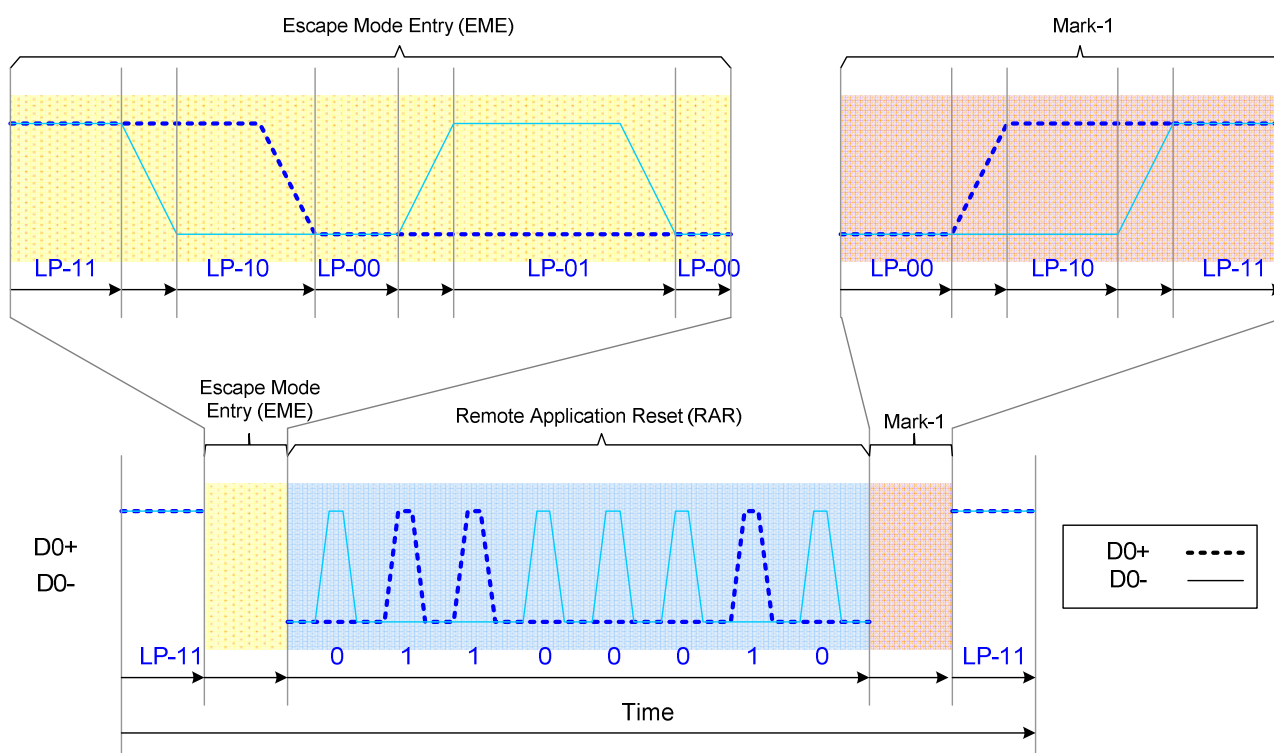
## Remote Application Reset (RAR)

The MPU can inform the display module that it should be reset in Remote Application Reset (RAR) trigger when data lanes enter the Escape Mode.

The Remote Application Reset (RAR) uses the following sequence:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Remote Application Reset (RAR) command in the Escape Mode: 0110 0010 (first to last bit)
- Mark-1: LP-00 => LP-10 => LP-11
- End: LP-11

This sequence is illustrated below for reference purpose:



**Figure 39: Remote Application Reset (RAR)**

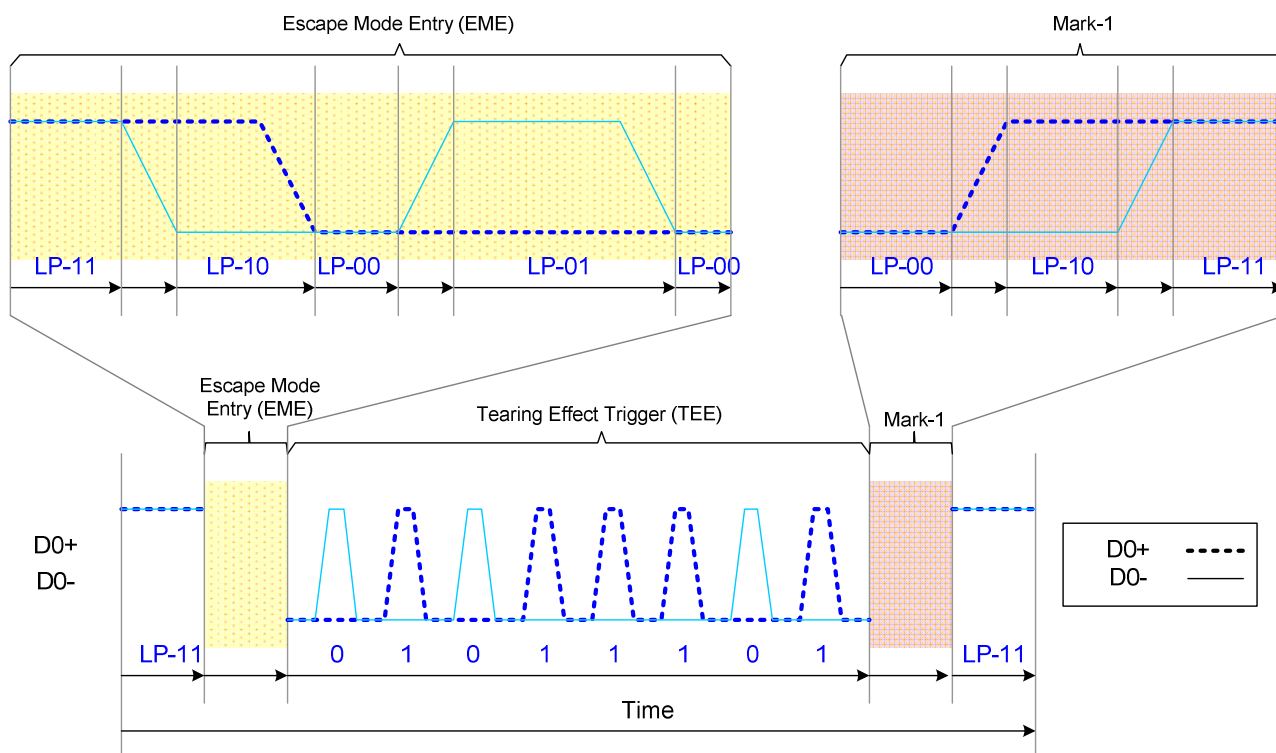
## Tearing Effect (TEE)

The display module can inform the MPU when a tearing effect event (New V-synch) has happened in the display module by the Tearing Effect (TEE).

The display module sends the Tearing Effect (TEE) with the following sequence:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Tearing Effect (TEE) trigger in the Escape Mode: 0101 1101 (first to last bit)
- Mark-1: LP-00 => LP-10 => LP-11
- End: LP-11

This sequence is illustrated below for reference purpose:



**Figure 40: Tearing Effect (TEE)**

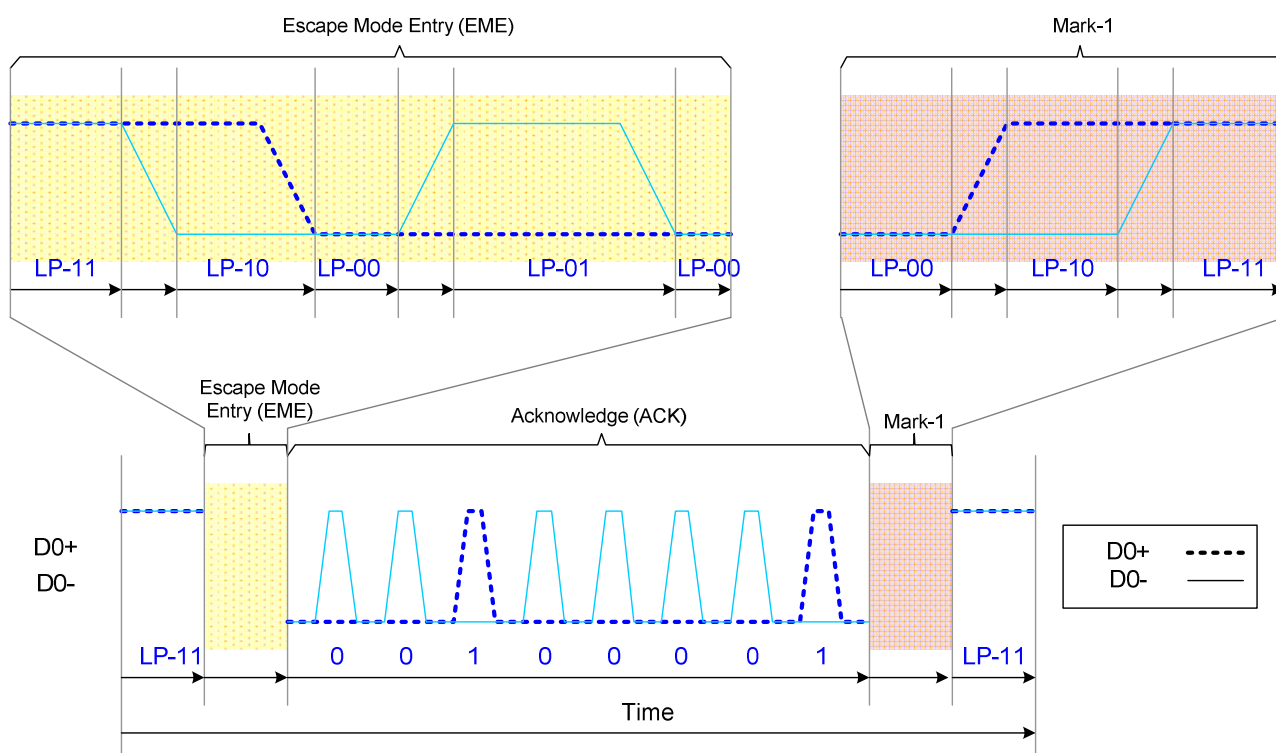
## Acknowledge (ACK)

The display module can inform the MPU that no errors are found by the Acknowledge (ACK).

The display module sends the Acknowledge (ACK) with the following sequence:

- Start: LP-11
- Escape Mode Entry (EME): LP-11 => LP-10 => LP-00 => LP-01 => LP-00
- Acknowledge (ACK) command in the Escape Mode: 0010 0001 (first to last bit)
- Mark-1: LP-00 => LP-10 => LP-11
- End: LP-11

This sequence is illustrated below for reference purpose:



**Figure 41: Acknowledge (ACK)**

## High-Speed Data Transmission (HSDT)

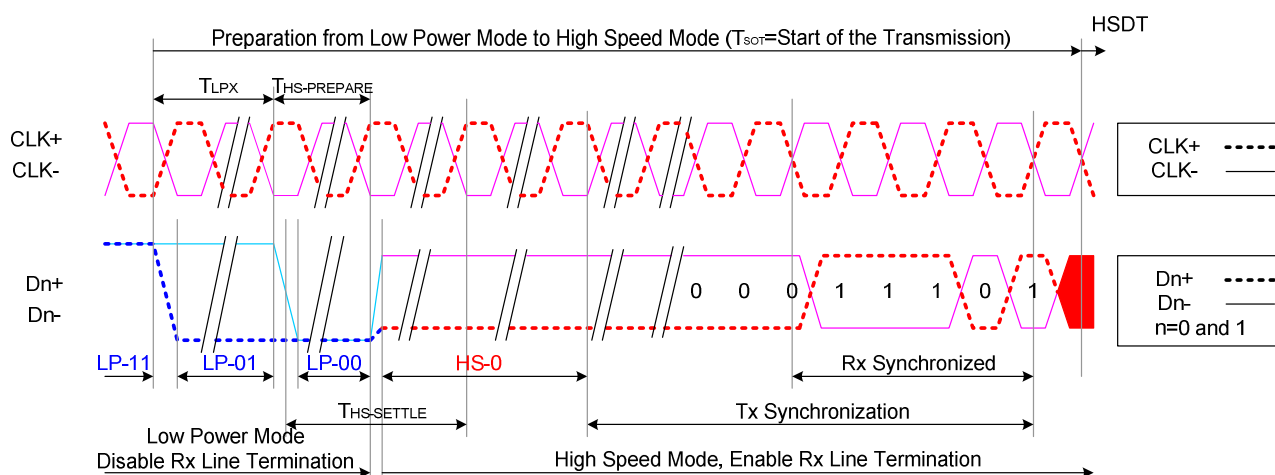
### Entering High-Speed Data Transmission (T<sub>SOT</sub> of HSDT)

The display module enters the High-Speed Data Transmission (HSDT) when Clock lanes DSI-CLK+/- have already entered the High-Speed Clock Mode (HSCM) through the MPU. See more information in the chapter “High-Speed Clock Mode (HSCM)”.

Data lanes DSI-D1+/- and DSI-D0+/- of the display module enter the High-Speed Data Transmission (T<sub>SOT</sub> of HSDT) with the following sequence:

- Start: LP-11
- HS-Request: LP-01
- HS-Settle: LP-00 => HS-0 (Rx: Lane Termination Enable)
- Rx Synchronization: 011101 (Tx (= MPU) Synchronization: 0001 1101)
- End: High-Speed Data Transmission (HSDT) – Ready to receive High-Speed Data Load

This sequence of entering High-Speed Data Transmission (T<sub>SOT</sub> of HSDT) is illustrated below:



**Figure 42: Entering High-Speed Data Transmission (T<sub>SOT</sub> of HSDT)**



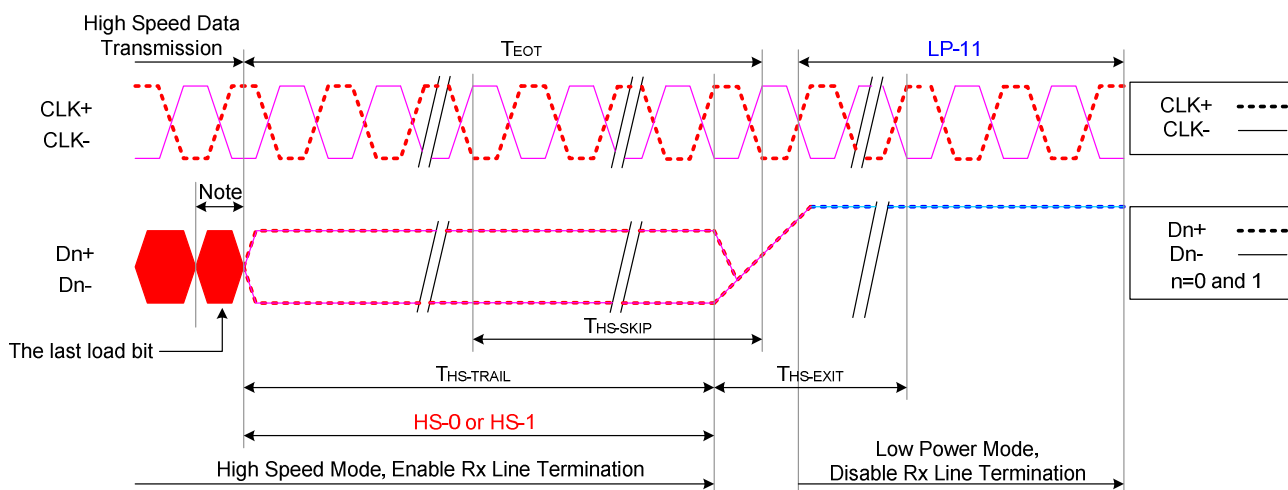
## Leaving High-Speed Data Transmission (T<sub>EOT</sub> of HSDT)

The display module leaves the High-Speed Data Transmission (T<sub>EOT</sub> of HSDT) when Clock lanes DSICLK+/- are in the High-Speed Clock Mode (HSCM) through the MPU. This HSCM is kept until data lanes DSI-D1+/- and DSI-D0+/- are in the LP-11 mode. See more information in the chapter “High-Speed Clock Mode (HSCM)”.

Data lanes DSI-D1+/- and DSI-D0+/- of the display module leave the High-Speed Data Transmission (T<sub>EOT</sub> of HSDT) with the following sequence:

- Start: High-Speed Data Transmission (HSDT)
- Stops High-Speed Data Transmission
  - o MPU changes to HS-1, if the last load bit is HS-0
  - o MPU changes to HS-0, if the last load bit is HS-1
- End: LP-11 (Rx: Lane Termination Disable)

The sequence of leaving High-Speed Data Transmission (T<sub>EOT</sub> of HSDT) is illustrated below:



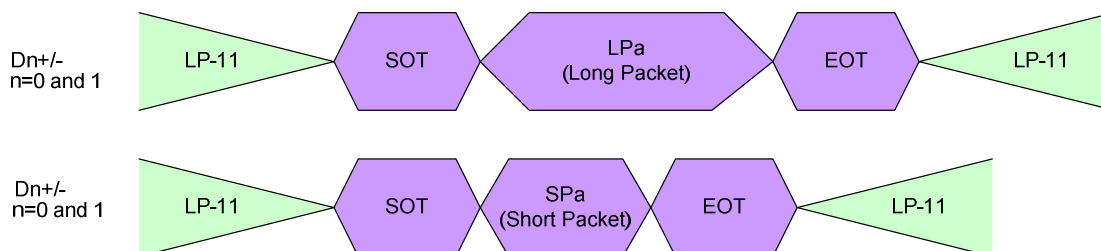
**Figure 43: Leaving High-Speed Data Transmission (T<sub>EOT</sub> of HSDT)<sup>Note</sup>**

<sup>Note</sup> 1. If the last load bit is HS-0, the transmitter changes from HS-0 to HS-1.  
2. If the last load bit is HS-1, the transmitter changes from HS-1 to HS-0.

## Burst of the High-Speed Data Transmission (HSDT)

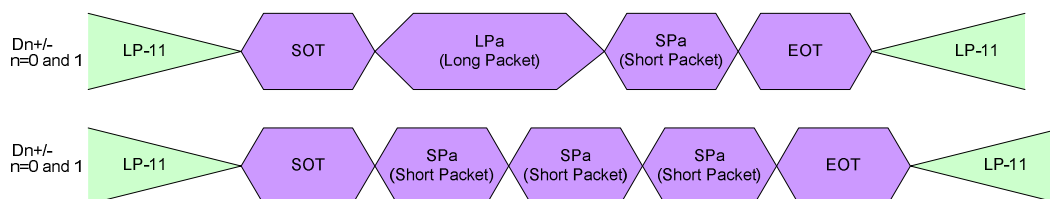
The burst of the “High-Speed Data Transmission” (HSDT) can consist of one data packet or several data packets. These data packets can be Long (LPa) or Short (SPa) packets. These packets are defined in the chapter “Short Packet (SPa) and Long Packet (LPa) Structures”.

These different burst of the High-Speed Data Transmission (HSDT) cases are illustrated below for reference purpose.



**Figure 44: Single Packet in High-Speed Data Transmissions**

The multiple packets in High-Speed Data Transmission are illustrated below for reference purposes:

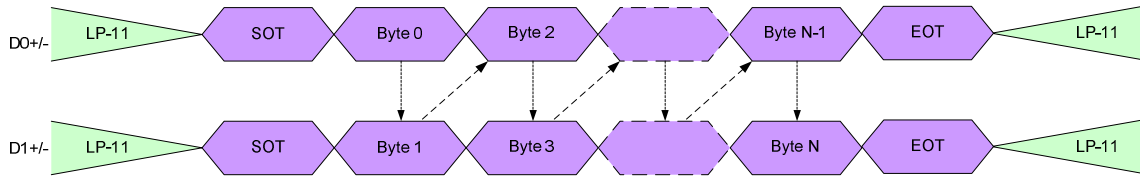


**Figure 45: Multiple Packets in High-Speed Data Transmission – Examples**

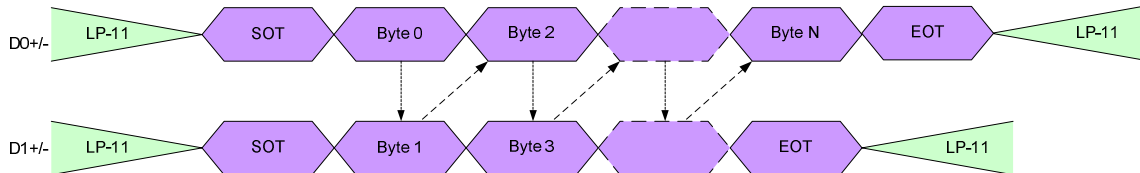
**Figure 46: Abbreviations**

| Abbreviation | Explanation                                          |
|--------------|------------------------------------------------------|
| EOT          | End of the Transmission                              |
| LPa          | Long Packet                                          |
| LP-11        | Low Power Mode, Both of Data lanes are 1 (Stop Mode) |
| SPa          | Short Packet                                         |
| SOT          | Start of the Transmission                            |

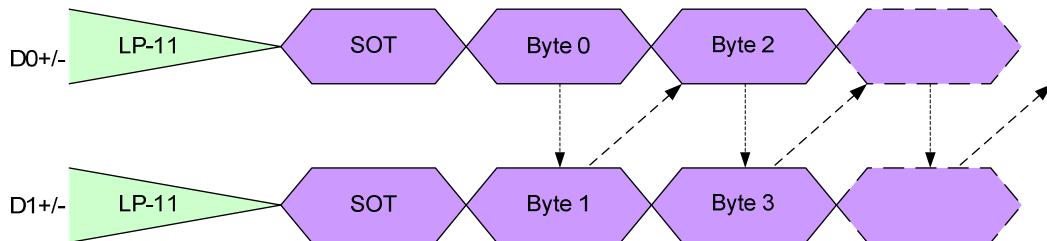
Byte orders of the sent packet in High-Speed Data Transmission (HSDT) are as follows.



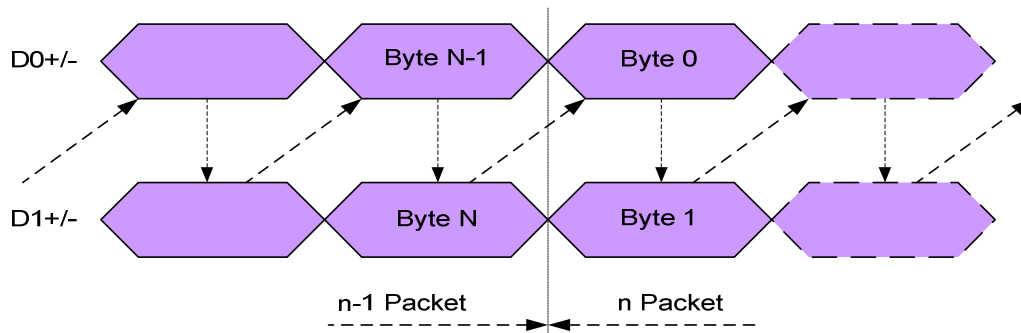
**Figure 47: Single Packet in HSDT – Even Number of Bytes**



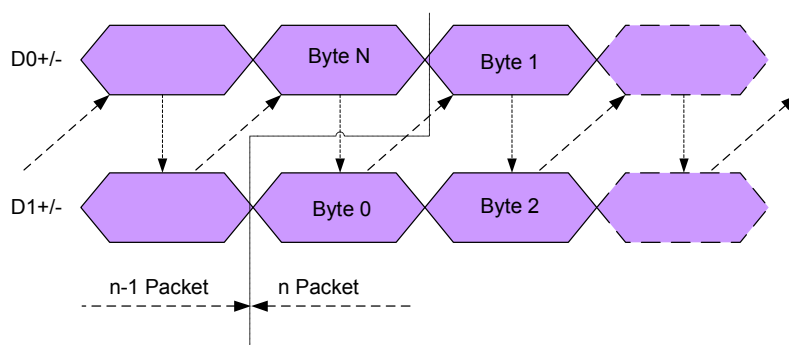
**Figure 48: Single Packet in HSDT – Odd Number of Bytes**



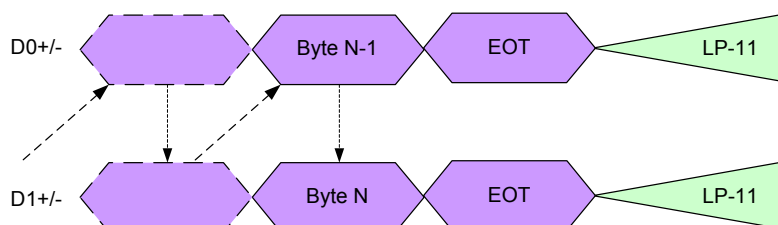
**Figure 49: Start of Transmission (SoT) in HSDT for Multiple Packets**



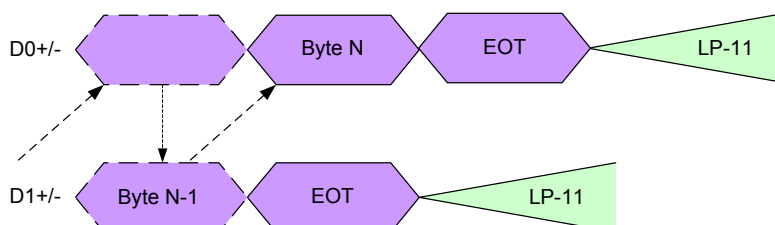
**Figure 50: Continuous Multiple Packets in HSDT when Number of Bytes is Equal on Both Data Lanes at the End of the Packet**



**Figure 51: Continuous Multiple Packets in HSDT when Number of Bytes is not Equal on Both Data Lanes at the End of the Packet**



**Figure 52: End of Transmission (EoT) in HSDT when Number of Bytes is Equal on Both Data Lanes at the End of the Packet**



**Figure 53: End of Transmission (EoT) in HSDT when Number of Bytes is not Equal on Both Data Lanes at the End of the Packet**

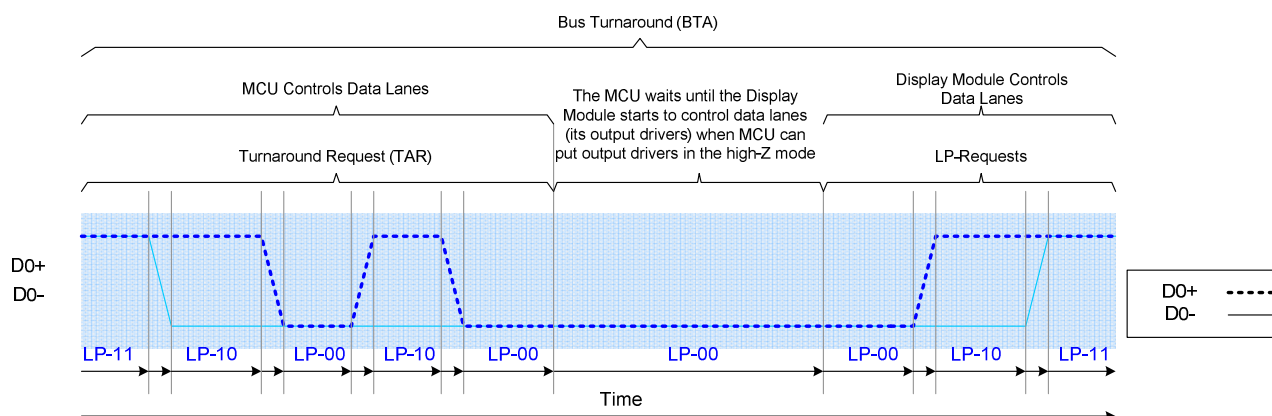
## Bus Turnaround (BTA)

The MPU or the display module, which controls DSI-D0+/- Data Lanes, can start a bus turnaround procedure when it requires information from a receiver, which can be the MPU or the display module.

The MPU and the display module use the same sequence when this bus turnaround procedure is applied. The sequence when the MPU wants to perform the bus turnaround procedure to the display module is described below for reference purpose:

- Start (MPU): LP-11
- Turnaround Request (MPU): LP-11 => LP-10 => LP-00 => LP-10 => LP-00
- The MPU waits until the display module starts to control DSI-D0+/- data lanes and the MPU stops to control DSI-D0+/- data lanes (= High-Z)
- The display module changes to the stop mode: LP-00 => LP-10 => LP-11

The same bus turnaround procedure (from the MPU to the display module) is illustrated below:



**Figure 54: Bus Turnaround Procedure**

The MPU and the display module can be switched in Figure 54: Bus Turnaround Procedure, if the Bus Turnaround (BTA) is from the display module to the MPU.

## Packet Level Communication

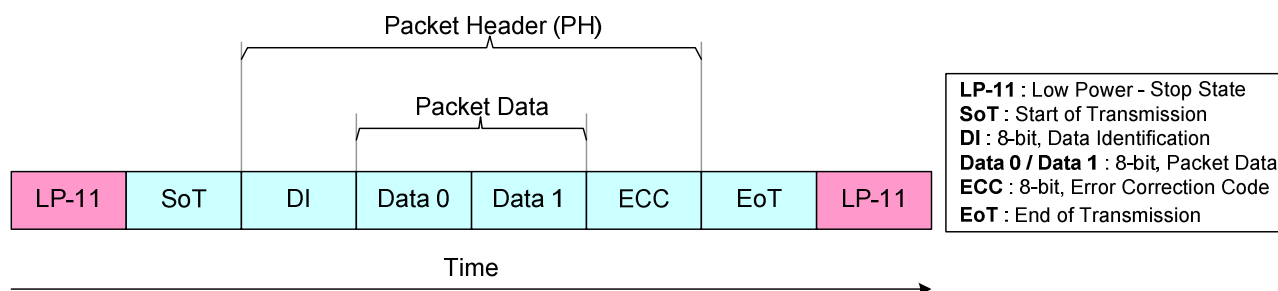
### Short Packet (SPa) and Long Packet (LPa) Structures

Short Packets (SPa) and Long Packets (LPa) can always be used when data transmission is done in Low Power Data Transmission (LPDT) or High-Speed Data Transmission (HSDT) modes<sup>Note</sup>.

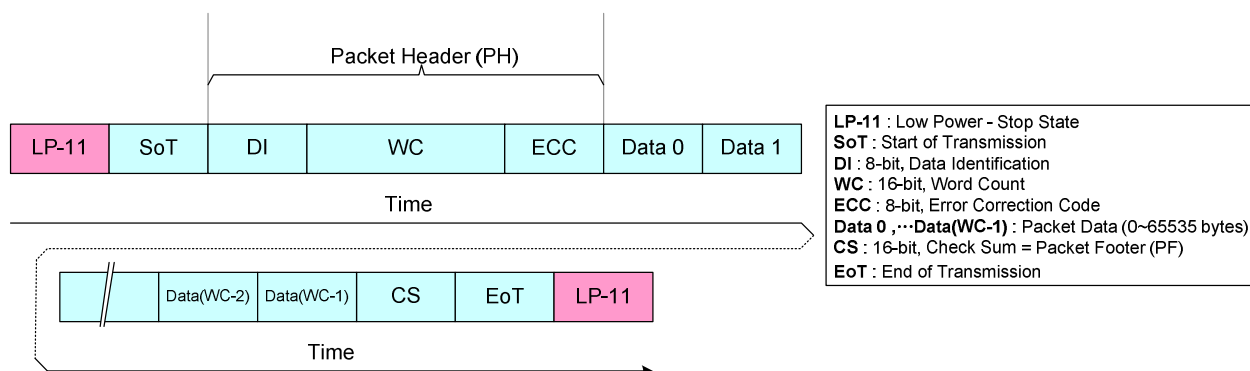
The lengths of the packets are:

- Short Packet (SPa): 4 bytes
- Long Packet (LPa): 6 to 65,541 bytes

The type of the packet (SPa or LPa) can be recognized from their packet headers (PH).



**Figure 55: Short Packet (SPa) Structure**



**Figure 56: Long Packet (LPa) Structure**

<sup>Note</sup> Short Packet (SPa) and Long Packet (LPa) present a single packet sending (= including LP-11, SoT, and EoT for each packet sending).

The other possibility is that SoT, EoT and LP-11 between packets are not necessary if packets are sent in multiple packet formats, for example:

- LP-11 => SoT => SPa => LPa => SPa => SPa => EoT => LP-11
- LP-11 => SoT => SPa => SPa => SPa => EoT => LP-11
- LP-11 => SoT => LPa => LPa => LPa => EoT => LP-11

## Bit Transmission Order of Bytes in Packets

The bit transmission order in a byte, which is used in packets, is that the Least Significant Bit (LSB) of a byte is sent first and the Most Significant Bit (MSB) of a byte is sent last.

This transmission order is illustrated below for reference purpose.

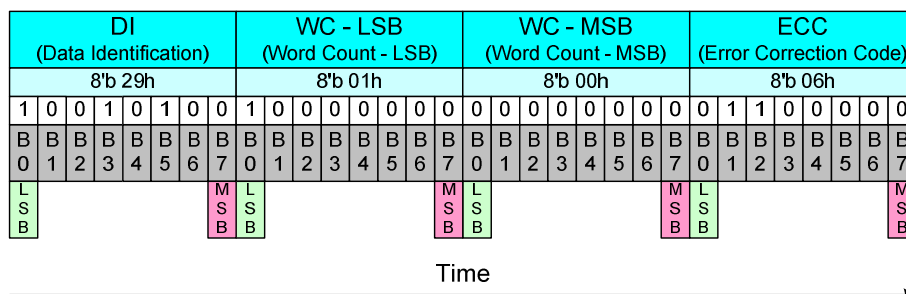


Figure 57: Bit Transmission Order of Bytes in Packets

## Byte Transmission Order of Multiple-Byte Information in Packets

The byte transmission order of the multiple-byte information, what is used in packets, is that the Least Significant (LS) Byte of the information is sent first and the Most Significant (MS) Byte of the information is sent last. For example, Word Count (WC) consists of 2 bytes (16 bits); the LS byte is sent first and the MS byte is sent last.

This transmission order is illustrated below for reference purpose.

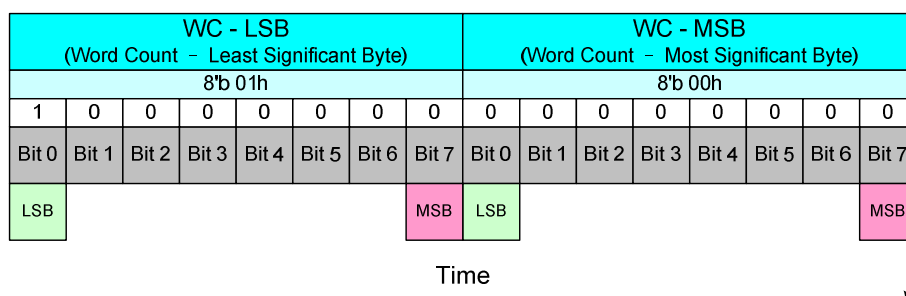


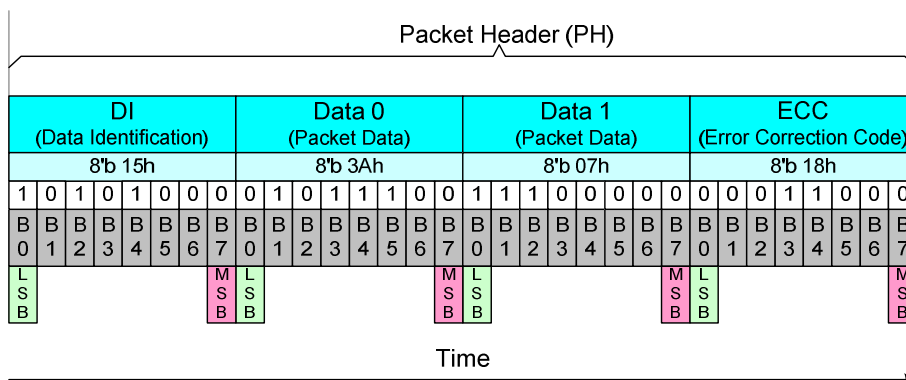
Figure 58: Byte Transmission Order of the Multiple-Byte Information in Packets

## Packet Header (PH)

The packet header always consists of 4 bytes. The content of these 4 bytes are different for Short Packets (SPa) and Long Packets (LPa).

### Short Packet (SPa):

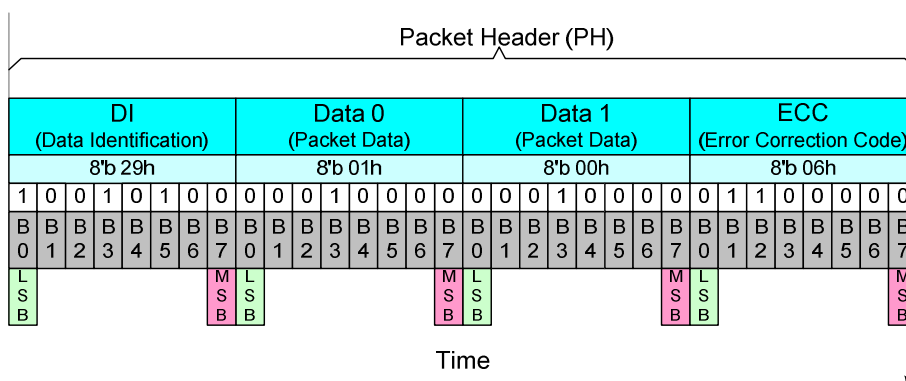
- 1<sup>st</sup> byte: Data Identification (DI) => identify that this is a Short Packet (SPa)
- 2<sup>nd</sup> and 3<sup>rd</sup> bytes: Packet Data (PD), Data 0 and 1
- 4<sup>th</sup> byte: Error Correction Code (ECC)



**Figure 59: Packet Header (PH) of a Short Packet (SPa)**

### Long Packet (LPa):

- 1<sup>st</sup> byte: Data Identification (DI) => identify that this is a Long Packet (LPa)
- 2<sup>nd</sup> and 3<sup>rd</sup> bytes: Word Count (WC)
- 4<sup>th</sup> byte: Error Correction Code (ECC)



**Figure 60: Packet Header (PH) on Long Packet (LPa)**

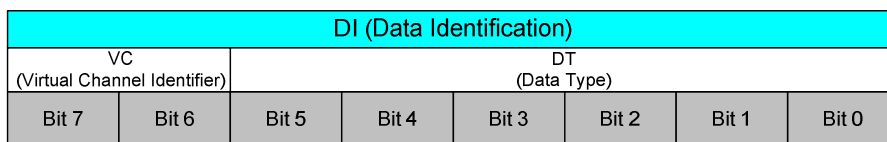


## Data Identification (DI)

Data Identification (DI) is a part of the Packet Header (PH) and it consists of 2 parts:

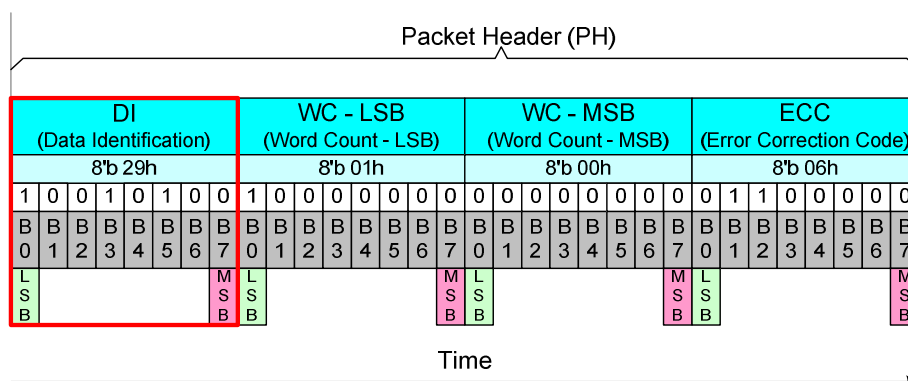
- Virtual Channel (VC), 2 bits, DI [7...6]
- Data Type (DT), 6 bits, DI [5...0]

The Data Identification (DI) structure is illustrated in the figure below.



**Figure 61: Data Identification (DI) Structure**

Data Identification (DI) is illustrated in the Packet Header (PH) below for reference purpose.

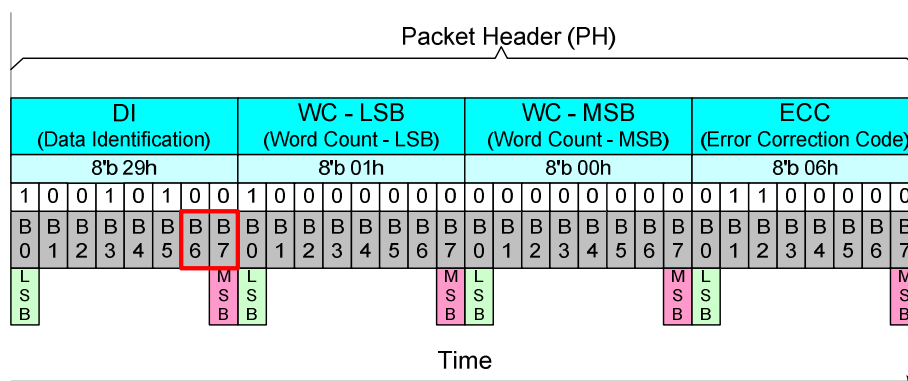


**Figure 62: Data Identification (DI) in the Packet Header (PH)**

## Virtual Channel (VC)

Virtual Channel (VC) is a part of the Data Identification (DI [7...6]) structure and it is used to indicate where a packet is to be sent from the MPU.

Bits of the Virtual Channel (VC) are illustrated below for reference purpose.

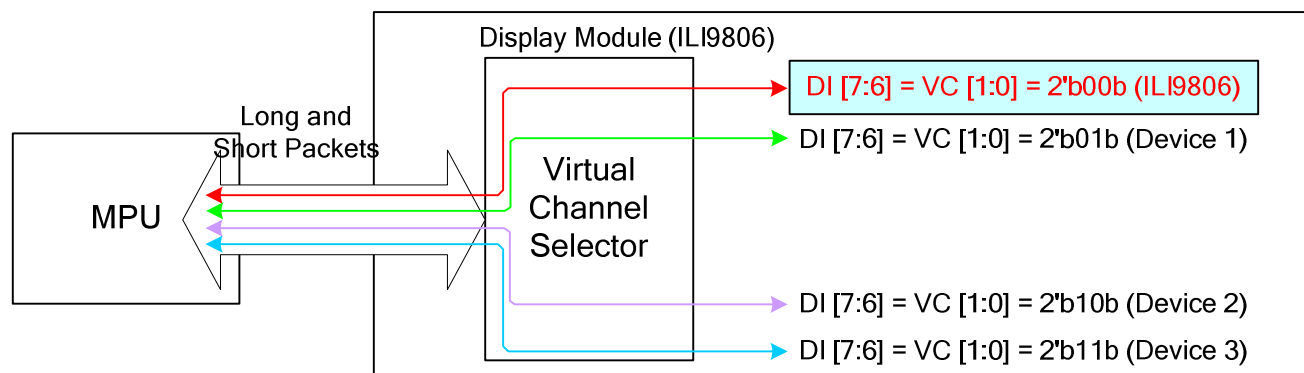


**Figure 63: Virtual Channel (VC) on the Packet Header (PH)**

Virtual Channel (VC) can assign 4 different channels to 4 different display modules. Devices use the same virtual channel as which the MPU uses to send packets to them, for example,

- The MPU uses the virtual channel 0 when it sends packets to ILI9806H
- ILI9806H also uses the virtual channel 0 when it sends packets to the MPU

This functionality is illustrated below.



**Figure 64: Virtual Channel (VC) Configuration**

Virtual Channel (VC) is always 0 (DI [7..6] = VC [1..0] = 00b) when the MPU sends the End of Transmission Packet to the display module. See the chapter "End of Transmission Packet (EoTP)".

This display module does not support the virtual channel selector for other devices (1 to 3) when the only possible virtual channel (VC [1..0]) is 00b for this display module.



**Table 15: Data Types (DT) from the Display Module (ILI9806H) to the MPU**

| From the Display Module (ILI9806H) to the MPU |      |      |      |      |      |     |                                          |                    |              |
|-----------------------------------------------|------|------|------|------|------|-----|------------------------------------------|--------------------|--------------|
| Bit5                                          | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 | Hex | Description                              | Short/Long Packet  | Abbreviation |
| 0                                             | 0    | 0    | 0    | 1    | 0    | 02  | Acknowledge with Error Report            | SPa (Short Packet) | AwER         |
| 0                                             | 1    | 1    | 1    | 0    | 0    | 1C  | DCS Read Long Response                   | LPa (Long Packet)  | DCSRR-L      |
| 1                                             | 0    | 0    | 0    | 0    | 1    | 21  | DCS Read Short Response, 1 byte returned | SPa (Short Packet) | DCSRR1-S     |
| 1                                             | 0    | 0    | 0    | 1    | 0    | 22  | DCS Read Short Response, 2 byte returned | SPa (Short Packet) | DCSRR2-S     |

The receiver will ignore other Data Types (DT) if they are not defined in the “Table 14: Data Type (DT) from the MPU to the Display Module (or Other Devices)” or “Table 15: Data Type (DT) from the Display Module (or Other Devices) to the MPU”.

## Packet Data (PD) of a Short Packet (SPa)

Packet Data (PD) of a Short Packet (SPa) is defined after Data Type (DT) of the Data Identification (DI), which indicates that a Short Packet (SPa) is to be sent.

Packet Data (PD) of a Short Packet (SPa) consists of 2 data bytes: Data 0 and Data 1.

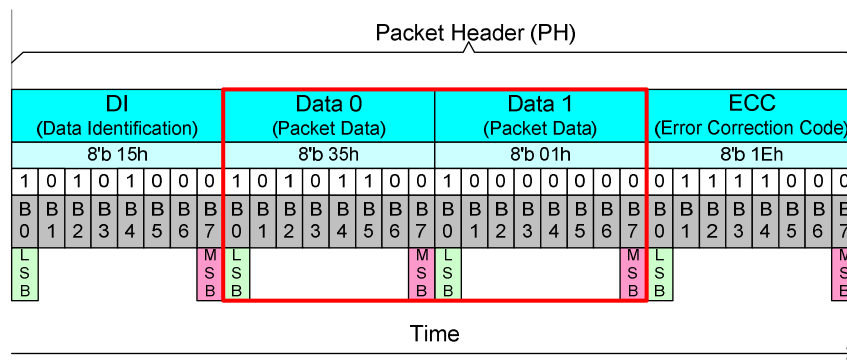
The sending order of Packet Data (PD) is that Data 0 is sent first and the Data 1 is sent last.

Bits of Data 1 are set to 0 if the information length is 1 byte.

Packet Data (PD) of a Short Packet (SPa), when the length of the information is 1 or 2 bytes and Virtual Channel (VC) is 0, are illustrated below for reference purpose.

Packet Data (PD) information:

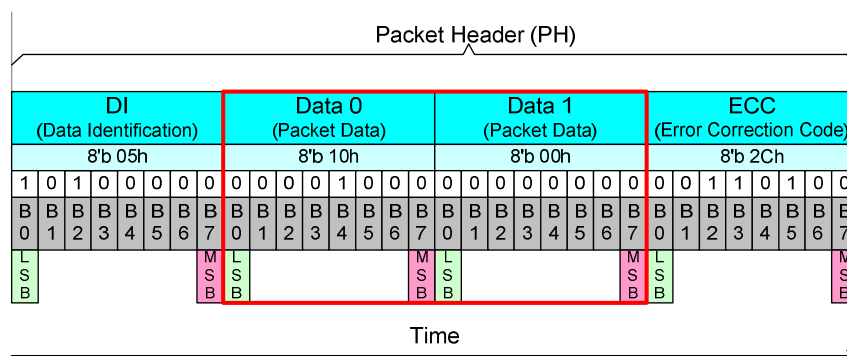
- Data 0: 35hex (Display Command Set (DCS) with 1 Parameter => DI (Data Type (DT)) = 15hex)
- Data 1: 01hex (DCS's parameter)



**Figure 66: Packet Data (PD) of a Short Packet (SPa), 2 Bytes Information**

Packet Data (PD) information:

- Data 0: 10hex (DCS without parameter => DI (Data Type (DT)) = 05hex)
- Data 1: 00hex (Null)



**Figure 67: Packet Data (PD) of a Short Packet (SPa), 1 Byte Information**

## Word Count (WC) of a Long Packet (LPa)

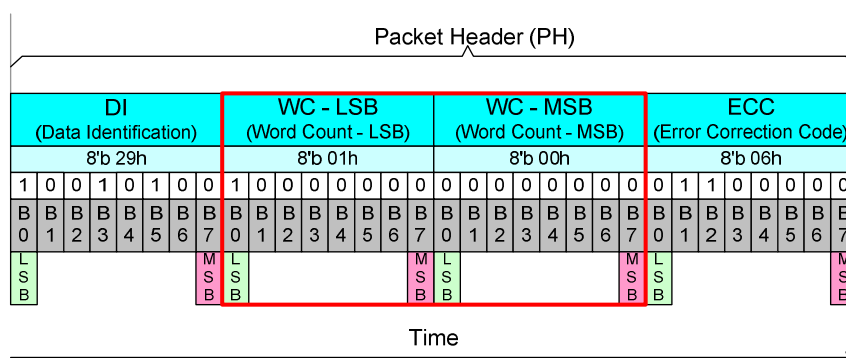
Word Count (WC) of a Long Packet (LPa) is defined after Data Type (DT) of the Data Identification (DI), which indicates that Long Packet (LPa) is to be sent.

Word Count (WC) indicates the amount of data bytes of the Packet Data (PD) which are to be sent after the Packet Header (PH). The location of Word Count (WC) in a Long Packet is the same as which of Packet Data (PD) in a Short Packet.

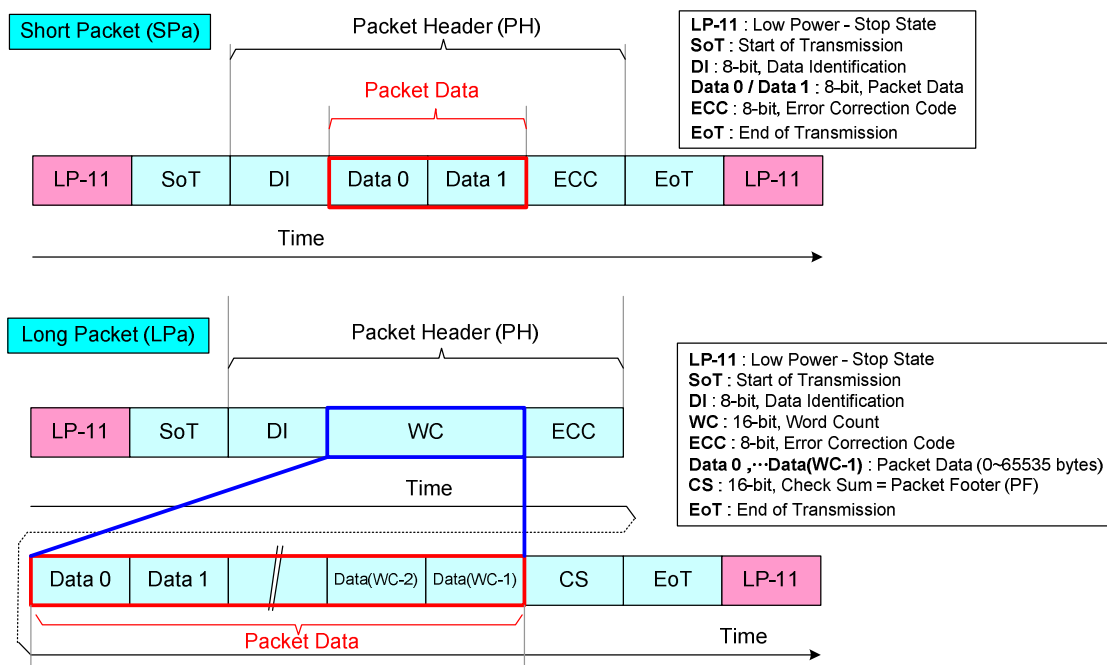
Word Count (WC) of a Long Packet (LPa) consists of 2 bytes.

The sending order of these 2 bytes of the Word Count (WC) is that the Least Significant (LS) Byte is sent first and the Most Significant (MS) Byte is sent last.

Word Count (WC) of a Long Packet (LPa) is illustrated below for reference purposes.



**Figure 68: Word Count (WC) of a Long Packet (LPa)**



**Figure 69: Packet Data in Short and Long Packets**

## Error Correction Code (ECC)

Error Correction Code (ECC) is a part of the Packet Header (PH), and its purpose is to identify an error or errors.

The ECC protects the following fields:

- Short Packet (SPa): Data Identification (DI) byte (8 bits: D [0...7]), Packet Data (PD) bytes (16 bits: D [8...23]) and ECC (8 bits: P [0...7])
- Long Packet (LPa): Data Identification (DI) byte (8 bits: D [0...7]), Word Count (WC) bytes (16 bits: D [8...23]) and ECC (8 bits: P [0...7])

D [23...0] and P [7...0] are illustrated below for reference purpose.

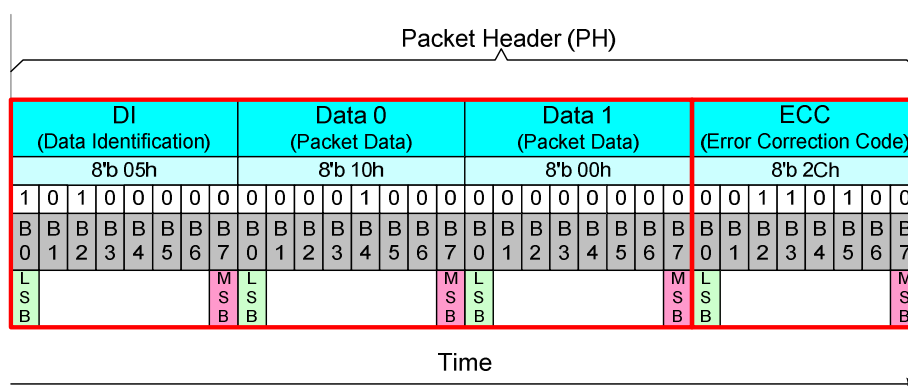


Figure 70: D [23...0] and P [7...0] of a Short Packet (SPa)

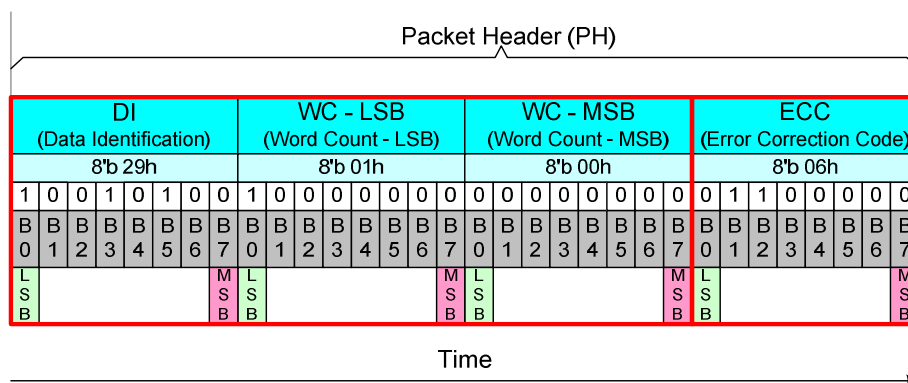
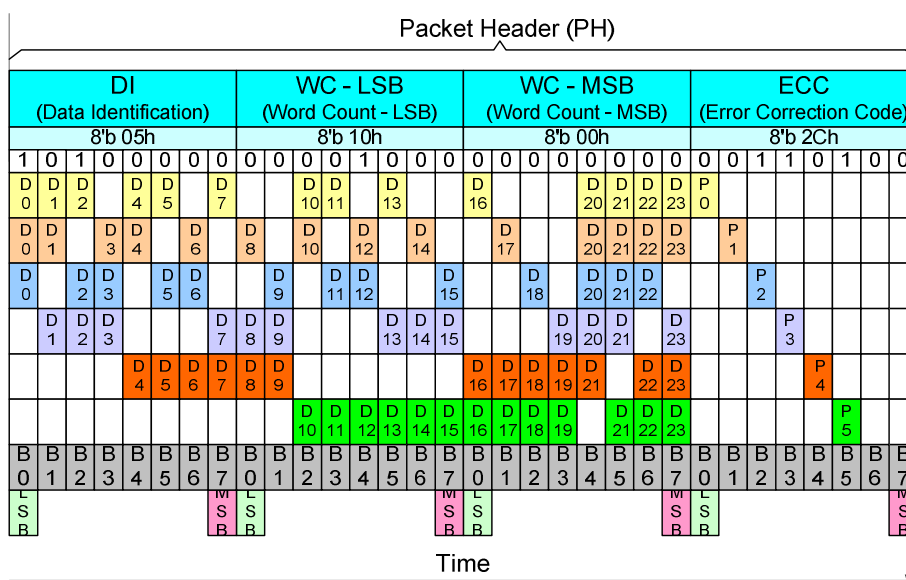


Figure 71: D [23...0] and P [7...0] of a Long Packet (LPa)

Error Correction Code (ECC) can recognize one error or several errors, but only a one-bit error will be corrected. Bits (P [7...0]) of the Error Correction Code (ECC) are defined, where the symbol '^' presents the XOR function (Pn is 1 if there is odd number of 1, and Pn is 0 if there is even number of 1), as below.

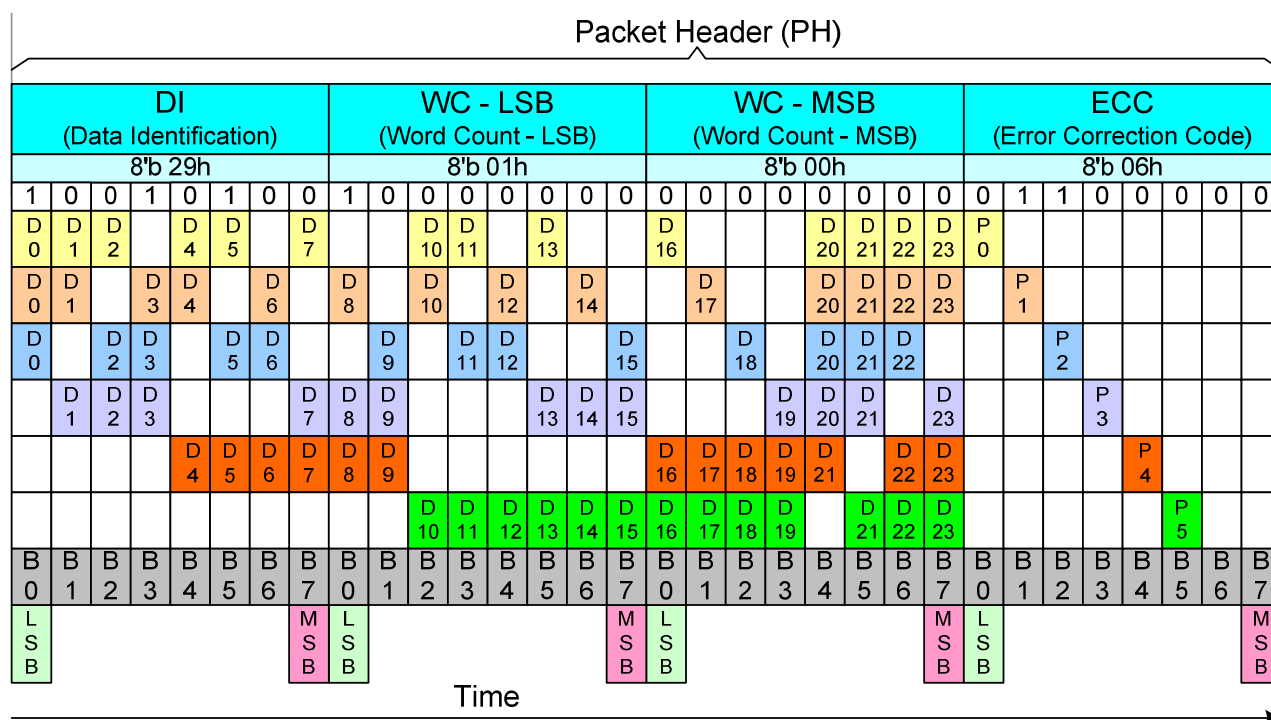
- P7 = 0
- P6 = 0
- P5 = D10^D11^D12^D13^D14^D15^D16^D17^D18^D19^D21^D22^D23
- P4 = D4^D5^D6^D7^D8^D9^D16^D17^D18^D19^D20^D22^D23
- P3 = D1^D2^D3^D7^D8^D9^D13^D14^D15^D19^D20^D21^D23
- P2 = D0^D2^D3^D5^D6^D9^D11^D12^D15^D18^D20^D21^D22
- P1 = D0^D1^D3^D4^D6^D8^D10^D12^D14^D17^D20^D21^D22^D23
- P0 = D0^D1^D2^D4^D5^D7^D10^D11^D13^D16^D20^D21^D22^D23

P7 and P6 are set to 0 because the Error Correction Code (ECC) is based on 64 bit value (D [63...0]), but this implementation is based on 24 bit value (D [23...0]). Therefore, only 6 bits (P [5...0]) for Error Correction Code (ECC) are needed.



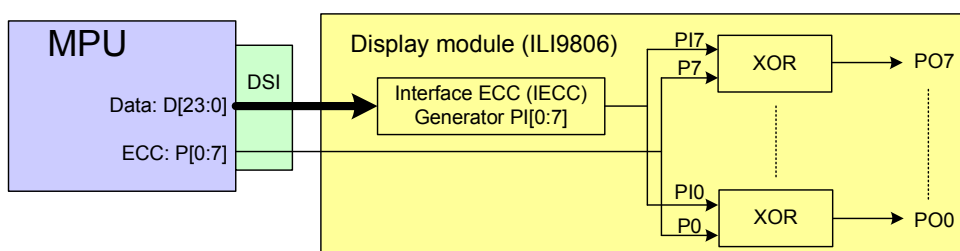
**Figure 72: XOR Functionality in a Short Packet (SPa)**





**Figure 73: XOR Functionality in a Long Packet (LPa)**

The transmitter (the MPU or the Display Module) sends data bits D [23...0] and Error Correction Code (ECC) P [7...0]. The receiver (the Display module or the MPU) calculates an Internal Error Correction Code (IECC) and compares the received Error Correction Code (ECC) and the Internal Error Correction Code (IECC). This comparison is done when each power bit of ECC and IECC have performed the XOR function. The result of this function is PO [7...0]. This functionality, where the transmitter is the MPU and the receiver is the display module, is illustrated below for reference purposes.



**Figure 74: Internal Error Correction Code (IECC) on the Display Module (the Receiver)**

The sent data bits (D [23...0]) and ECC (P [7...0]) are received correctly, if the value of the PO [7...0] is 00h.

The sent data bits (D [23...0]) and ECC (P [7...0]) are not received correctly, if the value of the PO [7...0] is not 00h.

|                             |   |   |   |   |   |   |   |   |                   |
|-----------------------------|---|---|---|---|---|---|---|---|-------------------|
| ECC P[7...0]                | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 03h               |
| IECC PI[7...0]              | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 03h               |
| XOR(ECC, IECC) => PO[7...0] | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | = 00h => No Error |
|                             | L |   |   |   |   |   |   | M |                   |
|                             | S |   |   |   |   |   |   | S |                   |
|                             | B |   |   |   |   |   |   | B |                   |

**Figure 75: Internal XOR Calculation between ECC and IECC Values – No Error**

|                             |   |   |   |   |   |   |   |   |                |
|-----------------------------|---|---|---|---|---|---|---|---|----------------|
| ECC P[7...0]                | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 03h            |
| IECC PI[7...0]              | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0Fh            |
| XOR(ECC, IECC) => PO[7...0] | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | = 0Ch => Error |
|                             | L |   |   |   |   |   |   | M |                |
|                             | S |   |   |   |   |   |   | S |                |
|                             | B |   |   |   |   |   |   | B |                |

**Figure 76: Internal XOR Calculation between ECC and IECC Values - Error**

The received Error Correction Code (ECC) can be 00h when the Error Correction Code (ECC) functionality is not used for data values D [23...0] on the transmitter side.

The amount of the errors (one or more) can be defined when the value of the PO [7...0] is compared to the values in the following table.

**Table 16: One Bit Error Value of the Error Correction Code (ECC)**

| Data Bit | PO7 | PO6 | PO5 | PO4 | PO3 | PO2 | PO1 | PO0 | Hex |
|----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| D [0]    | 0   | 0   | 0   | 0   | 0   | 1   | 1   | 1   | 07h |
| D [1]    | 0   | 0   | 0   | 0   | 1   | 0   | 1   | 1   | 0Bh |
| D [2]    | 0   | 0   | 0   | 0   | 1   | 1   | 0   | 1   | 0Dh |
| D [3]    | 0   | 0   | 0   | 0   | 1   | 1   | 1   | 0   | 0Eh |
| D [4]    | 0   | 0   | 0   | 1   | 0   | 0   | 1   | 1   | 13h |
| D [5]    | 0   | 0   | 0   | 1   | 0   | 1   | 0   | 1   | 15h |
| D [6]    | 0   | 0   | 0   | 1   | 0   | 1   | 1   | 0   | 16h |
| D [7]    | 0   | 0   | 0   | 1   | 1   | 0   | 0   | 1   | 19h |
| D [8]    | 0   | 0   | 0   | 1   | 1   | 0   | 1   | 0   | 1Ah |
| D [9]    | 0   | 0   | 0   | 1   | 1   | 1   | 0   | 0   | 1Ch |
| D [10]   | 0   | 0   | 1   | 0   | 0   | 0   | 1   | 1   | 23h |
| D [11]   | 0   | 0   | 1   | 0   | 0   | 1   | 0   | 1   | 25h |
| D [12]   | 0   | 0   | 1   | 0   | 0   | 1   | 1   | 0   | 26h |
| D [13]   | 0   | 0   | 1   | 0   | 1   | 0   | 0   | 1   | 29h |
| D [14]   | 0   | 0   | 1   | 0   | 1   | 0   | 1   | 0   | 2Ah |
| D [15]   | 0   | 0   | 1   | 0   | 1   | 1   | 0   | 0   | 2Ch |
| D [16]   | 0   | 0   | 1   | 1   | 0   | 0   | 0   | 1   | 31h |
| D [17]   | 0   | 0   | 1   | 1   | 0   | 0   | 1   | 0   | 32h |
| D [18]   | 0   | 0   | 1   | 1   | 0   | 1   | 0   | 0   | 34h |
| D [19]   | 0   | 0   | 1   | 1   | 1   | 0   | 0   | 0   | 38h |
| D [20]   | 0   | 0   | 0   | 1   | 1   | 1   | 1   | 1   | 1Fh |
| D [21]   | 0   | 0   | 1   | 0   | 1   | 1   | 1   | 1   | 2Fh |
| D [22]   | 0   | 0   | 1   | 1   | 0   | 1   | 1   | 1   | 37h |
| D [23]   | 0   | 0   | 1   | 1   | 1   | 0   | 1   | 1   | 3Bh |

One error is detected if the value of the PO [7...0] is found in Table 16: One Bit Error Value of the Error Correction Code (ECC), and the receiver can correct this one-bit error because this found value also defines the location of the corrupt bit, for example,

- PO [7...0] = 0Eh
- The bit of the data (D [23...0]), which is not correct, is D [3]

More than one error is detected if the value of the PO [7...0] is not in Table 16: One Bit Error Value of the Error Correction Code (ECC), for example, PO [7...0] = 0Ch.

## Packet Data (PD) of a Long Packet (LPa)

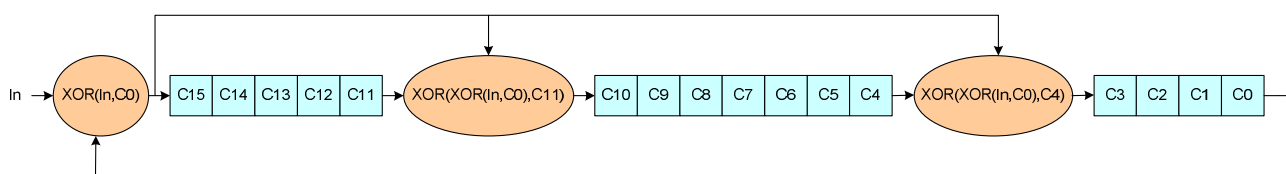
Packet Data (PD) of a Long Packet (LPa) is defined after the Packet Header (PH) of the Long Packet (LPa).

The amount of data bytes is defined in the chapter “Word Count (WC) of a Long Packet (LPa)”.

## Packet Footer (PF) of a Long Packet (LPa)

The Packet Footer (PF) of a Long Packet (LPa) is defined after the Packet Data (PD) of a Long Packet (LPa). The Packet Footer (PF) is the checksum value which is calculated from the Packet Data of the Long Packet (LPa).

The checksum uses a 16-bit Cyclic Redundancy Check (CRC) value which is generated by a polynomial  $X^{16}+X^{12}+X^5+X^0$ , as illustrated below.

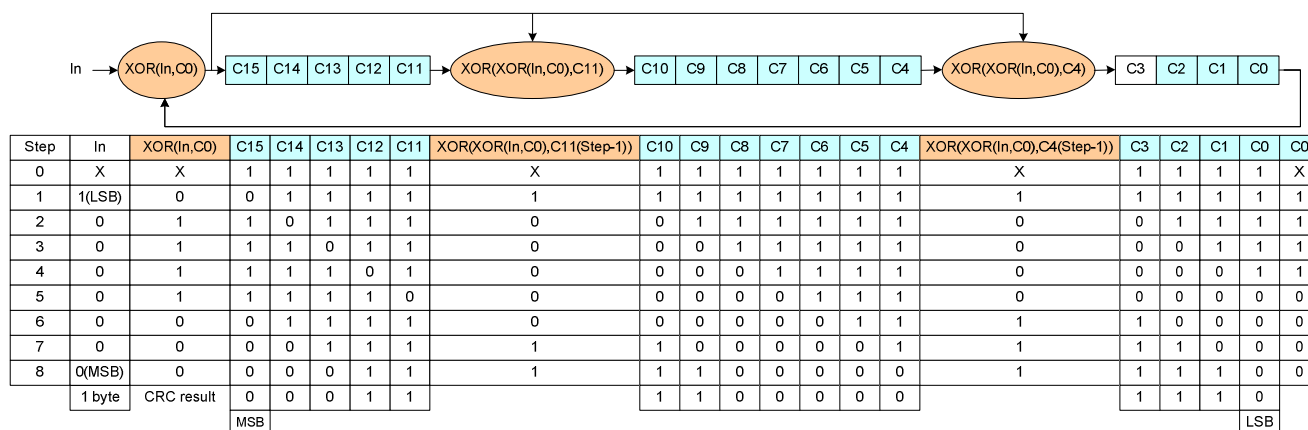


**Figure 77: 16-bit Cyclic Redundancy Check (CRC) Calculation**

The 16-bit Cyclic Redundancy Check (CRC) generator is initialized to FFFFh before calculations.

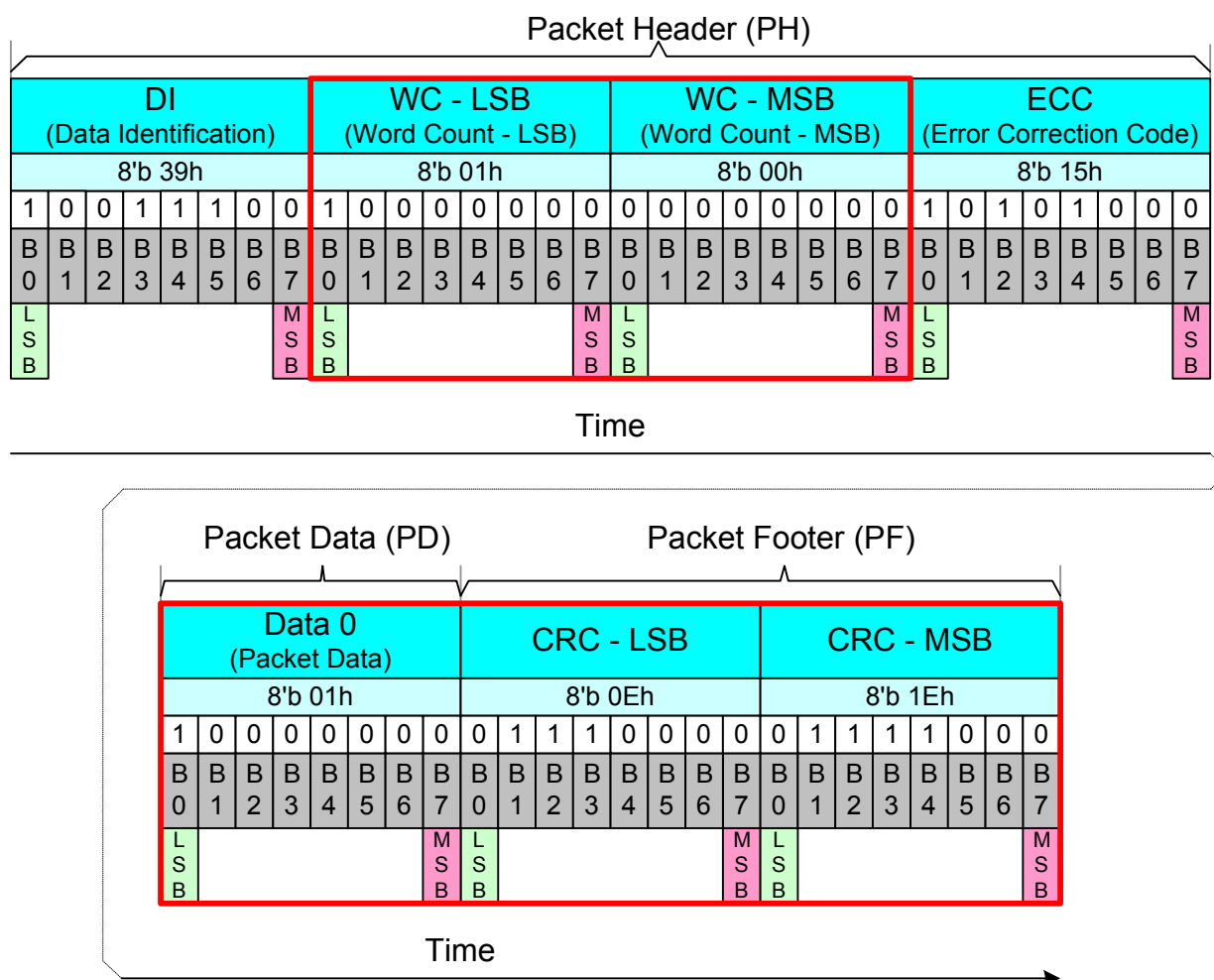
The Most Significant Bit (MSB) of the data byte of the Packet Data (PD) is the first bit to be inputted into the 16-bit Cyclic Redundancy Check (CRC).

An example of the 16-bit Cyclic Redundancy Check (CRC), where the Packet Data (PD) of the Long Packet (LPa) is 01h, is illustrated (step-by-step) below.



**Figure 78: CRC Calculation – Packet Data (PD) is 01h**

The value of the Packet Footer (PF) is 1E0Eh in this example. This example (command 01h has been sent) is illustrated below.



**Figure 79: Packet Footer (PF) Example**

The receiver calculates its own checksum value from the received Packet Data (PD). The receiver compares its own checksum with the Packet Footer (PF) which the transmitter has sent.

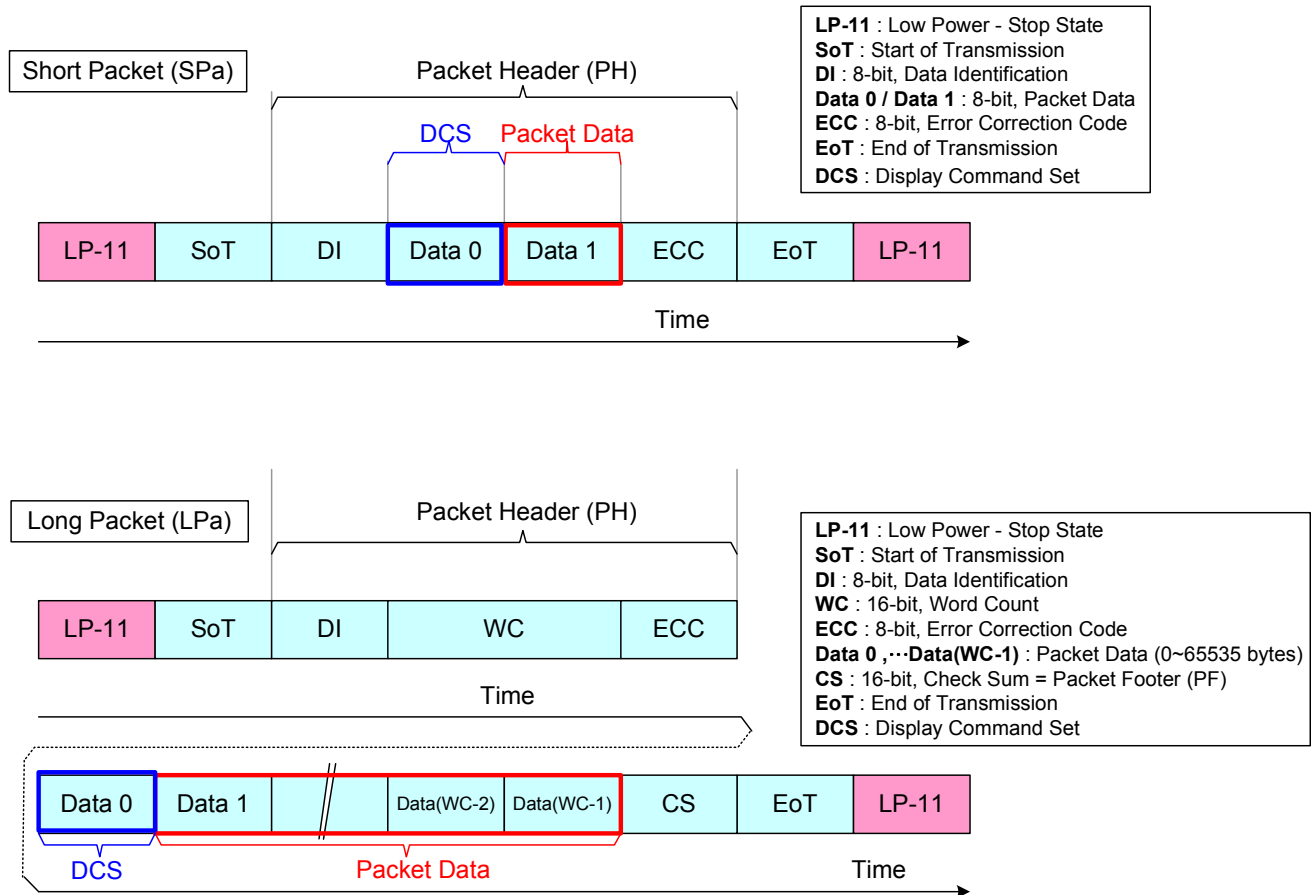
The received Packet Data (PD) and Packet Footer (PF) are correct if the checksums of the receiver and Packet Footer (PF) are equal. The received Packet Data (PD) and Packet Footer (PF) are not correct if the checksums of the receiver and Packet Footer (PF) are not equal.

## Packet Transmissions

### Packet from the MPU to the Display Module

#### Display Command Set (DCS)

Display Command Set (DCS), which is defined in the Chapter 5.2 Command Description, is transmitted from the MPU to the display module. This Display Command Set (DCS) is always defined in the Data 0 of the Packet Data (PD), which is included in a Short Packet (SPa) and a Long packet (LPa), as illustrated below.



**Figure 80: Display Command Set (DCS) in Short Packet (SPa) and Long Packet (LPa)**

## Display Command Set (DCS) Write, No Parameter (DCSWN-S)

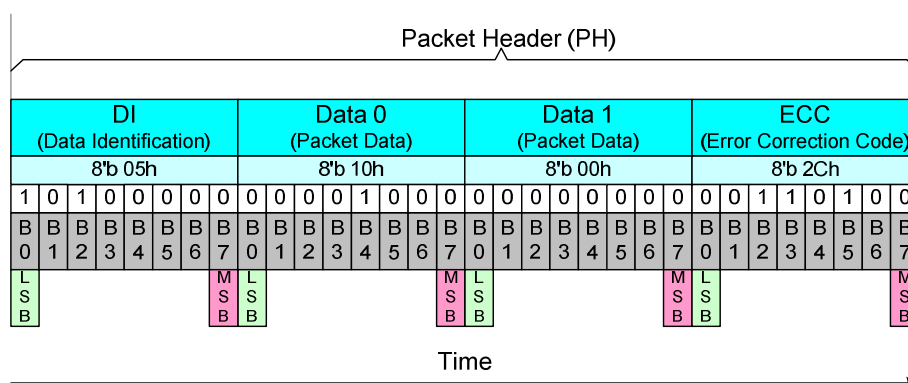
“Display Command Set (DCS) Write, No Parameter” is always used in a Short Packet (SPa), which is defined in the Data Type (DT, 00 0101b), from the MPU to the display module. These commands are defined in the table below. (See Chapter 5.2: Command Description.)

**Table 17: Display Command Set (DCS) Write, No Parameters (DCSWN-S)**

| Command                       |
|-------------------------------|
| NOP (00h)                     |
| Software Reset (01h)          |
| Sleep In(10h)                 |
| Sleep Out (11h)               |
| Partial Mode On (12h)         |
| Normal Display Mode On (13h)  |
| All Pixel Off (22h)           |
| All Pixel On (23h)            |
| Display Off (28h)             |
| Display ON (29h)              |
| Tearing Effect Line OFF (34h) |
| Idle Mode Off (38h)           |
| Idle Mode On (39h)            |

A Short Packet (SPa) is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 00 0101b
- Packet Data (PD)
  - o Data 0: “Sleep In (10h)”, Display Command Set (DCS)
  - o Data 1: Always 00hex
- Error Correction Code (ECC)



**Figure 81: Display Command Set (DCS) Write, No Parameter (DCSWN-S) - Example**

## Display Command Set (DCS) Write, 1 Parameter (DCSW1-S)

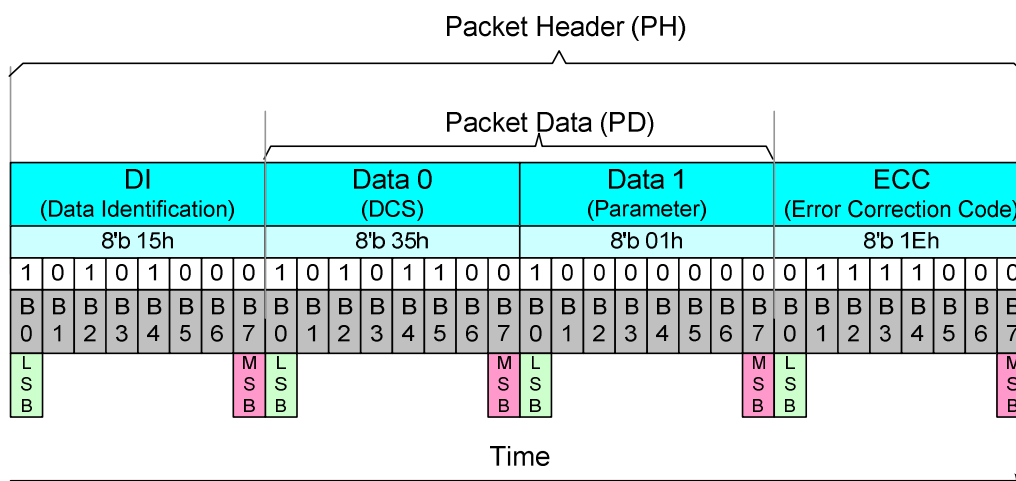
“Display Command Set (DCS) Write, 1 Parameter” (DCSW1-S) is always used in a Short Packet (SPa), which is defined in the Data Type (DT, 01 0101b), from the MPU to the display module. These commands are defined in the table below. (See chapter 5.2: Command Description.)

**Table 18: Display Command Set (DCS) Write, 1 Parameter (DCSW1-S)**

| Command                                         |
|-------------------------------------------------|
| Memory Write (2Ch), Note                        |
| Tearing Effect Line ON(35h)                     |
| Memory Access Control (36h)                     |
| Interface Pixel Format (3Ah)                    |
| Memory Write Continue (3Ch), <sup>Note</sup>    |
| Write Display Brightness (51h)                  |
| Write CTRL Display (53h)                        |
| Write Content Adaptive Brightness control (55h) |
| Write CABC Minimum Brightness (5Eh)             |

A Short Packet (SPa) is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 01 0101b
- Packet Data (PD)
  - o Data 0: “Tearing Effect Line ON(35h)”, Display Command Set (DCS)
  - o Data 1: 01hex, Parameter of the DCS
- Error Correction Code (ECC)



**Figure 82: Display Command Set (DCS) Write, 1 Parameter (DCSW1-S) – Example**

<sup>Note</sup> One subpixel has been written.



## Display Command Set (DCS) Write Long (DCSW-L)

“Display Command Set (DCS) Write Long” (DCSW-L) is always used in a Long Packet (LPa), which is defined in the Data Type (DT, 11 1001b), from the MPU to the display module. Command (No Parameters) and Write (1 or more parameters), are defined in the table below. (See chapter 5.2: Command Description.)

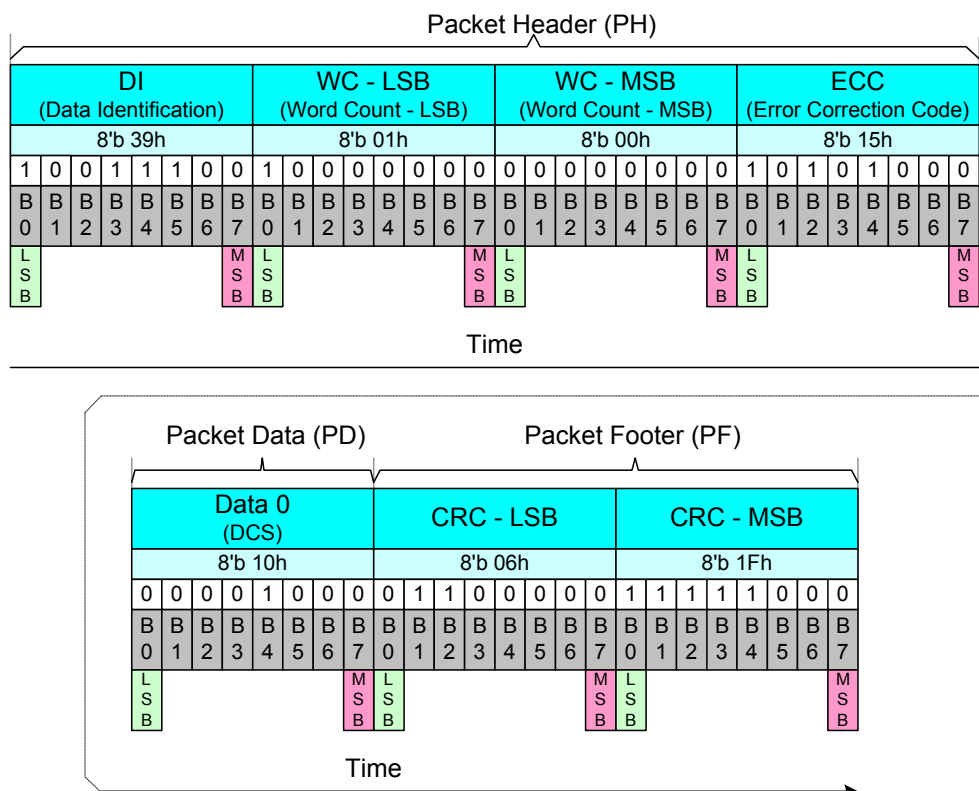
**Table 19: Display Command Set (DCS) Write Long (DCSW-L)**

| Command                                                            |
|--------------------------------------------------------------------|
| NOP (00h), <sup>Note 1</sup>                                       |
| Software Reset (01h), <sup>Note 1</sup>                            |
| Sleep In(10h), <sup>Note 1</sup>                                   |
| Sleep Out (11h), <sup>Note 1</sup>                                 |
| Partial Mode On (12h), <sup>Note 1</sup>                           |
| Normal Display Mode On (13h), <sup>Note 1</sup>                    |
| All Pixel Off (22h)                                                |
| All Pixel On (23h)                                                 |
| Display Off (28h), <sup>Note 1</sup>                               |
| Display ON (29h), <sup>Note 1</sup>                                |
| Column Address Set (2Ah)                                           |
| Page Address Set (2Bh)                                             |
| Memory Write (2Ch), <sup>Note 2</sup>                              |
| Partial Area (30h)                                                 |
| Tearing Effect Line OFF (34h), <sup>Note 1</sup>                   |
| Tearing Effect Line ON (35h), <sup>Note 2</sup>                    |
| Memory Access Control (36h), <sup>Note 2</sup>                     |
| Idle Mode Off (38h), <sup>Note 1</sup>                             |
| Idle Mode On (39h), <sup>Note 1</sup>                              |
| Interface Pixel Format (3Ah)                                       |
| Memory Write Continue (3Ch), <sup>Note 2</sup>                     |
| Write Display Brightness (51h), <sup>Note 2</sup>                  |
| Write CTRL Display (53h), <sup>Note 2</sup>                        |
| Write Content Adaptive Brightness control (55h), <sup>Note 2</sup> |
| Write CABC Minimum Brightness (5Eh)                                |

A Long Packet (LPa), when one command (no Parameter) was sent, is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 11 1001b
- Word Count (WC)
  - o Word Count (WC): 0001h
- Error Correction Code (ECC)
- Packet Data (PD): Data 0: “Sleep In (10h)”, Display Command Set (DCS)
- Packet Footer (PF)

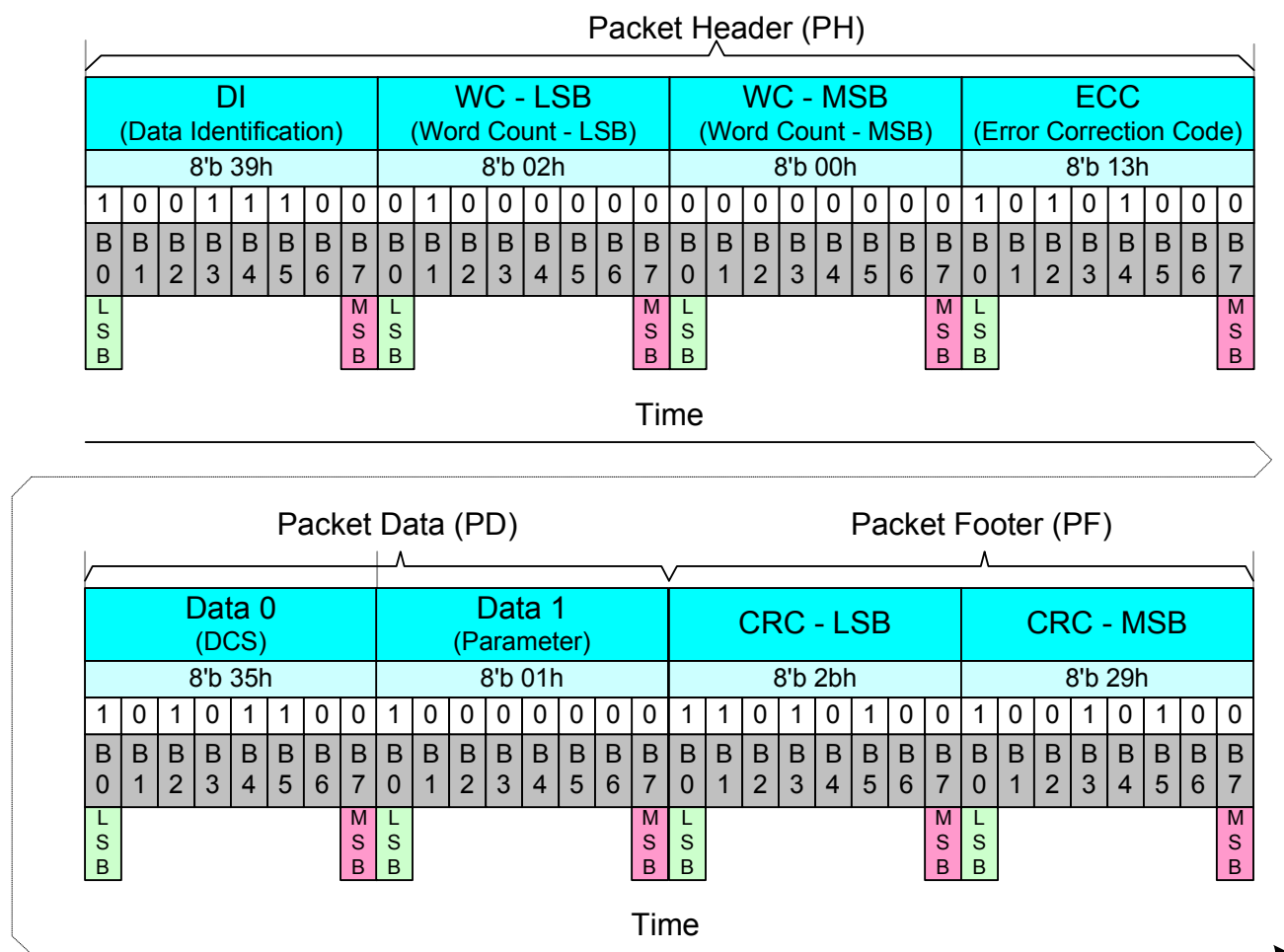
<sup>Note 1</sup> It can also be used in a Short Packet (SPa); See chapter “Display Command Set (DCS) Write, No Parameter”.



**Figure 83: Display Command Set (DCS) Write Long (DCSW-L) with DCS Only - Example**

A Long Packet (LPa), when one Write (1 parameter) was sent, is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 11 1001b
- Word Count (WC)
  - o Word Count (WC): 0002h
- Error Correction Code (ECC)
- Packet Data (PD):
  - o Data 0: "Tearing Effect Line ON(35h)", Display Command Set (DCS)
  - o Data 1: 01hex, Parameter of the DCS
- Packet Footer (PF)



**Figure 84: Display Command Set (DCS) Write Long with DCS and 1 Parameter - Example**

A Long Packet (LPa), when one Write (4 parameters) was sent, is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 11 1001b
- Word Count (WC)
  - o Word Count (WC): 0005h
- Error Correction Code (ECC)
- Packet Data (PD):
  - o Data 0: "Column Address Set (2Ah)", Display Command Set (DCS)
  - o Data 1: 00hex, 1st Parameter of the DCS, Start Column SC [15...8]
  - o Data 2: 12hex, 2nd Parameter of the DCS, Start Column SC [7...0]
  - o Data 3: 01hex, 3rd Parameter of the DCS, End Column EC [15...8]
  - o Data 4: EFhex, 4th Parameter of the DCS, End Column EC [7...0]
- Packet Footer (PF)

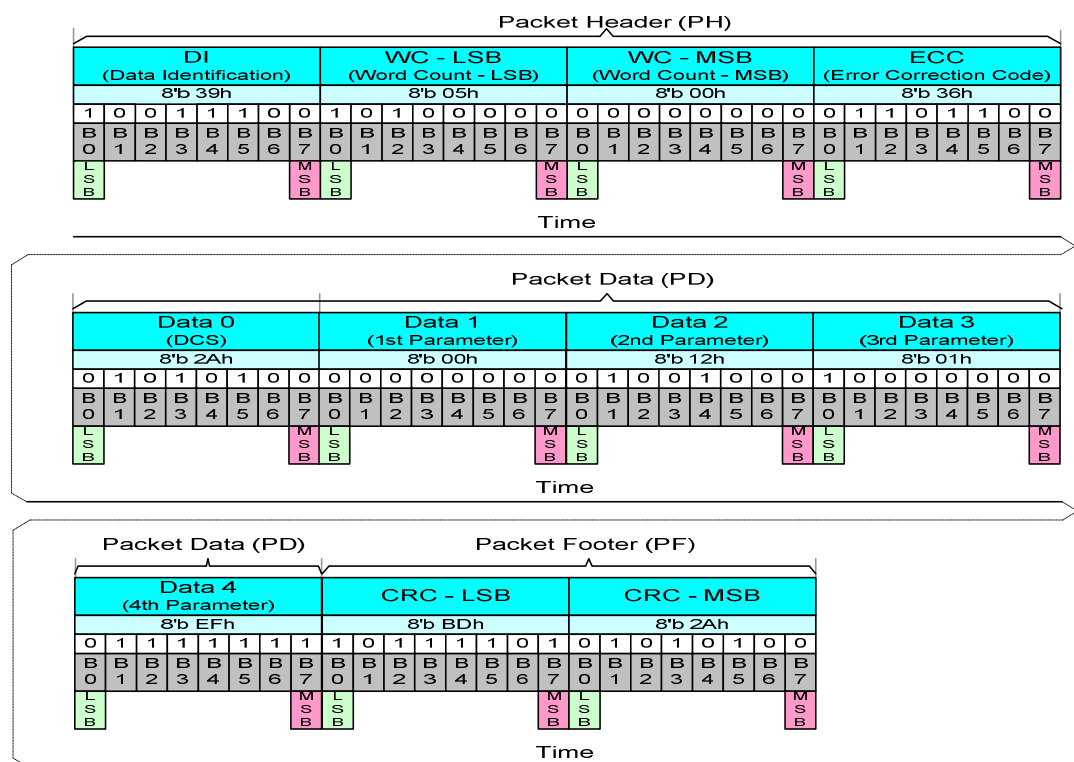


Figure 85: Display Command Set (DCS) Write Long with DCS and 4 Parameters - Example

## Display Command Set (DCS) Read, No Parameter (DCSRN-S)

“Display Command Set (DCS) Read, No Parameter” (DCSRN-S) is always used in a Short Packet (SPa), which is defined in the Data Type (DT, 00 0110b), from the MPU to the display module. These commands are defined in the table below. (See Chapter 5.2: Command Description.)

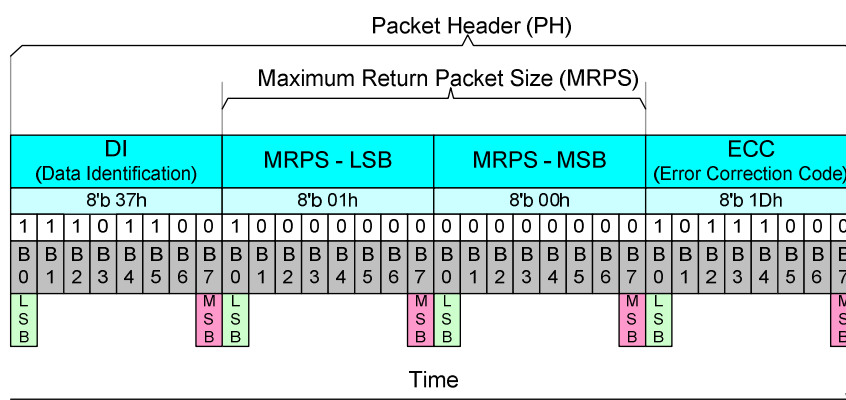
**Table 20: Display Command Set (DCS) Read, No Parameter (DCSRN-S)**

| Command                                        |
|------------------------------------------------|
| Read Number of the Errors on DSI (05h)         |
| Read Display Power Mode (0Ah)                  |
| Read Display MADCTL (0Bh)                      |
| Read Display Pixel Format (0Ch)                |
| Read Display Image Mode (0Dh)                  |
| Read Display Signal Mode (0Eh)                 |
| Read Display Self-Diagnostic Result (0Fh)      |
| Memory Read (2Eh)                              |
| Memory Read Continue (3Eh)                     |
| Read Display Brightness Value (52h)            |
| Read CTRL Value Display (54h)                  |
| Read Content Adaptive Brightness Control (56h) |
| Read CABC Minimum Brightness (5Fh)             |
| Read Black/White Low Bits (70h)                |
| Read Bkx (71h)                                 |
| Read Bky(72h)                                  |
| Read Wx (73h)                                  |
| Read Wy (74h)                                  |
| Read Red/Green Low Bits (75h)                  |
| Read Rx (76h)                                  |
| Read Ry (77h)                                  |
| Read Gx (78h)                                  |
| Read Gy (79h)                                  |
| Read Blue/A Color Low Bits (7Ah)               |
| Read Bx (7Bh)                                  |
| Read By (7Ch)                                  |
| Read Ax (7Dh)                                  |
| Read Ay (7Eh)                                  |
| Read DDB Start (A1h)                           |
| Read DDB Continue (A8h)                        |
| First Checksum (AAh)                           |
| Read Continue Checksum (AFh)                   |
| Read ID1 (DAh)                                 |
| Read ID2 (DBh)                                 |
| Read ID3 (DCh)                                 |

The MPU has to define to the display module the maximum size of the returned packet. A command used for this purpose is “Set Maximum Return Packet Size” (SMRPS-S), which Data Type (DT) is 11 0111b and which uses Short Packets (SPa) before the MPU can send “Display Command Set (DCS) Read, No Parameter” to the display module. This sequence is illustrated below for reference purposes.

**Step 1:**

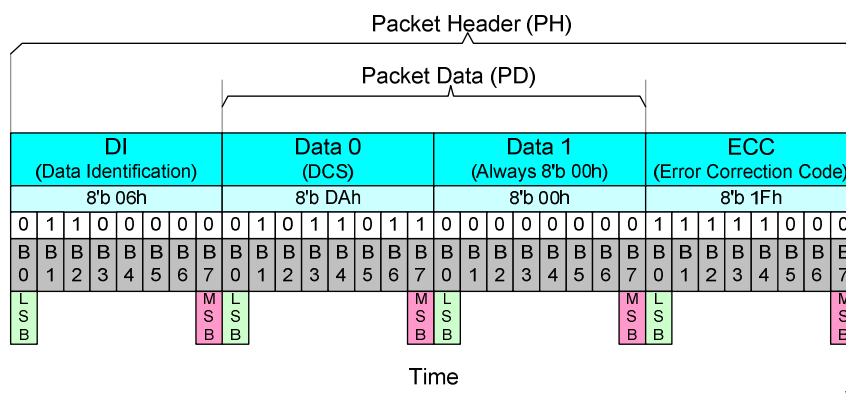
- The MPU sends “Set Maximum Return Packet Size” (Short Packet (SPa)) (SMRPS-S) to the display module when it wants to return one byte from the display module
- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 11 0111b
- Maximum Return Packet Size (MRPS)
  - o Data 0: 01hex
  - o Data 1: 00hex
- Error Correction Code (ECC)



**Figure 86 Set Maximum Return Packet Size (SMRPS-S) - Example**

**Step 2:**

- The MPU wants to receive the value of the “Read ID1 (DAh)” from the display module when the MPU sends “Display Command Set (DCS) Read, No Parameter” to the display module.
- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 00 0110b
- Packet Data (PD)
  - o Data 0: “Read ID1 (DAh)”, Display Command Set (DCS)
  - o Data 1: Always 00hex
- Error Correction Code (ECC)



**Figure 87 Display Command Set (DCS) Read, No Parameter (DCSRN-S) - Example**

**Step 3:**

The display module can send 2 different information to the MPU after the Bus Turnaround (BTA).

1. An acknowledge with Error Report (AwER): it is used in a Short Packet (SPa) if an error is found while receiving a command. See the chapter "Acknowledge with Error Report (AwER)".
2. Information of the received command: it can be transmitted in a Short Packet (SPa) or Long Packet (LPa).

## Null Packet, No Data (NP-L)

“Null Packet, No Data” (NP-L) is always used in a Long Packet (LPa), which is defined in the Data Type (DT, 001001b), from the MPU to the display module. The purpose of this command is to keep data lanes in the high speed mode (HSDT), if necessary.

The display module can ignore the Packet Data (PD), which is sent by the MPU.

A Long Packet (LPa), when 5 random data bytes of the Packet Data (PD) are sent, is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 00 1001b
- Word Count (WC)
  - o Word Count (WC): 0005hex
- Error Correction Code (ECC)
- Packet Data (PD):
  - o Data 0: 89hex (Random data)
  - o Data 1: 23hex (Random data)
  - o Data 2: 12hex (Random data)
  - o Data 3: A2hex (Random data)
  - o Data 4: E2hex (Random data)
- Packet Footer (PF)





## End of Transmission Packet (EoTP)

“End of Transmission Packet” (EoTP), which is defined in the Data Type (DT, 00 1000b) and optional in the interface level, is always used in a Short Packet (SPa) from the MPU to the display module. The purpose of this command is to terminate the high Speed Data Transmission (HSDT) mode properly when the EoTP is added after the last payload packet before “End of Transmission” (EoT).

The MPU can decide if it wants to use the “End of Transmission Packet” (EoTP) or not. The display shall have the capability to support both. That is, if the MPU applies the EoTP, it shall report the “DSI Protocol Violation Error” when the EoTP is not detected in the High-Speed (HS). The display module error reporting shall be enabled/disabled statistically, according to the module application.

The display module will/will not receive “End of Transmission Packet” (EoTP) from the MPU during the Low Power Data Transmission (LPDT) mode before “Mark-1” (= leaving Escape mode), which ends the Low Power Data Transmission (LPDT) mode.

The display module is not allowed to send “End of Transmission Packet” (EoTP) to the MPU during the Low Power Data Transmission (LPDT) mode.

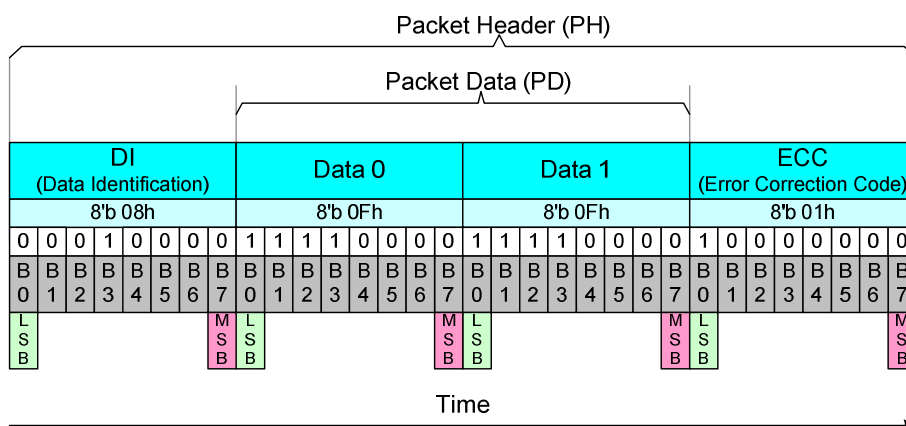
The summary of the receiving and transmitting EoTP is listed below.

**Table 21: Receiving and Transmitting EoTP during LPDT**

| Direction             | Display Module in<br>High Speed Data Transmission (HSDT) | Display Module in<br>Low Power Data Transmission (LPDT) |
|-----------------------|----------------------------------------------------------|---------------------------------------------------------|
| MPU => Display Module | With or Without EoTP is Supported                        | With or Without EoTP is Supported                       |
| Display Module => MPU | HS Mode is not available<br>(EoTP is not available)      | EoTP cannot be sent by the Display<br>Module            |

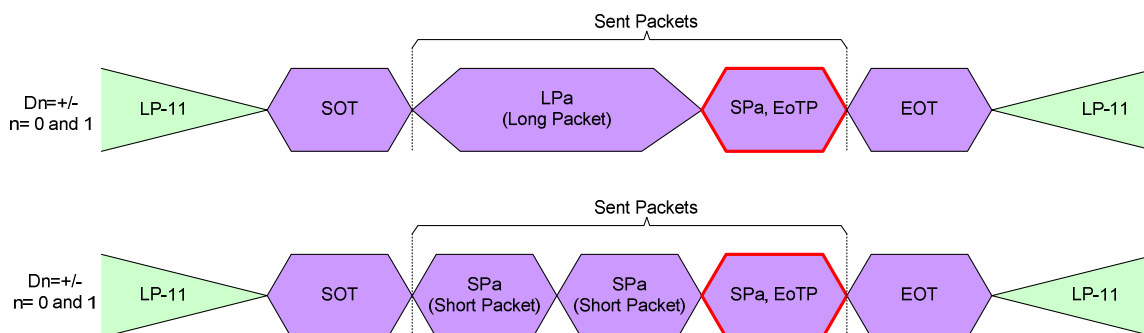
Short Packet (SPa) uses a fixed format as follows:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 00 1000b
- Packet Data (PD)
  - o Data 0: 0Fhex
  - o Data 1: 0Fhex
- Error Correction Code (ECC)
  - o ECC: 01hex



**Figure 89: End of Transmission Packet (EoTP)**

Some cases of the “End of Transmission Packet” (EoTP) are illustrated below for reference purpose only.



**Figure 90: End of Transmission Packet (EoTP) - Examples**

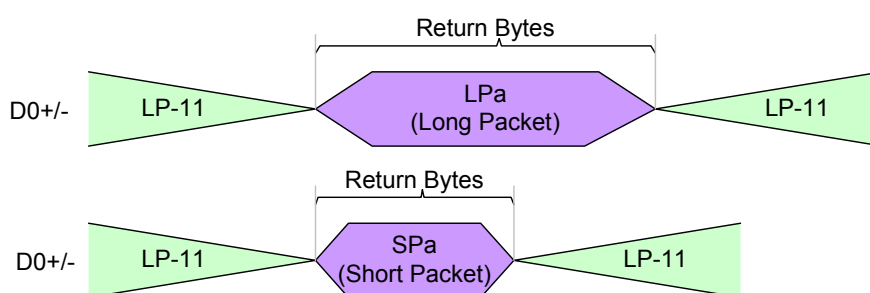
## Packet from the Display Module to the MPU

### Used Packet Types

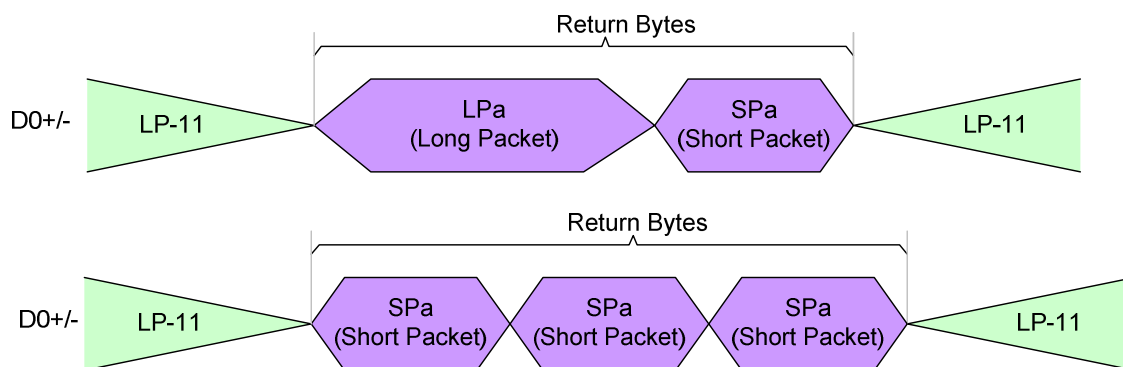
The display module can use Short Packets (SPa) or Long Packets (LPa) when it returns information to the MPU after the MPU requests information from the Display Module. This information can be a response of the Display Command Set (DCS) (See the chapter “Display Command Set (DCS) Read, No Parameter” (DCSRN-S)) or an Acknowledge with Error Report (See the chapter: “Acknowledge with Error Report (AwER)” (AwER)).

The used packet type is defined in the Data Type (DT). See the chapter “Data Type (DT)”. If the maximum size of the Packet Data (PD) could be sent in one packet, then the display module cannot separate returned bytes into several packets.

Both cases are illustrated below for reference purpose.



**Figure 91: Return Bytes in a Single Packet**

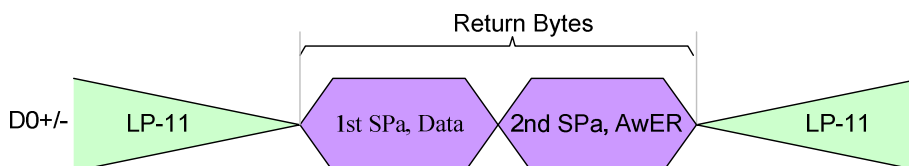


**Figure 92: Return Bytes in Several Packets – Not Allowed**

### Exception:

The display module returns 2 packets (1<sup>st</sup> packet: Data, 2<sup>nd</sup> Packet: Acknowledge with Error Report) to the MPU when the display module receives a read command (see the chapter “Display Command Set (DCS) Read, No Parameter (DCSRN-S)”), in which a single bit error is detected and corrected by the EEC (see bit 8 in “Table 23: Acknowledge with Error Report (AwER) for Short Packet (SPa) Response”).

These returned packets are illustrated below for reference purpose.



**Figure 93: Exception when Return Bytes in Several Packets**

AwER = Acknowledge with Error Report

## Acknowledge with Error Report (AwER)

“Acknowledge with Error Report” (AwER), which is defined in the Data Type (DT, 00 0010b), is always transmitted through a Short Packet (SPa) from the display module to the MPU. The 16 bits in the Packet Data (PD) can indicate the current error(s) if one or more than one bit(s) is/are set to 1, as defined in the following table.

**Table 22: Acknowledge with Error Report (AwER) for Long Packet (LPa) Response**

| Bit | Description                                    |
|-----|------------------------------------------------|
| 0   | SoT Error                                      |
| 1   | SoT Sync Error                                 |
| 2   | EoT Sync Error                                 |
| 3   | Escape Mode Entry Command Error                |
| 4   | Low-Power Transmit Sync Error                  |
| 5   | Any Protocol Timer Time-Out                    |
| 6   | False Control Error                            |
| 7   | Contention is Detected on the Display Module   |
| 8   | ECC Error, single-bit (detected and corrected) |
| 9   | ECC Error, multi-bit (detected, not corrected) |
| 10  | Checksum Error                                 |
| 11  | DSI Data Type (DT) Not Recognized              |
| 12  | DSI Virtual Channel (VC) ID Invalid            |
| 13  | Invalid Transmission Length                    |
| 14  | Reserved, Set to 0 internally                  |
| 15  | DSI Protocol Violation                         |

**Table 23: Acknowledge with Error Report (AwER) for Short Packet (SPa) Response**

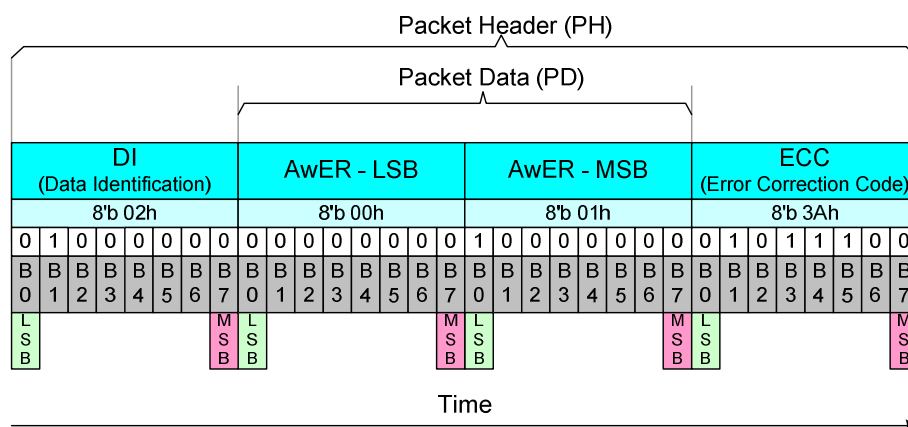
| Bit | Description                                               |
|-----|-----------------------------------------------------------|
| 0   | SoT Error                                                 |
| 1   | SoT Sync Error                                            |
| 2   | EoT Sync Error                                            |
| 3   | Escape Mode Entry Command Error                           |
| 4   | Low-Power Transmit Sync Error                             |
| 5   | Any Protocol Timer Time-Out                               |
| 6   | False Control Error                                       |
| 7   | Contention is Detected on the Display Module              |
| 8   | ECC Error, single-bit (detected and corrected)            |
| 9   | ECC Error, multi-bit (detected, not corrected)            |
| 10  | Reserved, Set to 0 internally (Only for Long Packet (LP)) |
| 11  | DSI Data Type (DT) Not Recognized                         |
| 12  | DSI Virtual Channel (VC) ID Invalid                       |
| 13  | Invalid Transmission Length                               |
| 14  | Reserved, Set to 0 internally                             |
| 15  | DSI Protocol Violation                                    |

These errors are included in all packages, which are received from the MPU to the display module, before the Bus Turnaround (BTA).

The display module ignores the received packet which includes an error or errors.

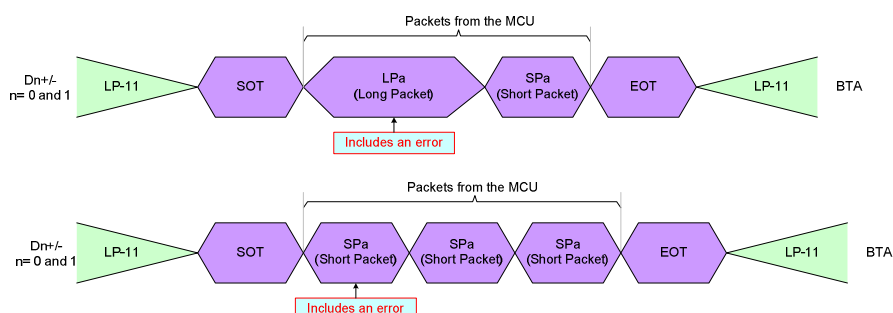
Acknowledge with Error Report (AwER) in a Short Packet (SPa) is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 00 0010b
- Packet Data (PD)
  - o Bit 8: ECC Error, single-bit (detected and corrected)
  - o AwER: 0100h
- Error Correction Code (ECC)



**Figure 94: Acknowledge with Error Report (AwER) – Example**

It is possible that the display module receives several packets, which include errors, from the MPU before the MPU performs the Bus Turnaround (BTA). Some examples are illustrated below for reference purpose.

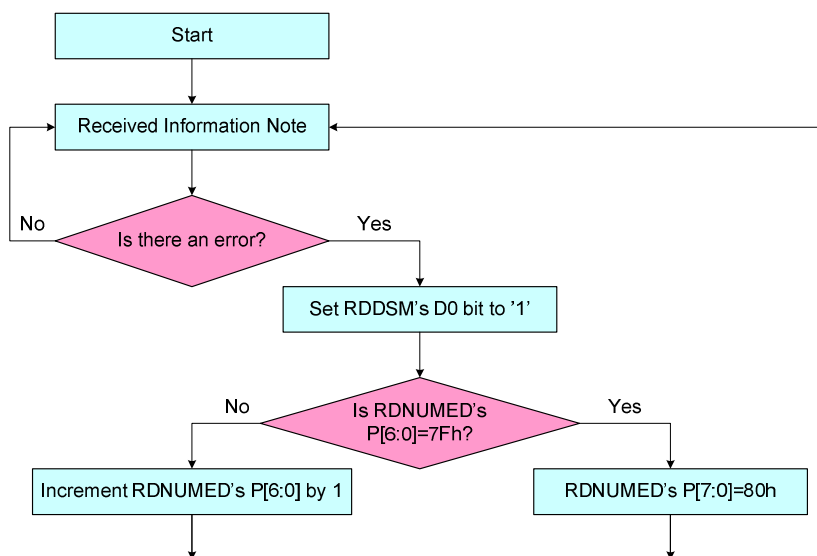


**Figure 95: Errors Packets**

Therefore, a method is needed to check if there are errors in the previous packets. These errors of the previous packets are indicated by “Read Display Signal Mode (0Eh)” and “Read Number of the Errors on DSI (05h)” commands. If a received packet includes an error, the bit D0 of the “Read Display Signal Mode (0Eh)” command will be set to 1.

The numbers of the packets, including an **ECC or CRC** error, are calculated in the RDNUMED register, which can read the “Read Number of the Errors on DSI (05h)” command. This command also sets the RDNUMED register to 00h and the bit D0 of the “Read Display Signal Mode (0Eh)” command to 0 after the MPU has read the RDNUMED register from the display module.

The functionality of the RDNUMED register is illustrated below for reference purpose.



**Figure 96: Flow Chart for Errors on DSI<sup>Note</sup>**

<sup>Note</sup> 1. This information can be Interface or Packet Level Communication but it is always from the MPU to the display module in this case.

2. CRC or ECC error

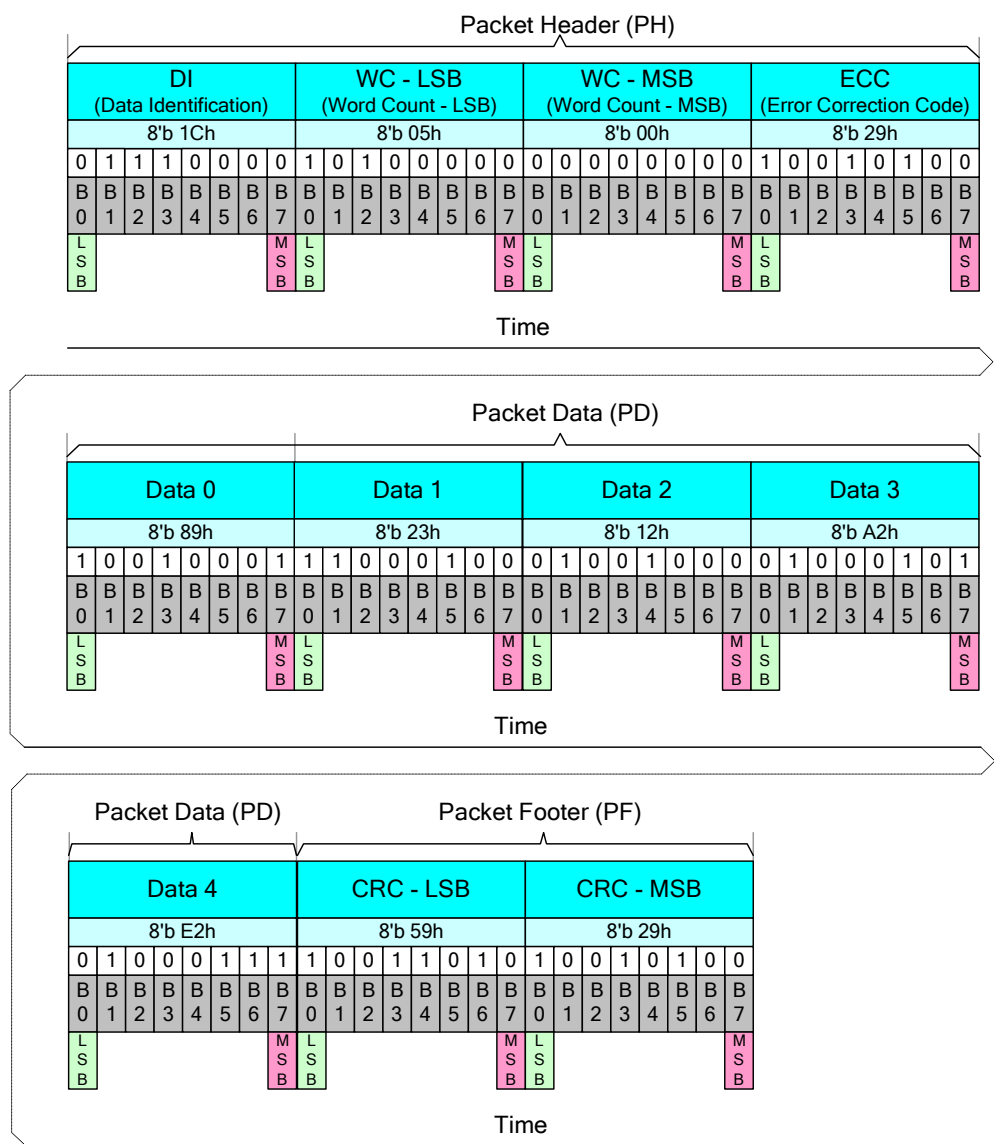


## DCS Read Long Response (DCSRR-L)

“DCS Read Long Response” (DCSRR-L), which is defined in the Data Type (DT, 011100b), is always used in a Long Packet (LPa) from the display module to the MPU. “DCS Read Long Response” (DCSRR-L) is used when the display module wants to respond to a DCS Read command, which the MPU has sent to the display module.

A Long Packet (LPa), which includes 5 data bytes of the Packet Data (PD), is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 01 1100b
- Word Count (WC)
  - o Word Count (WC): 0005hex
- Error Correction Code (ECC)
- Packet Data (PD):
  - o Data 0: 89hex
  - o Data 1: 23hex
  - o Data 2: 12hex
  - o Data 3: A2hex
  - o Data 4: E2hex
- Packet Footer (PF)



**Figure 97: DCS Read Long Response (DCSRR-L) - Example**

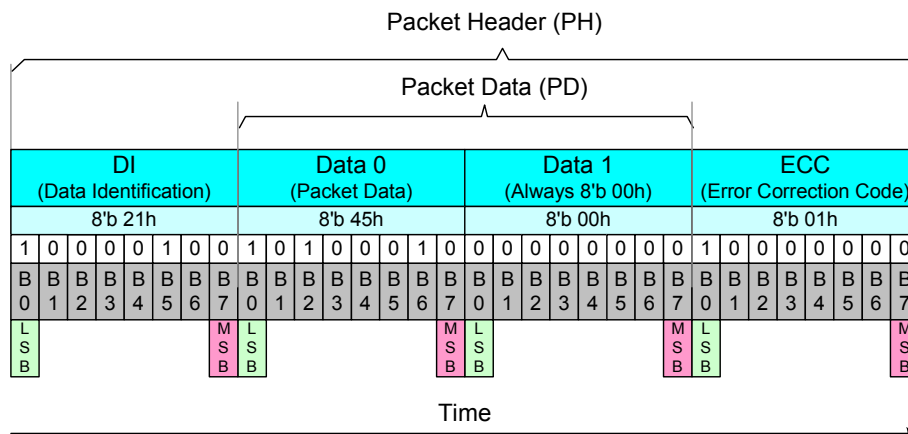
## DCS Read Short Response, 1 Byte Returned (DCSRR1-S)

“DCS Read Short Response, 1 Byte Returned”, which is defined in the Data Type (DT, 10 0001b), (DCSRR1-S) is always used in a Short Packet (SPa) from the display module to the MPU. “DCS Read Short Response, 1 Byte Returned (DCSRR1-S) is used when the display module wants to respond to a DCS Read command, which the MPU has sent to the display module.

A Short Packet (SPa) is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 10 0001b
- Packet Data (PD)
  - o Data 0: 45hex
  - o Data 1: 00hex (Always)
- Error Correction Code (ECC)

This is defined on the Short Packet (SP) as follows.



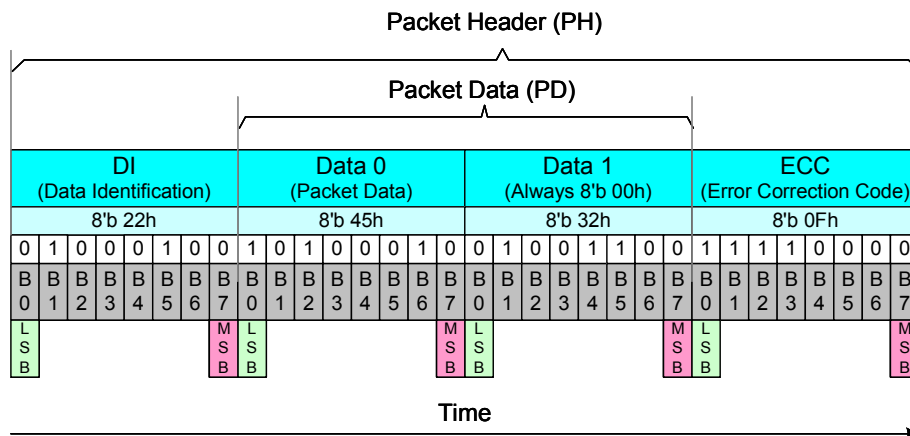
**Figure 98: DCS Read Short Response, 1 Byte Returned (DCSRR1-S) - Example**

## DCS Read Short Response, 2 Bytes Returned (DCSRR2-S)

“DCS Read Short Response, 2 Bytes Returned” (DCSRR2-S) is always used in a Short Packet (SPa), which is defined in the Data Type (DT, 10 0010b), from the display module to the MPU. “DCS Read Short Response, 2 Bytes Returned” (DCSRR2-S) is used when the display module wants to respond to a DCS Read command, which the MPU has sent to the display module.

A Short Packet (SPa) is defined as:

- Data Identification (DI)
  - o Virtual Channel (VC, DI [7...6]): 00b
  - o Data Type (DT, DI [5...0]): 10 0010b
- Packet Data (PD)
  - o Data 0: 45hex
  - o Data 1: 32hex
- Error Correction Code (ECC)



**Figure 99: DCS Read Short Response, 2 Bytes Returned (DCSRR2-S) - Example**

## Communication Sequences

### General

The communication sequences can be done on interface or packet levels between the MPU and the display module. See chapters “Interface Level Communication” and “Packet Level Communication”.

This communication sequence description is for DSI data lanes (DSI-D0+/- and DSI-D1+/-), and it is assumed that the needed low level communication is done on DSI clock lanes (DSI-CLK+/-) automatically. See the chapter “DSI-CLK Lanes”.

Functions of the interface level communication are described in the following table.

**Table 24: Interface Level Communication**

| Interface Mode | Abbreviation | Interface Action Description |
|----------------|--------------|------------------------------|
| Low Power      | LP-11        | Stop State                   |
|                | LPDT         | Low Power Data Transmission  |
|                | ULPS         | Ultra-Low Power State        |
|                | RAR          | Remote Application Reset     |
|                | TEE          | Tearing Effect Event         |
|                | ACK          | Acknowledge (No Error)       |
|                | BTA          | Bus Turnaround               |
| High Speed     | HSDT         | High speed Data Transmission |

Functions of the packet level communication are described in the following table.

**Table 25: Packet Level Communication**

| Interface Mode            | Abbreviation | Packet Size  | Interface Action Description   |
|---------------------------|--------------|--------------|--------------------------------|
| MPU                       | DCSW1-S      | Short Packet | DCS Write, 1 Parameter         |
|                           | DCSWN-S      | Short Packet | DCS Write, No Parameter        |
|                           | DCSW-L       | Long Packet  | DCS Write Long                 |
|                           | DCSRN-S      | Short Packet | DCS Read, No Parameter         |
|                           | SMRPS-S      | Short Packet | Set Maximum Return Packet Size |
|                           | NP-L         | Long Packet  | Null Packet, No Data           |
|                           | EoTP         | Short Packet | End of Transmission Packet     |
| Display Module (ILI9806H) | AwER         | Short Packet | Acknowledge with Error Packet  |
|                           | DCSRR-L      | Long Packet  | DCS Read Long Response         |
|                           | DCSRR1-S     | Short Packet | DCS Read Short Response        |
|                           | DCSRR2-S     | Short Packet | DCS Read Short Response        |

## Sequences

### DCS Write, 1 Parameter Sequence

A Short Packet (SPa) of “Display Command Set (DCS) Write, 1 Parameter (DCSW1-S)” is defined in the chapter “Display Command Set (DCS) Write, 1 Parameter (DCSW1-S)”, and examples of sequences on how this packet is used is described in the following tables.

**Table 26: DCS Write, 1 Parameter Sequence – Example 1**

| DCS Write, 1 Parameter Sequence – Example 1 |               |                        |                       |                           |               |         |
|---------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---------|
| Line                                        | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment |
|                                             | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |         |
| 1                                           | --            | LP-11                  | →                     | --                        | --            | Start   |
| 2                                           | DCSW1-S       | LPDT                   | →                     | --                        | --            |         |
| 3                                           | --            | LP-11                  | →                     | --                        | --            | End     |

**Table 27: DCS Write, 1 Parameter Sequence – Example 2**

| DCS Write, 1 Parameter Sequence – Example 2 |               |                        |                       |                           |               |                            |
|---------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|----------------------------|
| Line                                        | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                    |
|                                             | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                            |
| 1                                           | --            | LP-11                  | →                     | --                        | --            | Start                      |
| 2                                           | DCSW1-S       | HSDT                   | →                     | --                        | --            |                            |
| 3                                           | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet |
| 4                                           | --            | LP-11                  | →                     | --                        | --            | End                        |

**Table 28: DCS Write, 1 Parameter Sequence – Example 3**

| DCS Write, 1 Parameter Sequence – Example 3 |               |                        |                       |                           |               |                                                               |
|---------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---------------------------------------------------------------|
| Line                                        | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                                       |
|                                             | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                                               |
| 1                                           | --            | LP-11                  | →                     | --                        | --            | Start                                                         |
| 2                                           | DCSW1-S       | HSDT                   | →                     | --                        | --            |                                                               |
| 3                                           | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet                                    |
| 4                                           | --            | LP-11                  | →                     | --                        | --            |                                                               |
| 5                                           | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from MPU to the display module       |
| 6                                           | --            | --                     | ←                     | LP-11                     | --            | If No Error → Go to Line 8<br>If Error Occurs → Go to Line 13 |
| 7                                           |               |                        |                       |                           |               |                                                               |
| 8                                           | --            | --                     | ←                     | ACK                       | --            | No Error                                                      |
| 9                                           | --            | --                     | ←                     | LP-11                     | --            |                                                               |
| 10                                          | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from the display module to MPU       |
| 11                                          | --            | LP-11                  | →                     | --                        | --            | End                                                           |
| 12                                          |               |                        |                       |                           |               |                                                               |
| 13                                          | --            | --                     | ←                     | LPDT                      | AwER          | Error Report                                                  |
| 14                                          | --            | --                     | ←                     | LP-11                     | --            |                                                               |
| 15                                          | --            | BTA                    | ↔                     | BTA                       | --            |                                                               |
| 16                                          | --            | LP-11                  | →                     | --                        | --            | End                                                           |

## DCS Write, No Parameter Sequence

A Short Packet (SPa) of “Display Command Set (DCS) Write, No Parameter (DCSWN-S)” is defined in the chapter “Display Command Set (DCS) Write, No Parameter (DCSWN-S)”, and examples of sequences on how this packet is used are described in the following tables.

**Table 29: DCS Write, No Parameter Sequence – Example 1**

| DCS Write, No Parameter Sequence – Example 1 |               |                        |                       |                           |               |         |
|----------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---------|
| Line                                         | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment |
|                                              | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |         |
| 1                                            | --            | LP-11                  | →                     | --                        | --            | Start   |
| 2                                            | DCSWN-S       | LPDT                   | →                     | --                        | --            |         |
| 3                                            | --            | LP-11                  | →                     | --                        | --            | End     |

**Table 30: DCS Write, No Parameter Sequence – Example 2**

| DCS Write, No Parameter Sequence – Example 2 |               |                        |                       |                           |               |                            |
|----------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|----------------------------|
| Line                                         | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                    |
|                                              | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                            |
| 1                                            | --            | LP-11                  | →                     | --                        | --            | Start                      |
| 2                                            | DCSWN-S       | HSDT                   | →                     | --                        | --            |                            |
| 3                                            | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet |
| 4                                            | --            | LP-11                  | →                     | --                        | --            | End                        |

**Table 31: DCS Write, No Parameter Sequence – Example 3**

| DCS Write, 1 Parameter Sequence – Example 3 |               |                        |                       |                           |               |                                                               |
|---------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---------------------------------------------------------------|
| Line                                        | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                                       |
|                                             | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                                               |
| 1                                           | --            | LP-11                  | →                     | --                        | --            | Start                                                         |
| 2                                           | DCSWN-S       | HSDT                   | →                     | --                        | --            |                                                               |
| 3                                           | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet                                    |
| 4                                           | --            | LP-11                  | →                     | --                        | --            |                                                               |
| 5                                           | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from MPU to the display module       |
| 6                                           | --            | --                     | ←                     | LP-11                     | --            | If No Error → Go to Line 8<br>If Error Occurs → Go to Line 13 |
| 7                                           |               |                        |                       |                           |               |                                                               |
| 8                                           | --            | --                     | ←                     | ACK                       | --            | No Error                                                      |
| 9                                           | --            | --                     | ←                     | LP-11                     | --            |                                                               |
| 10                                          | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from the display module to MPU       |
| 11                                          | --            | LP-11                  | →                     | --                        | --            | End                                                           |
| 12                                          |               |                        |                       |                           |               |                                                               |
| 13                                          | --            | --                     | ←                     | LPDT                      | AwER          | Error Report                                                  |
| 14                                          | --            | --                     | ←                     | LP-11                     | --            |                                                               |
| 15                                          | --            | BTA                    | ↔                     | BTA                       | --            |                                                               |
| 16                                          | --            | LP-11                  | →                     | --                        | --            | End                                                           |





## DCS Write Long Sequence

A Long Packet (LPa) of “Display Command Set (DCS) Write Long (DCSW-L)” is defined in the chapter “Display Command Set (DCS) Write Long (DCSW-L)”, and examples of sequences on how this packet is used are described in the following tables.

**Table 32: DCS Write Long Sequence – Example 1**

| DCS Write Long Sequence – Example 1 |               |                        |                       |                           |               |         |
|-------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---------|
| Line                                | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment |
|                                     | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |         |
| 1                                   | --            | LP-11                  | →                     | --                        | --            | Start   |
| 2                                   | DCSW-L        | LPDT                   | →                     | --                        | --            |         |
| 3                                   | --            | LP-11                  | →                     | --                        | --            | End     |

**Table 33: DCS Write Long Sequence – Example 2**

| DCS Write Long Sequence – Example 2 |               |                        |                       |                           |               |                            |
|-------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|----------------------------|
| Line                                | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                    |
|                                     | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                            |
| 1                                   | --            | LP-11                  | →                     | --                        | --            | Start                      |
| 2                                   | DCSRN-S       | HSDT                   | →                     | --                        | --            |                            |
| 3                                   | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet |
| 4                                   | --            | LP-11                  | →                     | --                        | --            | End                        |

**Table 34: DCS Write Long Sequence – Example 3**

| DCS Write Long Sequence – Example 3 |               |                        |                       |                           |               |                                                               |
|-------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---------------------------------------------------------------|
| Line                                | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                                       |
|                                     | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                                               |
| 1                                   | --            | LP-11                  | →                     | --                        | --            | Start                                                         |
| 2                                   | DCSRN-S       | HSDT                   | →                     | --                        | --            |                                                               |
| 3                                   | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet                                    |
| 4                                   | --            | LP-11                  | →                     | --                        | --            |                                                               |
| 5                                   | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from MPU to the display module       |
| 6                                   | --            | --                     | ←                     | LP-11                     | --            | If No Error → Go to Line 8<br>If Error Occurs → Go to Line 13 |
| 7                                   |               |                        |                       |                           |               |                                                               |
| 8                                   | --            | --                     | ←                     | ACK                       | --            | No Error                                                      |
| 9                                   | --            | --                     | ←                     | LP-11                     | --            |                                                               |
| 10                                  | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from the display module to MPU       |
| 11                                  | --            | LP-11                  | →                     | --                        | --            | End                                                           |
| 12                                  |               |                        |                       |                           |               |                                                               |
| 13                                  | --            | --                     | ←                     | LPDT                      | AwER          | Error Report                                                  |
| 14                                  | --            | --                     | ←                     | LP-11                     | --            |                                                               |
| 15                                  | --            | BTA                    | ↔                     | BTA                       | --            |                                                               |
| 16                                  | --            | LP-11                  | →                     | --                        | --            | End                                                           |



**Table 35: DCS Write Long Sequence – Example 4<sup>Note</sup>**

| DCS Write Long Sequence – Example 4 |               |                        |                       |                           |               |                                              |
|-------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|----------------------------------------------|
| Line                                | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                      |
|                                     | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                              |
| 1                                   | --            | LP-11                  | →                     | --                        | --            | Start                                        |
| 2                                   | DCSW-L        | HSDT                   | →                     | --                        | --            | Memory Write (2Ch)                           |
| 3                                   | DCSW-L        | HSDT                   | →                     | --                        | --            | Memory Write Continue (3Ch)                  |
| 4                                   | DCSW-L        | HSDT                   | →                     | --                        | --            | Memory Write Continue (3Ch)                  |
| 5                                   | DCSW1-S       | HSDT                   | →                     | --                        | --            | Memory Write Continue (3Ch) with 1 Parameter |
| 6                                   | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet                   |
| 7                                   | --            | LP-11                  | →                     | --                        | --            | End                                          |

<sup>Note</sup> This is an example that image data are sent in 4 packets.

## DCS Read, No Parameter Sequence

A Short Packet (SPa) of “Display Command Set (DCS) Read, No Parameter (DCSRN-S)” is defined in the chapter “Display Command Set (DCS) Read, No Parameter (DCSRN-S)”, and examples of sequences on how this packet is used are described in the following tables.

**Table 36: DCS Read, No Parameter Sequence – Example 1**

| DCS Read, No Parameter Sequence – Example 1 |               |                        |                       |                           |               |                                                                                                               |
|---------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---------------------------------------------------------------------------------------------------------------|
| Line                                        | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                                                                                       |
|                                             | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                                                                                               |
| 1                                           | --            | LP-11                  | →                     | --                        | --            | Start                                                                                                         |
| 2                                           | SMRPS-S       | HSDT                   | →                     | --                        | --            | Defined how many data byte is wanted to read : 1 byte                                                         |
| 3                                           | DCSRN-S       | HSDT                   | →                     | --                        | --            | Wanted to get a response ID1 (DAh)                                                                            |
| 4                                           | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet                                                                                    |
| 5                                           | --            | LP-11                  | →                     | --                        | --            |                                                                                                               |
| 6                                           | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from MPU to the display module                                                       |
| 7                                           | --            | --                     | ←                     | LP-11                     | --            | If No Error → Go to Line 9<br>If Error Occurs → Go to Line 14<br>If Error is Corrected by ECC → Go to Line 19 |
| 8                                           |               |                        |                       |                           |               |                                                                                                               |
| 9                                           | --            | --                     | ←                     | LPDT                      | DCSRR1-S      | Response 1 byte return                                                                                        |
| 10                                          | --            | --                     | ←                     | LP-11                     | --            |                                                                                                               |
| 11                                          | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from the display module to MPU                                                       |
| 12                                          | --            | LP-11                  | →                     | --                        | --            | End                                                                                                           |
| 13                                          |               |                        |                       |                           |               |                                                                                                               |
| 14                                          | --            | --                     | ←                     | LPDT                      | AwER          | Error Report                                                                                                  |
| 15                                          | --            | --                     | ←                     | LP-11                     | --            |                                                                                                               |
| 16                                          | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from the display module to MPU                                                       |
| 17                                          | --            | LP-11                  | →                     | --                        | --            | End                                                                                                           |
| 18                                          |               |                        |                       |                           |               |                                                                                                               |
| 19                                          | --            | --                     | ←                     | LPDT                      | DCSRR1-S      | Response 1 byte return                                                                                        |
| 20                                          | --            | --                     | ←                     | LPDT                      | AwER          | Error Report (Error is corrected by ECC)                                                                      |
| 21                                          |               |                        | ←                     | LP-11                     | --            |                                                                                                               |
| 22                                          | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from the display module to MPU                                                       |
| 23                                          | --            | LP-11                  | →                     | --                        | --            | End                                                                                                           |

**Table 37: DCS Read, No Parameter Sequence – Example 2**

| DCS Read, No Parameter Sequence – Example 2 |               |                        |                       |                           |               |                                                                                                               |
|---------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|---------------------------------------------------------------------------------------------------------------|
| Line                                        | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                                                                                       |
|                                             | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                                                                                               |
| 1                                           | --            | LP-11                  | ➔                     | --                        | --            | Start                                                                                                         |
| 2                                           | SMRPS-S       | HSDT                   | ➔                     | --                        | --            | Defined how many data byte is wanted to read : 200 bytes                                                      |
| 3                                           | DCSRN-S       | HSDT                   | ➔                     | --                        | --            | Wanted to get a response "Memory Read" (2Eh)                                                                  |
| 4                                           | EoTP          | HSDT                   | ➔                     | --                        | --            | End of Transmission Packet                                                                                    |
| 5                                           | --            | LP-11                  | ➔                     | --                        | --            |                                                                                                               |
| 6                                           | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from MPU to the display module                                                       |
| 7                                           | --            | --                     | ←                     | LP-11                     | --            | If No Error ➔ Go to Line 9<br>If Error Occurs ➔ Go to Line 14<br>If Error is Corrected by ECC ➔ Go to Line 19 |
| 8                                           |               |                        |                       |                           |               |                                                                                                               |
| 9                                           | --            | --                     | ←                     | LPDT                      | DCSRR-L       | Response 200 byte return                                                                                      |
| 10                                          | --            | --                     | ←                     | LP-11                     | --            |                                                                                                               |
| 11                                          | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from the display module to MPU                                                       |
| 12                                          | --            | LP-11                  | ➔                     | --                        | --            | End                                                                                                           |
| 13                                          |               |                        |                       |                           |               |                                                                                                               |
| 14                                          | --            | --                     | ←                     | LPDT                      | AwER          | Error Report                                                                                                  |
| 15                                          | --            | --                     | ←                     | LP-11                     | --            |                                                                                                               |
| 16                                          | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from the display module to MPU                                                       |
| 17                                          | --            | LP-11                  | ➔                     | --                        | --            | End                                                                                                           |
| 18                                          |               |                        |                       |                           |               |                                                                                                               |
| 19                                          | --            | --                     | ←                     | LPDT                      | DCSRR-S       | Response 200 byte return                                                                                      |
| 20                                          | --            | --                     | ←                     | LPDT                      | AwER          | Error Report (Error is corrected by ECC)                                                                      |
| 21                                          | --            | --                     | ←                     | LP-11                     | --            |                                                                                                               |
| 22                                          | --            | BTA                    | ↔                     | BTA                       | --            | Interface Control Change from the display module to MPU                                                       |
| 23                                          | --            | LP-11                  | ➔                     | --                        | --            | End                                                                                                           |

## Null Packet, No Data Sequence

A Long Packet (LPa) of “Null Packet, No Data (NP-L)” is defined in the chapter “Null Packet, No Data (NP-L)”, and an example of sequence on how this packet is used is described in the following table.

**Table 38: Null Packet, No Data Sequence - Example**

| Null Packet, No Data Sequence – Example |               |                        |                       |                           |               |                                           |
|-----------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|-------------------------------------------|
| Line                                    | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                   |
|                                         | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                           |
| 1                                       | --            | LP-11                  | →                     | --                        | --            | Start                                     |
| 2                                       | NP-L          | HSDT                   | →                     | --                        | --            | Only High Speed Data Transmission is used |
| 3                                       | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet                |
| 4                                       | --            | LP-11                  | →                     | --                        | --            | End                                       |

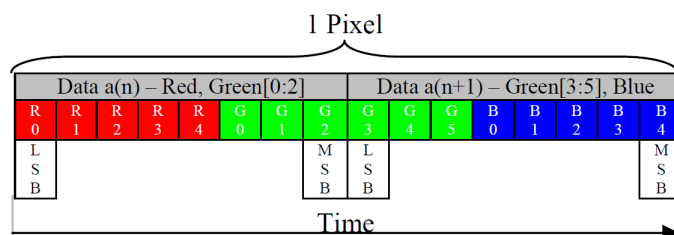
## End of Transmission Packet

A Short Packet (SPa) of “End of Transmission (EoTP)” is defined in the chapter “End of Transmission Packet (EoTP)”, and an example of sequence on how this packet is used is described in the following table.

**Table 39: End of Transmission Packet – Example**

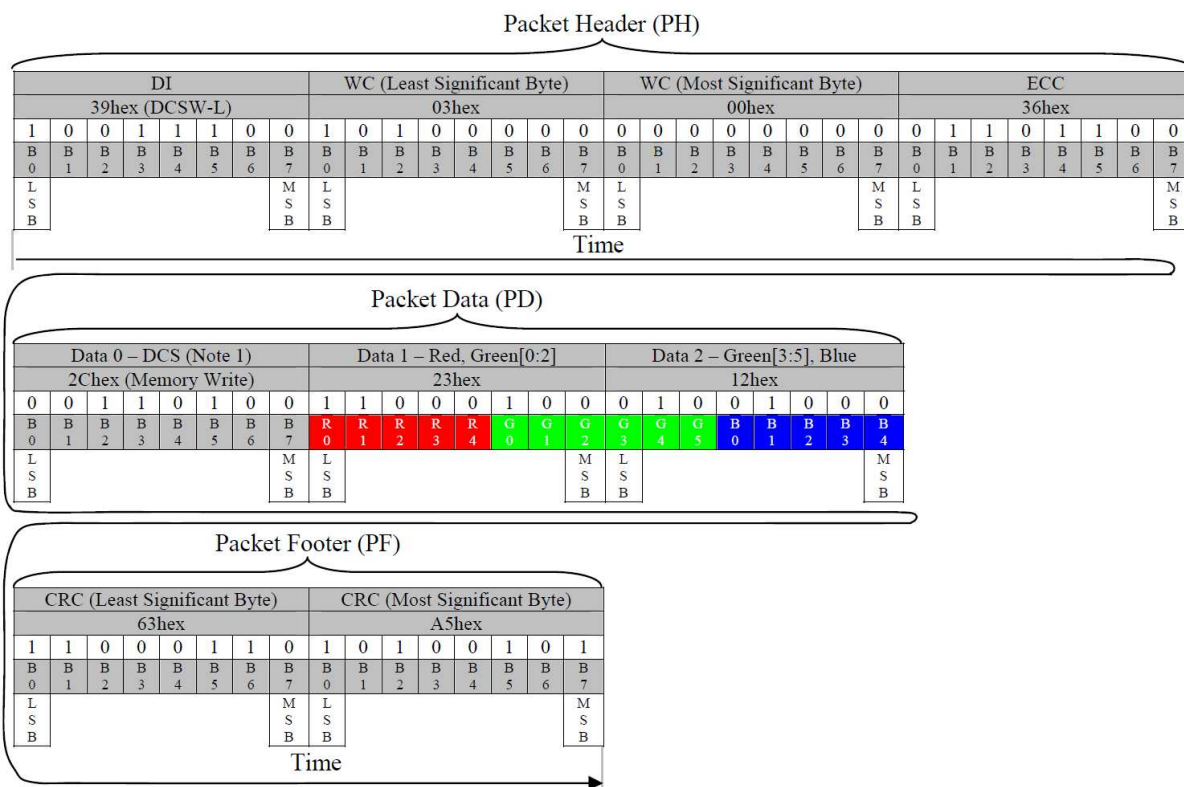
| End of Transmission Packet – Example |               |                        |                       |                           |               |                                           |
|--------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|-------------------------------------------|
| Line                                 | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                   |
|                                      | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                           |
| 1                                    | --            | LP-11                  | →                     | --                        | --            | Start                                     |
| 2                                    | NP-L          | HSDT                   | →                     | --                        | --            | Only High Speed Data Transmission is used |
| 3                                    | EoTP          | HSDT                   | →                     | --                        | --            | End of Transmission Packet                |
| 4                                    | --            | LP-11                  | →                     | --                        | --            | End                                       |

## 16 Bit/Pixel Writing



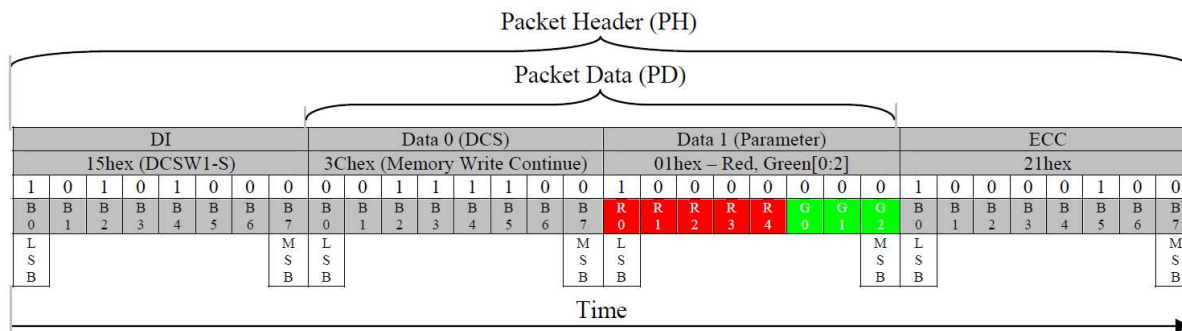
**Figure 100: One Pixel Bit and Write Color Orders**

The MPU can send the following packet to the display module.

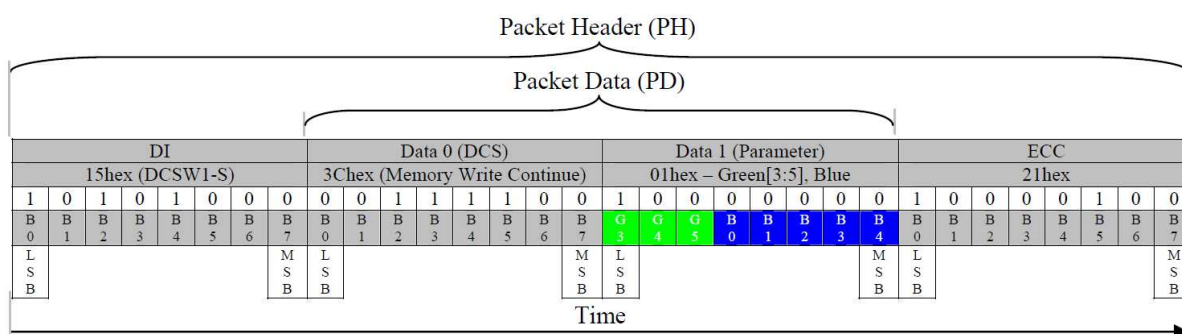


**Figure 101: One Pixel Write (DCSW-L) – Example 1<sup>Note</sup>**

- <sup>Note</sup>
1. DCS (Data 0) can be Memory Write (2Ch) or Memory Write Continue (3Ch) command.
  2. It is possible that one pixel information is split into different packets which end and star as follows: RG – GB (2 packets).
  3. A packet can include several pixels (not just one pixel as in this example).



**Figure 102: Red/Green [0:2] Subpixel Write (DCSW1-S) – Example 2<sup>Note 1</sup>**



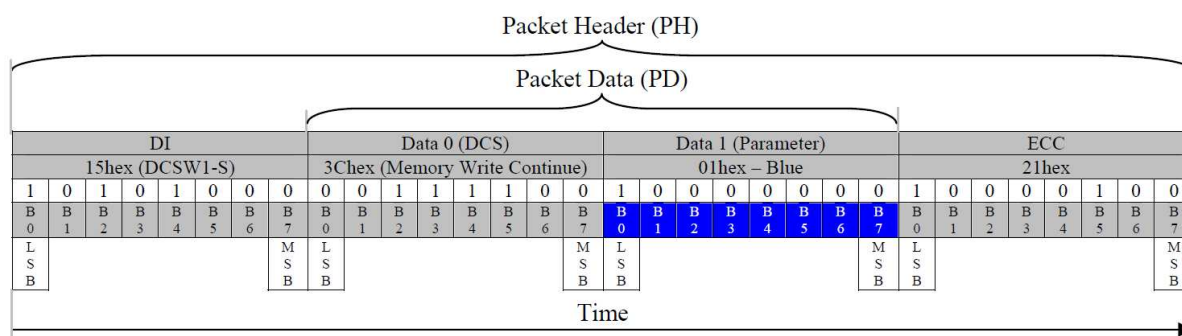
**Figure 103: Green [3:5]/Blue Subpixel Write (DCSW1-S) – Example 3<sup>Note 2</sup>**

<sup>Note 1</sup> DCS (Data 0) can also be “Memory Write” (2Ch) command.

<sup>Note 2</sup> 1. DCS (Data 0) cannot be “Memory Write” (2Ch) command. It must always be “Memory Write Continue” (3Ch).  
2. Previous data byte is R [0:4] G [0:2].



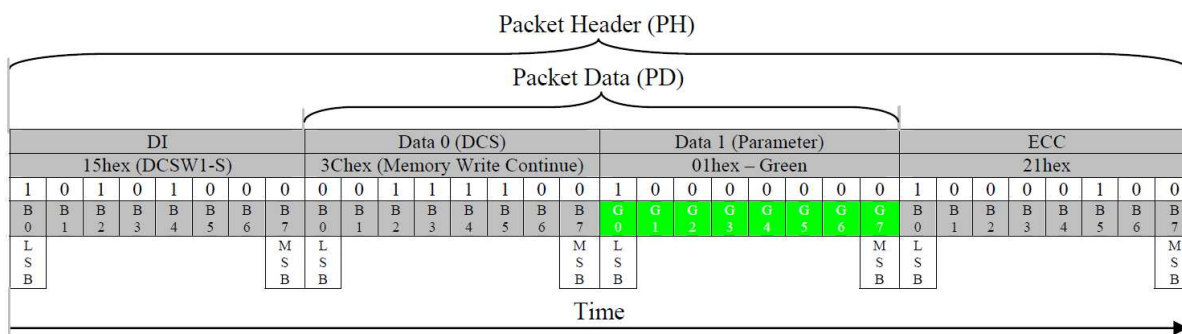




**Figure 106: Blue Subpixel Write (DCSW1-S) – Example 2**

Notes:

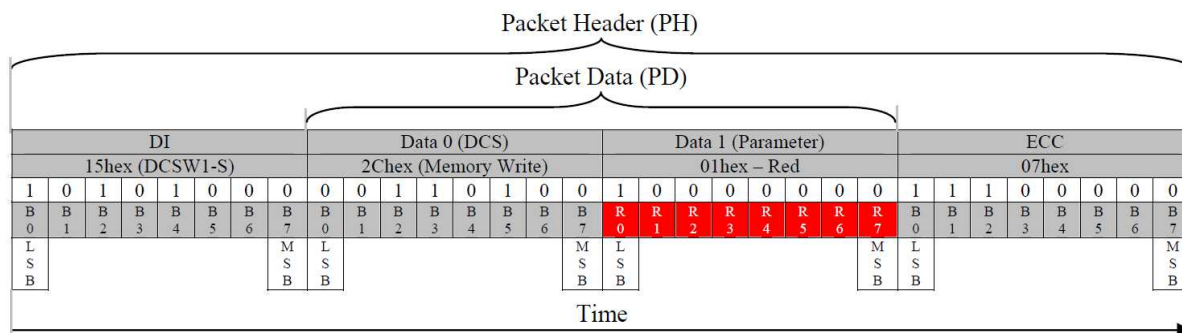
1. DCS (Data 0) cannot be “Memory Write” (2Ch) command. It must always be “Memory Write Continue” (3Ch)
2. Previous data byte is G [0:7].



**Figure 107: Green Subpixel Write (DCSW1-S) – Example 3**

Notes:

1. DCS (Data 0) cannot be “Memory Write” (2Ch) command. It must always be “Memory Write Continue” (3Ch)
2. Previous data byte is R [0:7].

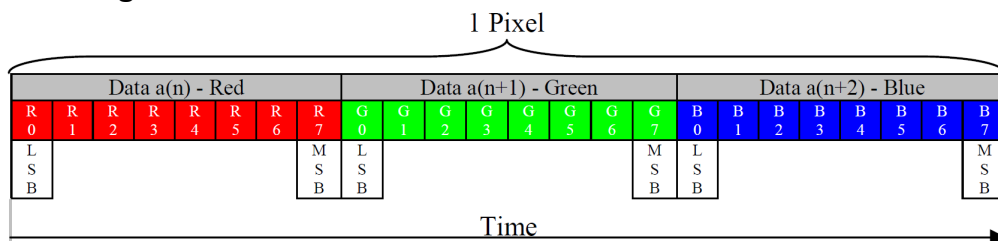


**Figure 108: Red Subpixel Write (DCSW1-S) – Example 4**

Notes:

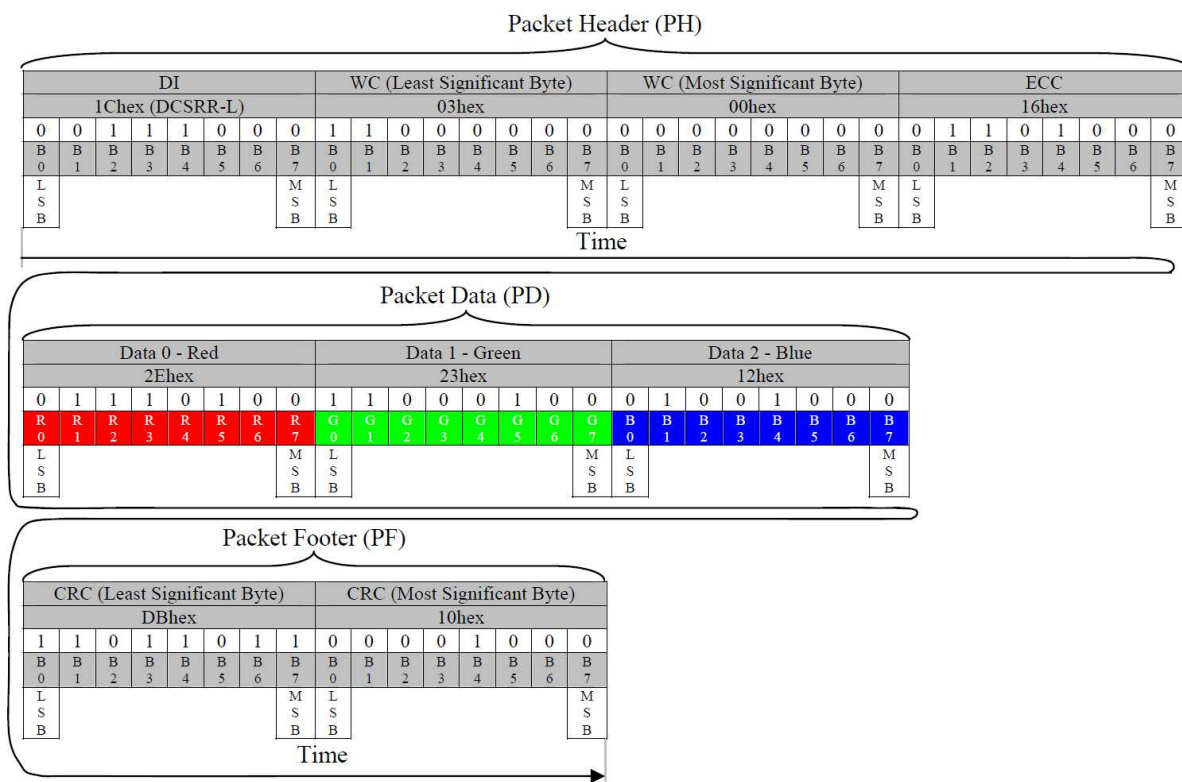
1. DCS (Data 0) can also be “Memory Write Continue” (3Ch) command.
2. Previous data byte is B [0:7].

## 24 bit/pixel Reading



**Figure 109: One Pixel Bit and Color Read Order**

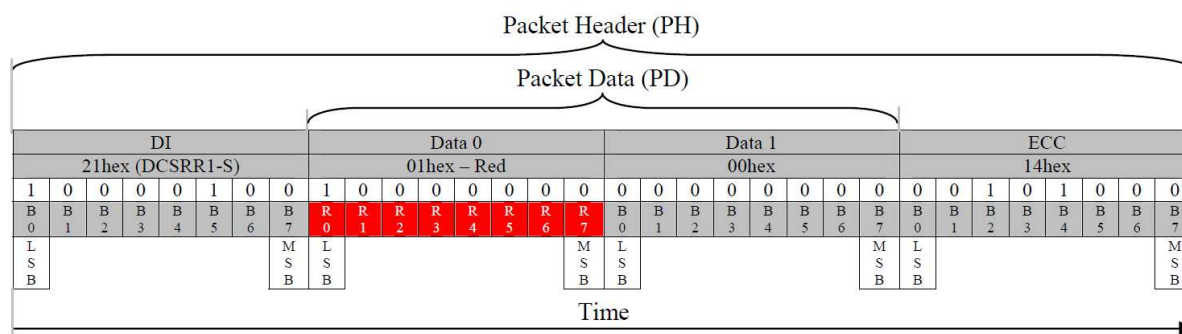
The display module can send following packets to the MPU after the MPU has sent a read command “Memory Read (2Eh)” or “Memory Read Continue (3Eh)”.



**Figure 110: One Pixel Read Response (DCSRR-L) – Example 1**

Note: It is possible that one pixel information is split in two or three different packets:

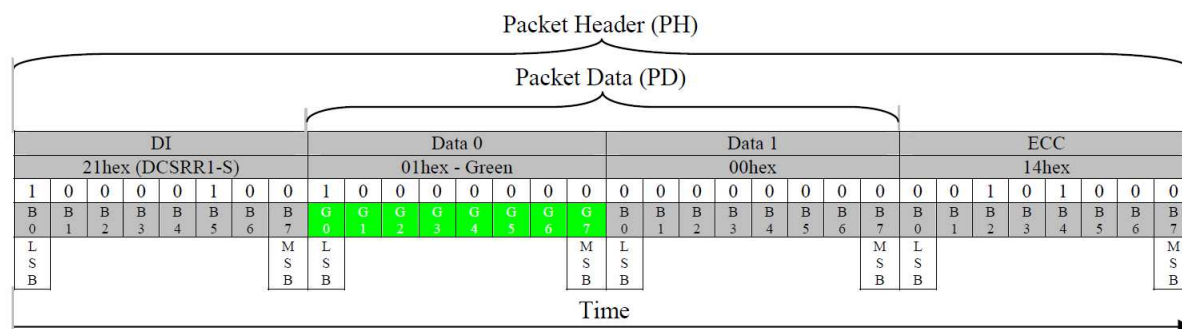
- R – GB (2 packets)
- RG – B (2 packets)
- R – G – B (3 packets)



**Figure 111: Red Subpixel Response (DCSRR1-S) – Example 2**

Notes:

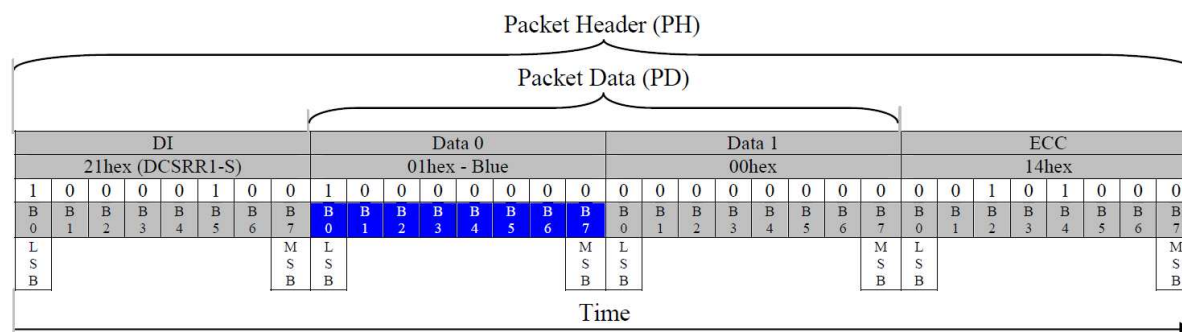
1. Data 1 is always 00h.
2. Previous data byte is B [0:7].



**Figure 112: Green Subpixel Response (DCSRR1-S) – Example 3**

Notes:

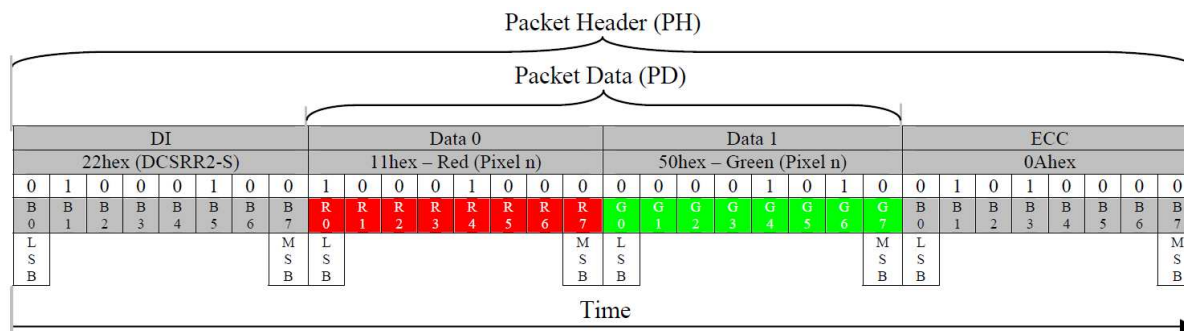
1. Data 1 is always 00h.
2. Previous data byte is R [0:7].



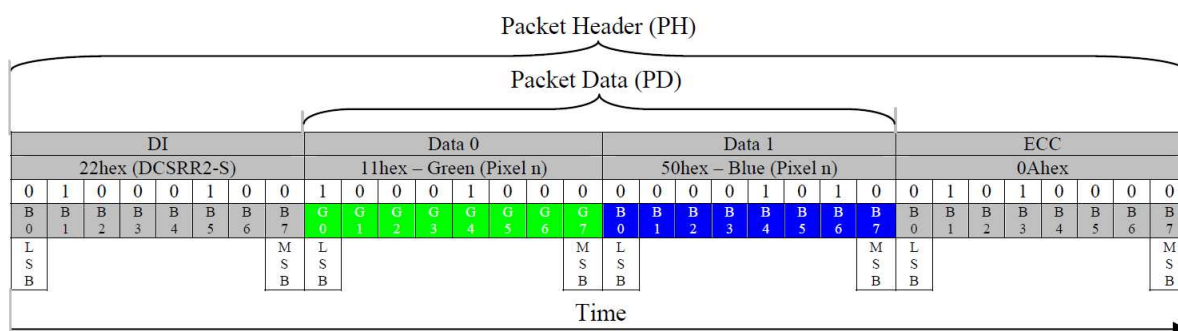
**Figure 113: Blue Subpixel Response (DCSRR1-S) – Example 4**

Notes:

1. Data 1 is always 00h.
2. Previous data byte is G [0:7].

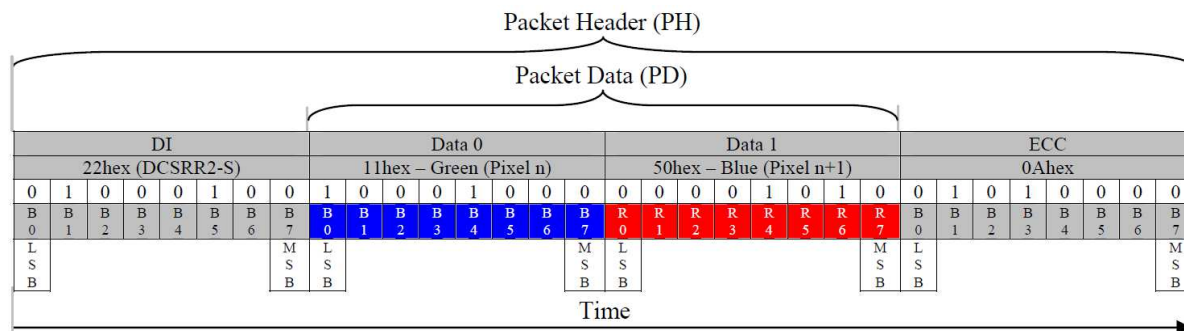


**Figure 114: Red and Green Subpixels Response (DCSRR2-S) – Example 5**



**Figure 115: Green and Blue Subpixels Response (DCSRR2-S) – Example 6**

Note: Previous data byte is R [0:7].



**Figure 116: Blue and Red Subpixels Response (DCSRR2-S) – Example 7**

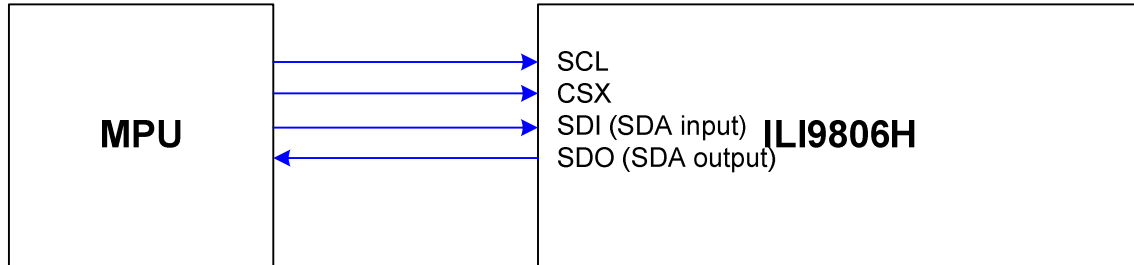
Note: Previous data byte is G [0:7].

## 4.7. Display Data Format

### 3-line Serial Interface

The 3-line/9-bit serial bus interface of the ILI9806H can be used by setting the external pin IM [3:0] to 0011/0100/1011.

The Figure 117 is an interface with 8080 MPU system interface.

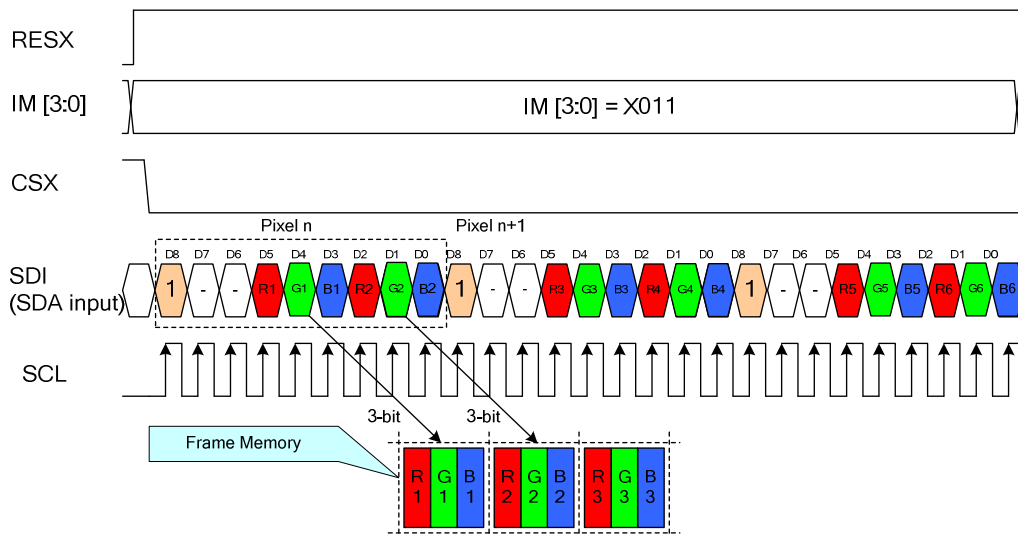


**Figure 117: 3-line Serial Interface**

The display data formats available for this type of color depth are:

- 65K-Colors, RGB 5, 6, 5 bits input data (Set Standard Command 3Ah, DBI [2:0] = 101)
- 262K-Colors, RGB 6, 6, 6 bits input data (Set Standard Command 3Ah, DBI [2:0] = 110)
- 16.7M colors, RGB 8, 8, 8 bits input (Set Standard Command 3Ah, DBI [2:0] = 111)

### SPI Data for 3-bit/pixel (RGB 1-1-1 bits input), 8-color



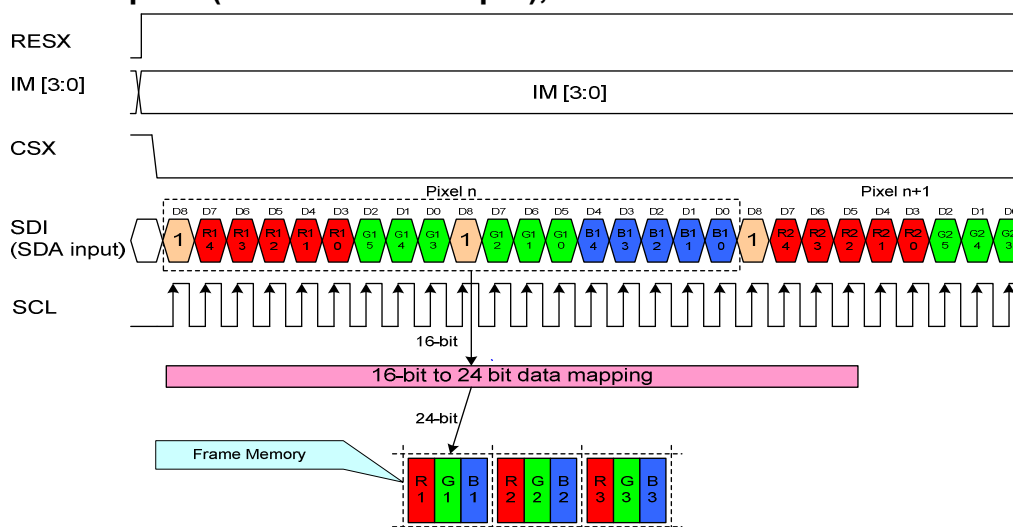
**Figure 118 :SPI Data for 3-bit/pixel (RGB 1-1-1 bits input), 8-color**

Notes:

1. One pixel data contains 3-bit color depth information.
2. '-' = void



### SPI Data for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color

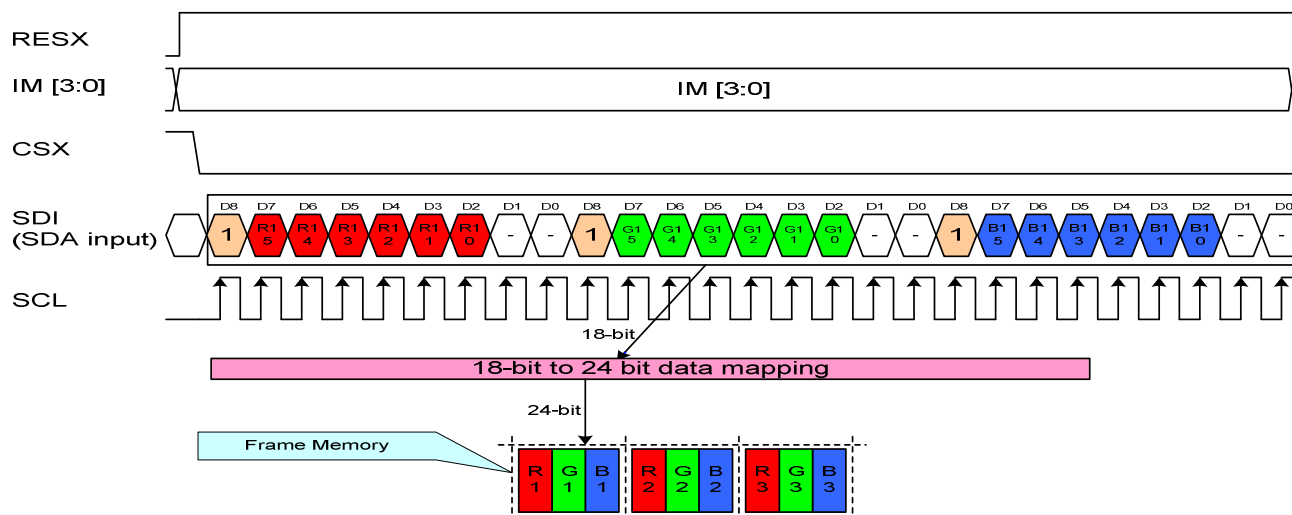


**Figure 119: SPI Data for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color (Rising edge example)**

Notes:

1. One pixel data contains 16-bit color depth information.
2. The most significant bits are: R x 4, G x 5 and B x 4.
3. The least significant bits are: R x 0, G x 0 and B x 0.

### SPI Data for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color

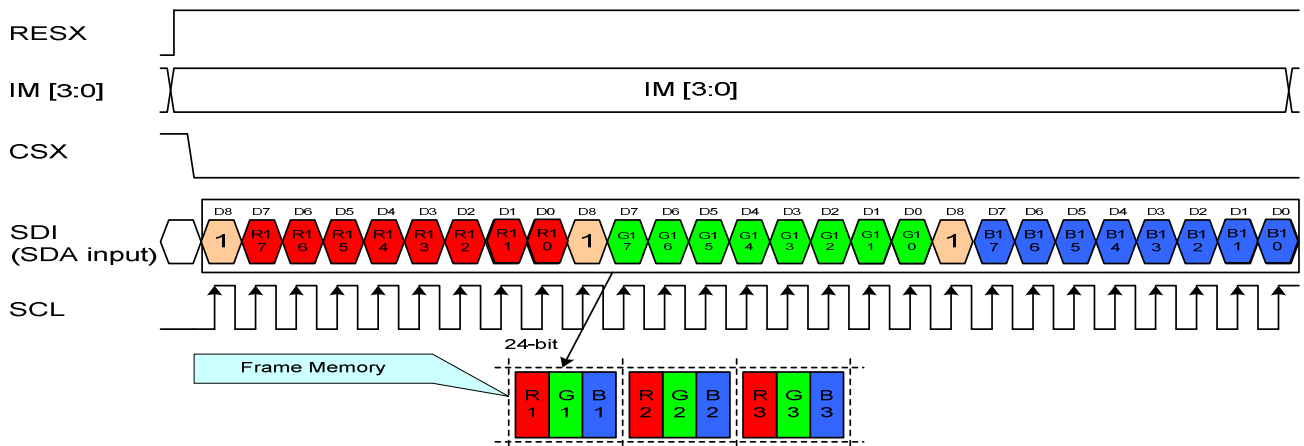


**Figure 120: SPI Data for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color (Rising edge example)**

Notes:

1. One pixel data contains 18-bit color depth information.
2. The most significant bits are: R x 5, G x 5 and B x 5.
3. The least significant bits are: R x 0, G x 0 and B x 0.
- 4: '-' = void

### SPI Data for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color

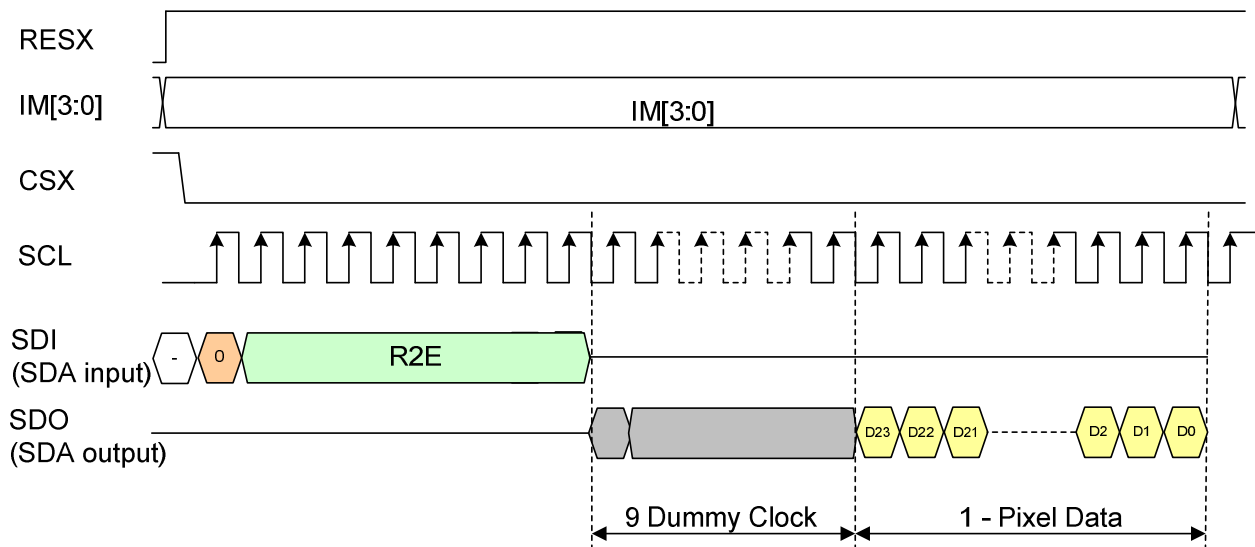


**Figure 121: SPI Data for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color (Rising edge example)**

Notes:

1. One pixel data contains 24-bit color depth information.
2. The most significant bits are: R x 7, G x 7 and B x 7.
3. The least significant bits are: R x 0, G x 0 and B x 0.

Read data through 3-line SPI mode



**Figure 122: 3-line SPI Mode Read Data (Rising edge example)**

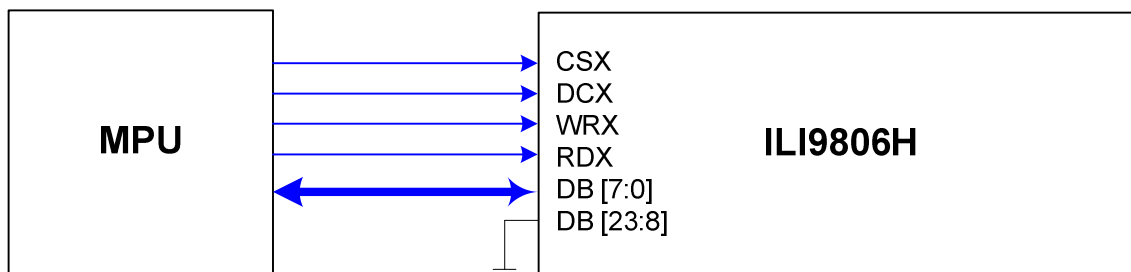
Note: '-' = void



### 8-bit Parallel MPU Interface

The DBI TYPE B 8-bit parallel bus interface of the ILI9806H can be used by setting the external pin IM [3:0] to 0000

The Figure 123 shows this system interface.



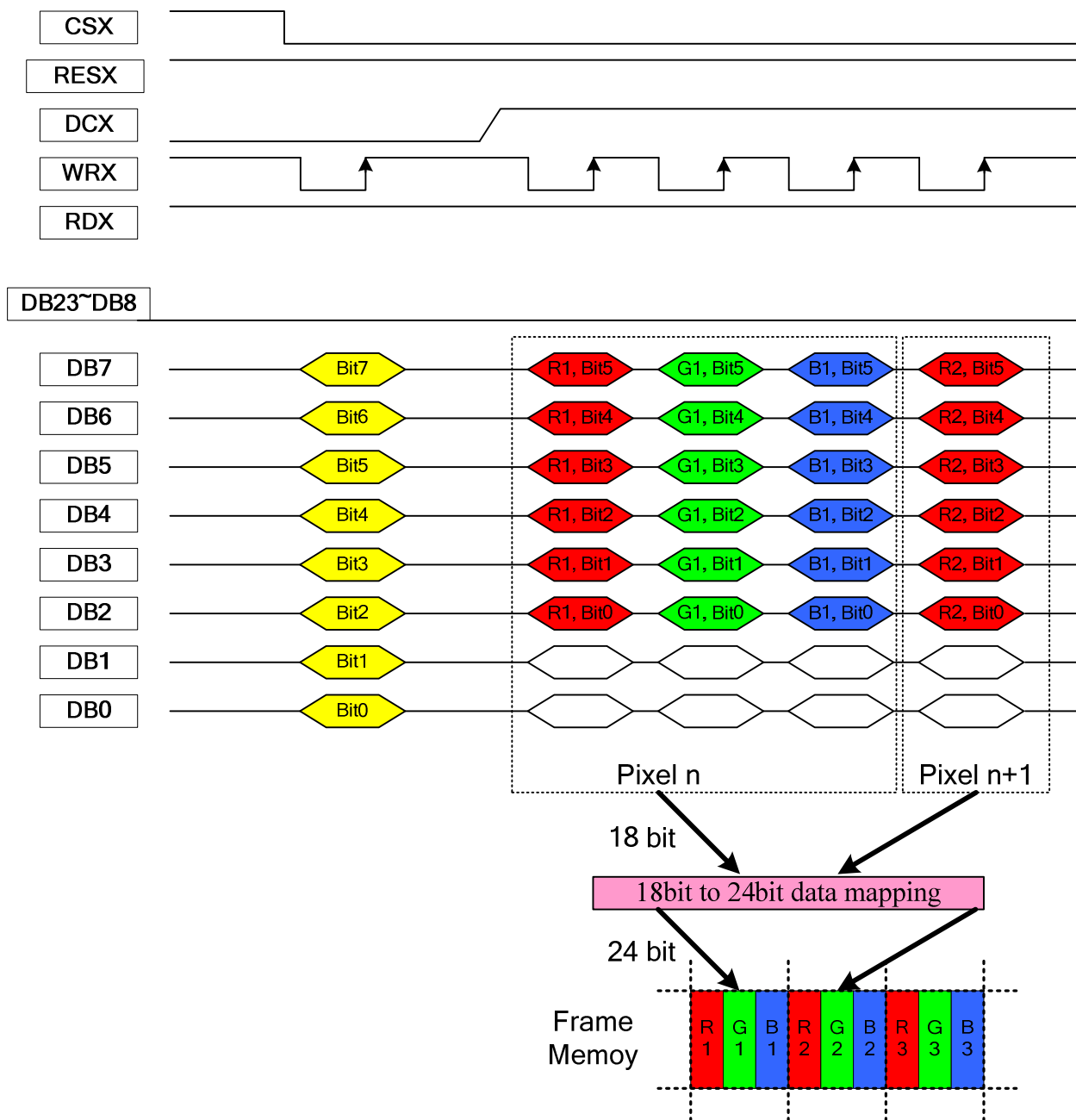
**Figure 123: 8-bit Parallel MPU Interface**

The display data formats available for this type of color depth are:

- 65K-Colors, RGB 5, 6, 5 bits input data (Set Standard Command 3Ah, DBI [2:0] = 101)
- 262K-Colors, RGB 6, 6, 6 bits input data (Set Standard Command 3Ah, DBI [2:0] = 110)
- 16.7M-Colors, RGB 8, 8, 8 bits input data (Set Standard Command 3Ah, DBI [2:0] = 111)



## 8-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color

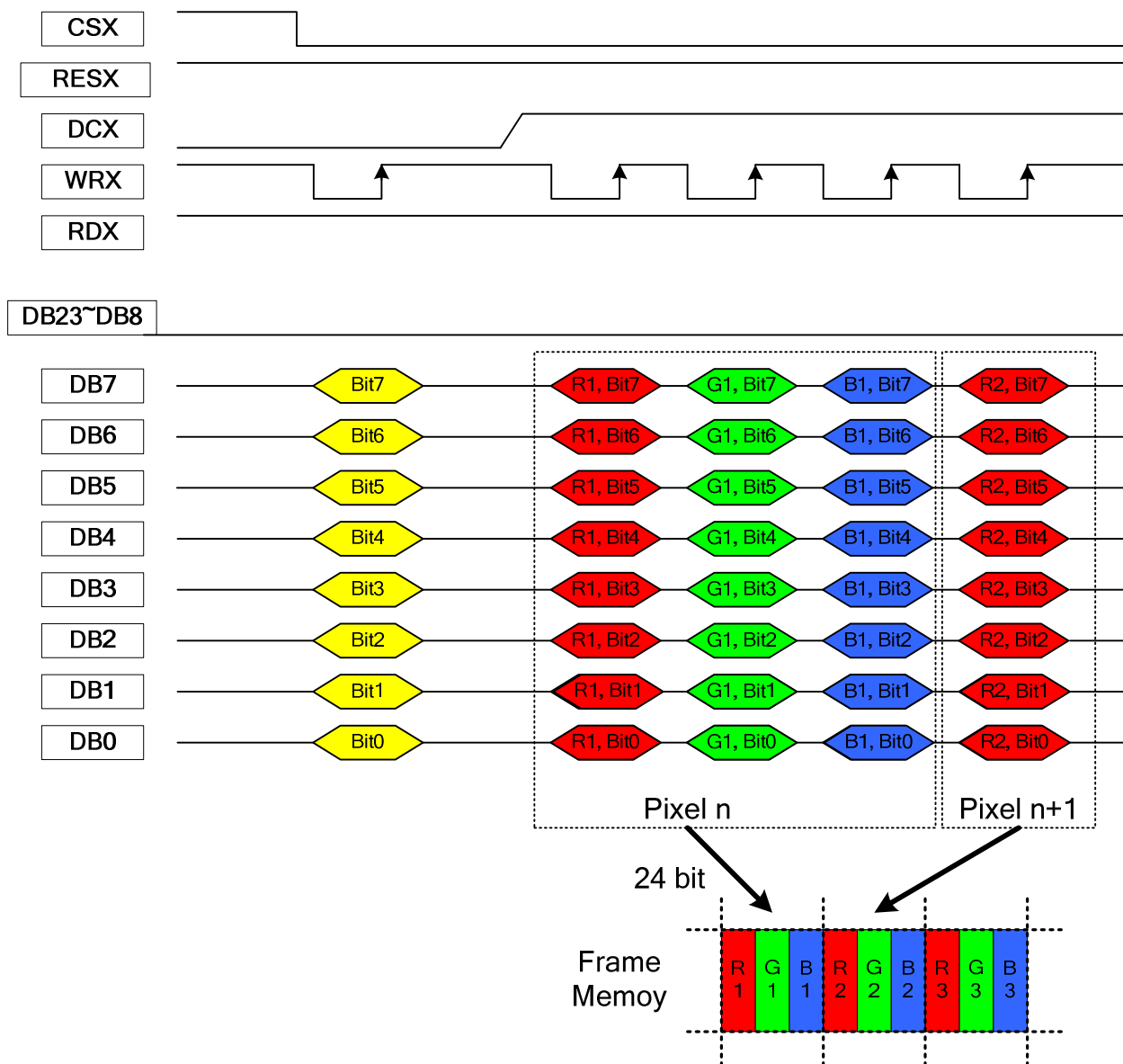


**Figure 125: 8-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color**

Notes:

1. The data order is as follows: MSB = DB7, LSB = DB0 and picture data is MSB = Bit 5, LSB = Bit 0 for Green, Red and Blue data.
2. 3-times transfer is used to transmit 1 pixel data to the 18-bit color depth information.
3. '-' = void

### 8-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color



**Figure 126: 8-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color**

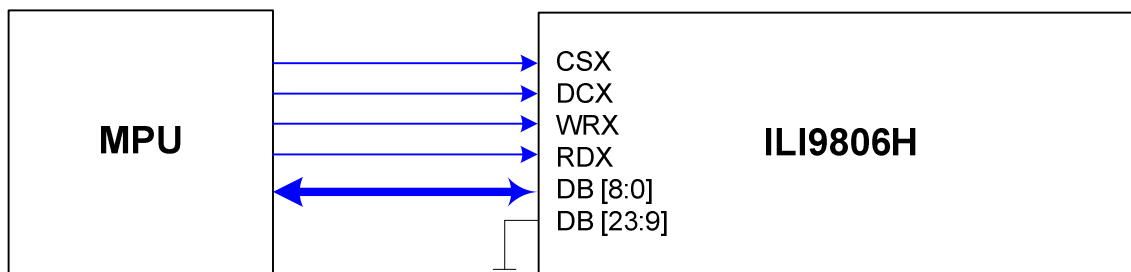
Notes:

1. The data order is as follows: MSB = DB7, LSB = DB0 and picture data is MSB = Bit 7, LSB = Bit 0 for Green, Red and Blue data.
2. 3-times transfer is used to transmit 1 pixel data to the 24-bit color depth information.
3. '-' = void

### 9-bit Parallel MPU Interface

The DBI TYPE B 9-bit parallel bus interface of the ILI9806H can be used by setting the external pin IM [3:0] to 1100.

The Figure 127 shows this system interface.

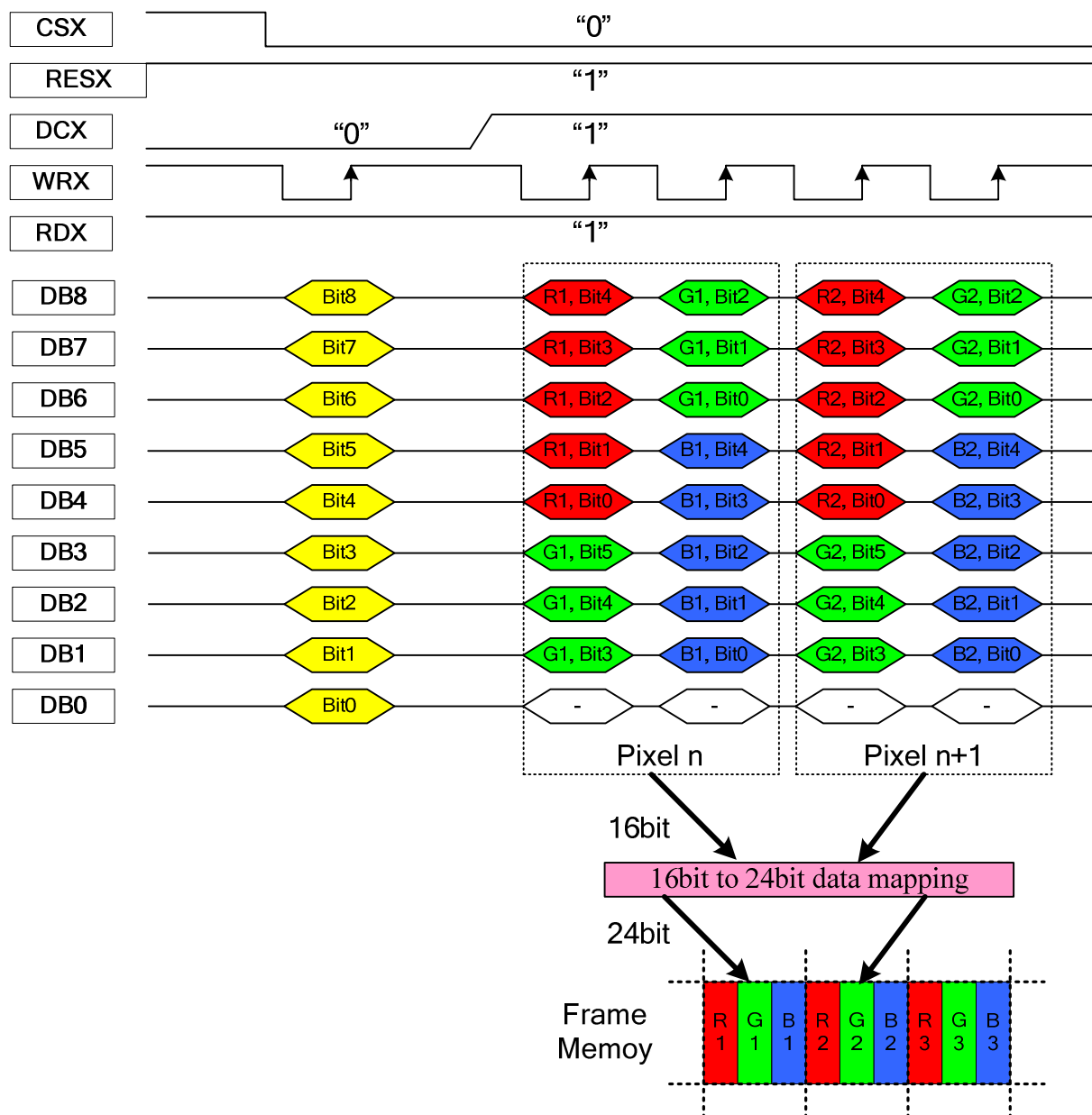


**Figure 127: 9-bit Parallel MPU Interface**

The display data formats available for this type of color depth are:

- 65K-Colors, RGB 5, 6, 5 bits input data (Set Standard Command 3Ah, DBI [2:0] = 101)
- 262K-Colors, RGB 6, 6, 6 bits input data (Set Standard Command 3Ah, DBI [2:0] = 110)
- 16.7M-Colors, RGB 8, 8, 8 bits input data (Set Standard Command 3Ah, DBI [2:0] = 111)

### 9-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color



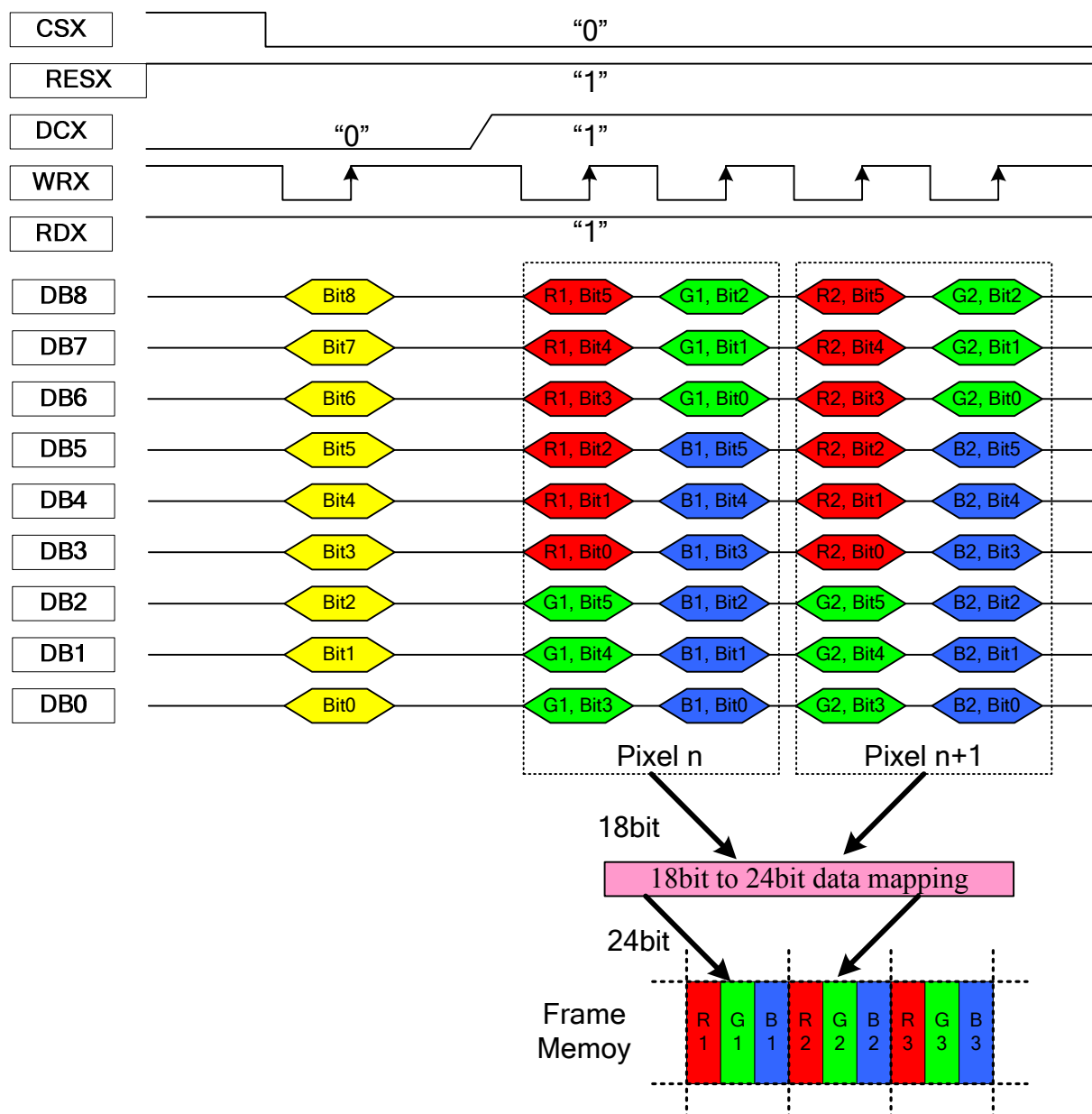
**Figure 128: 9-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color**

Notes:

1. The data order is as follows: MSB = DB8, LSB = DB0, and picture data is MSB = Bit 5, LSB = Bit 0 for Green, MSB = Bit 4, LSB = Bit 0 for Red and Blue data.
2. 2-times transfer is used to transmit 1 pixel data to the 16-bit color depth information.

3. '-' = void

### 9-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color

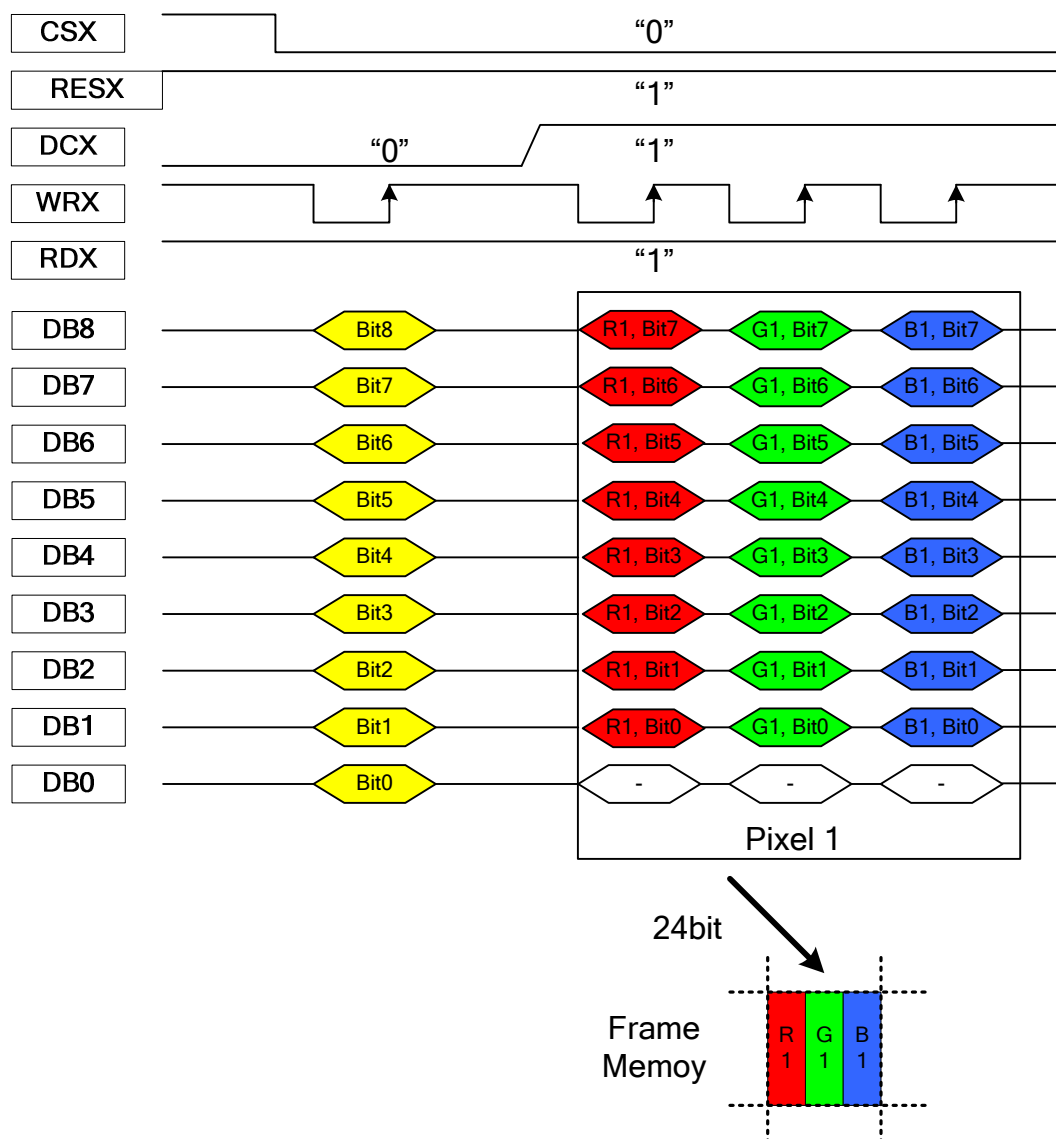


**Figure 129: 9-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color**

#### Notes:

1. The data order is as follows: MSB = DB8, LSB = DB0, and picture data is MSB = Bit 5, LSB = Bit 0 for Green, Red and Blue data.
2. 2-times transfer is used to transmit 1 pixel data to the 18-bit color depth information.
3. '-' = void

### 9-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color



**Figure 130: 9-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color**

Notes:

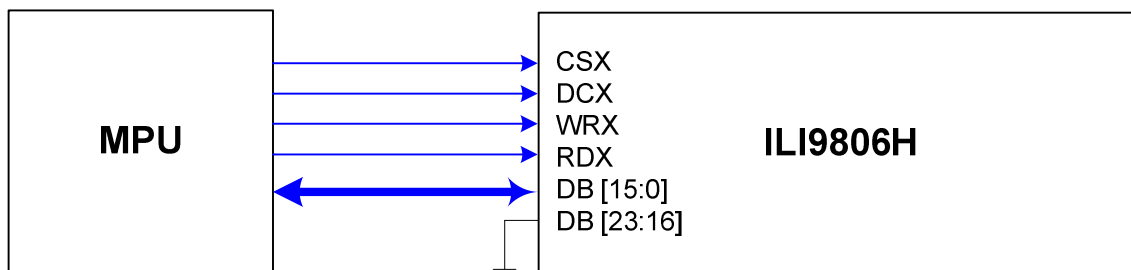
1. The data order is as follows: MSB = DB8, LSB = DB0, and picture data is MSB = Bit 7, LSB = Bit 0 for Green, Red and Blue data.
2. 3-times transfer is used to transmit 1 pixel data to the 24-bit color depth information.
3. '-' = void



## 16-bit Parallel MPU Interface

The DBI TYPE B 16-bit parallel bus interface of the ILI9806H can be used by setting the external pin IM [3:0] to 0001.

The Figure 131 shows this system interface.

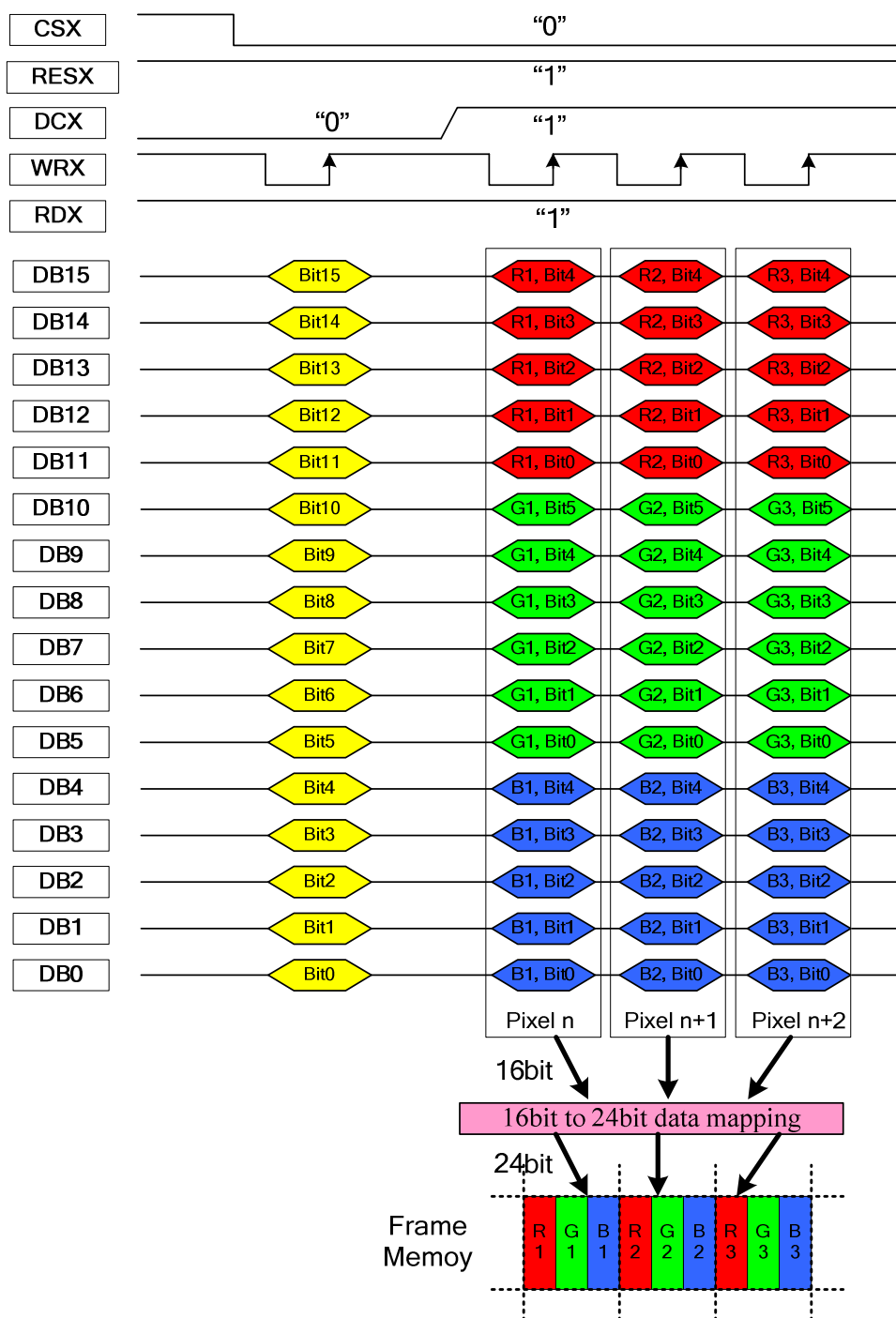


**Figure 131: 16-bit Parallel MPU Interface**

The display data formats available for this type of color depth are:

- 65K-Colors, RGB 5, 6, 5 bits input data (Set Standard Command 3Ah, DBI [2:0] = 101)
- 262K-Colors, RGB 6, 6, 6 bits input data (Set Standard Command 3Ah, DBI [2:0] = 110)
- 16.7M-Colors, RGB 8, 8, 8 bits input data (Set Standard Command 3Ah, DBI [2:0] = 111)

### 16-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color

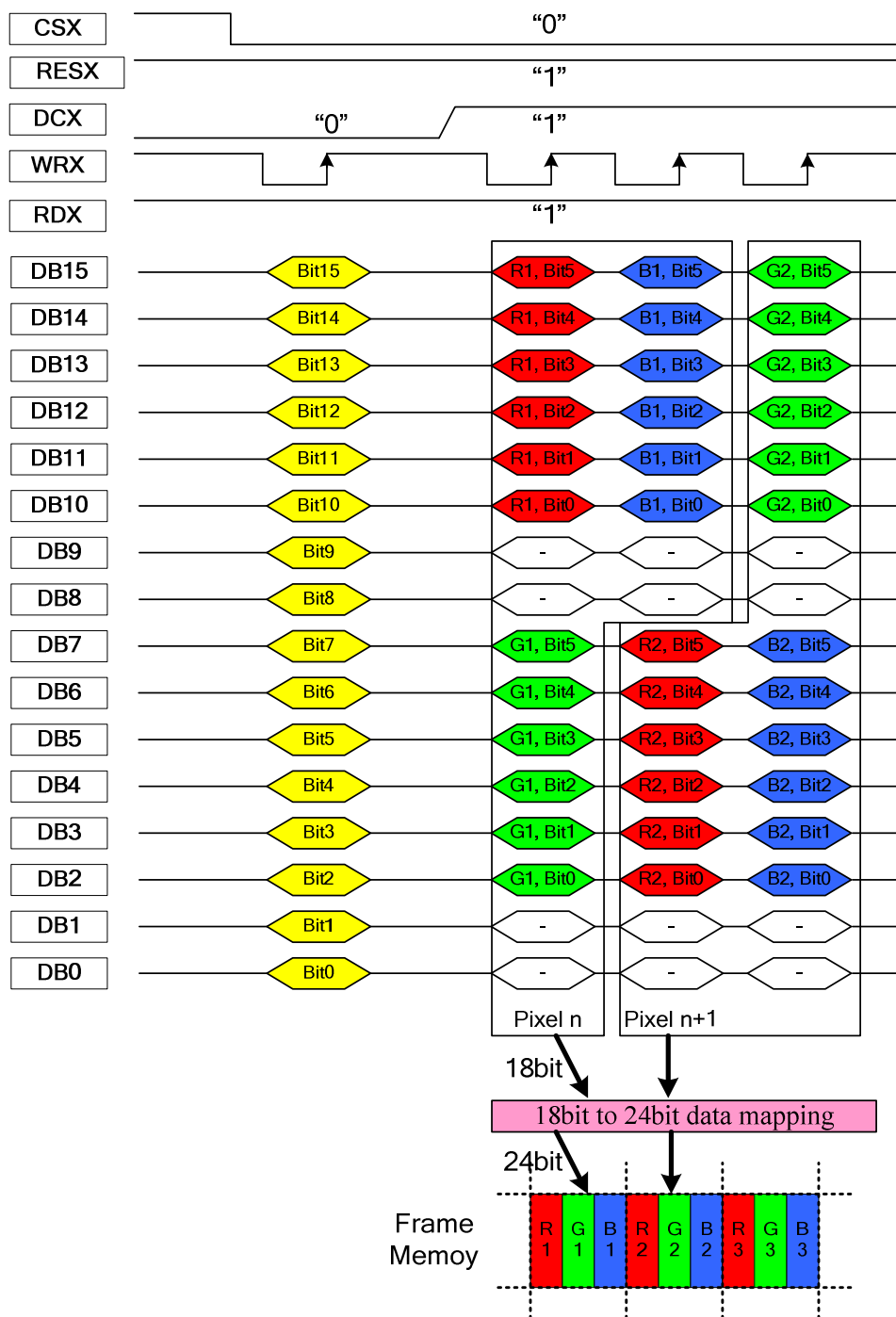


**Figure 132: 16-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color**

#### Notes:

1. The data order is as follows: MSB = DB15, LSB = DB0 and picture data is MSB = Bit 5, LSB = Bit 0 for Green data and MSB = Bit 4, LSB = Bit0 for Red and Blue data.
2. 1-time transfer is used to transmit 1 pixel data to the 16-bit color depth information.
3. '-' = void

### 16-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color

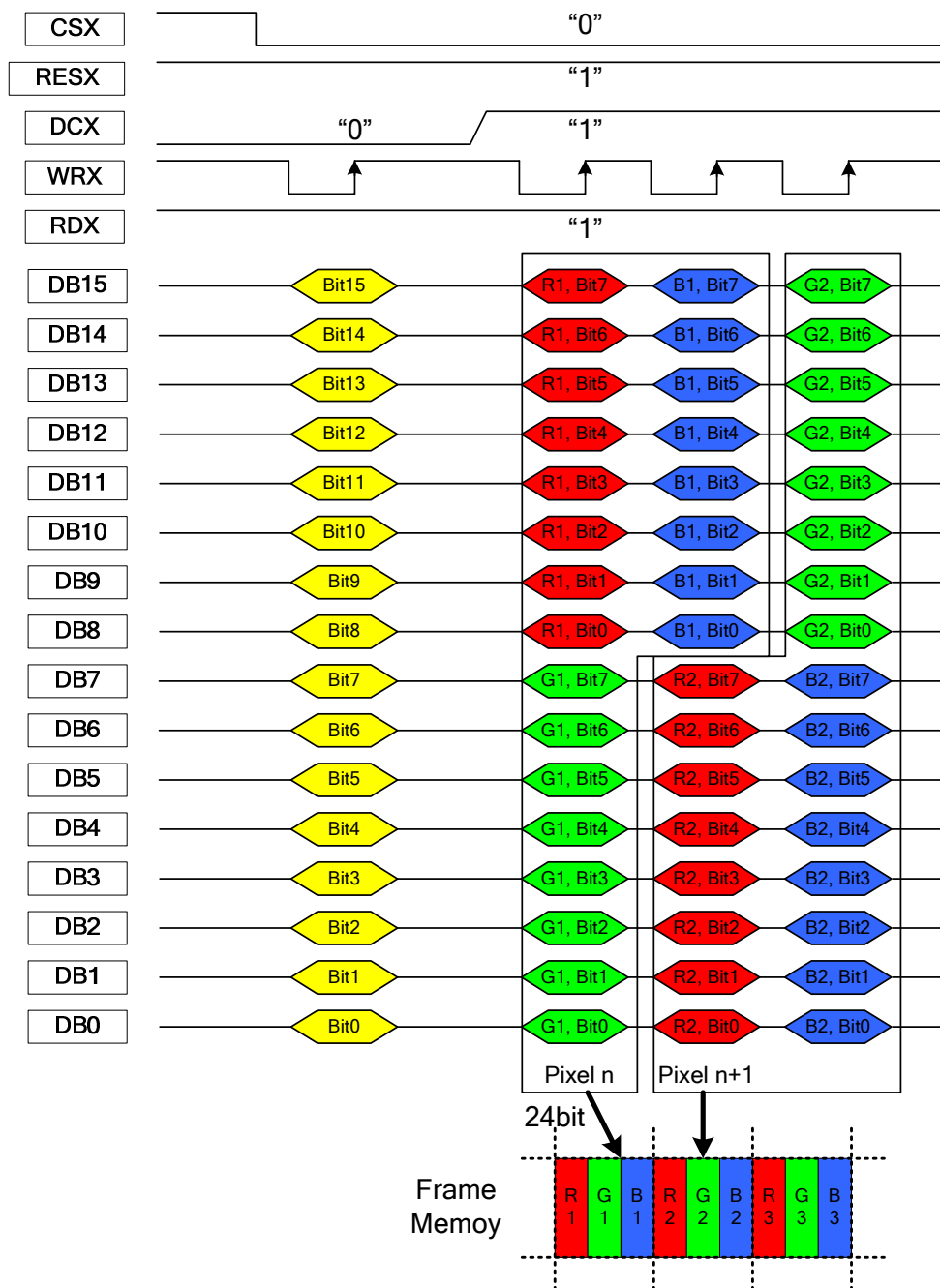


**Figure 133: 16-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color**

Notes:

1. The data order is as follows: MSB = DB15, LSB = DB0, and picture data is MSB = Bit 5, LSB = Bit 0 for Green, Red and Blue data.
2. 3-times transfer is used to transmit 2 pixel data to the 18-bit color depth information.
3. '-' = void

### 16-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color



**Figure 134: 16-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color**

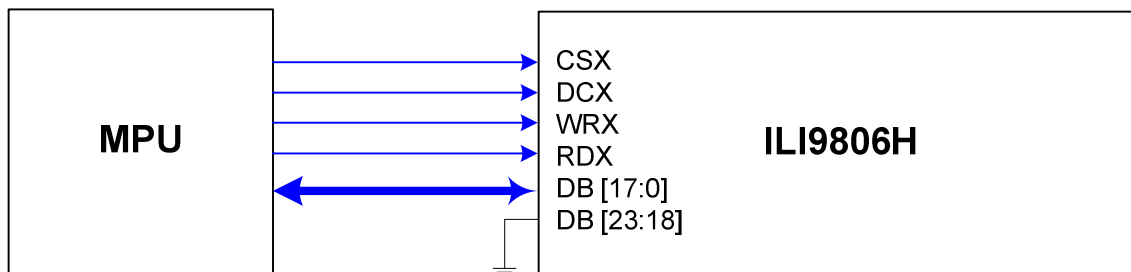
**Notes:**

1. The data order is as follows: MSB = DB15, LSB = DB0, and picture data is MSB = Bit 7, LSB = Bit 0 for Green, Red and Blue data.
2. 3-times transfer is used to transmit 2 pixel data to the 24-bit color depth information.
3. '-' = void

### 18-bit Parallel MPU Interface

The DBI TYPE B 18-bit parallel bus interface of the ILI9806H can be used by setting the external pin IM [3:0] to 1101.

The Figure 135 shows this system interface.

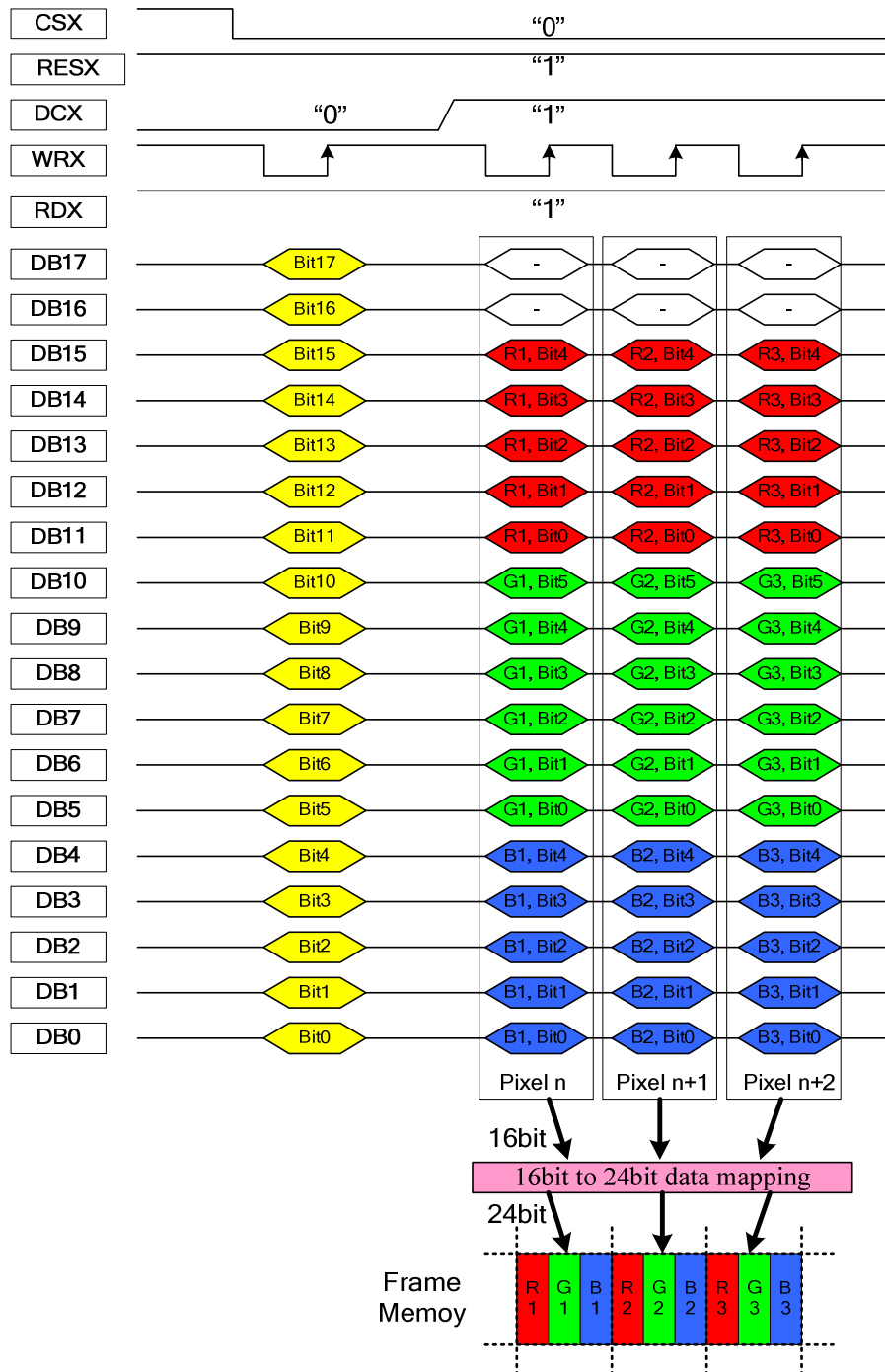


**Figure 135: 18-bit Parallel MPU Interface**

The display data formats available for this type of color depth are:

- 65K-Colors, RGB 5, 6, 5 bits input data (Set Standard Command 3Ah, DBI [2:0] = 101)
- 262K-Colors, RGB 6, 6, 6 bits input data (Set Standard Command 3Ah, DBI [2:0] = 110)
- 16.7M-Colors, RGB 8, 8, 8 bits input data (Set Standard Command 3Ah, DBI [2:0] = 111)

### 18-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color

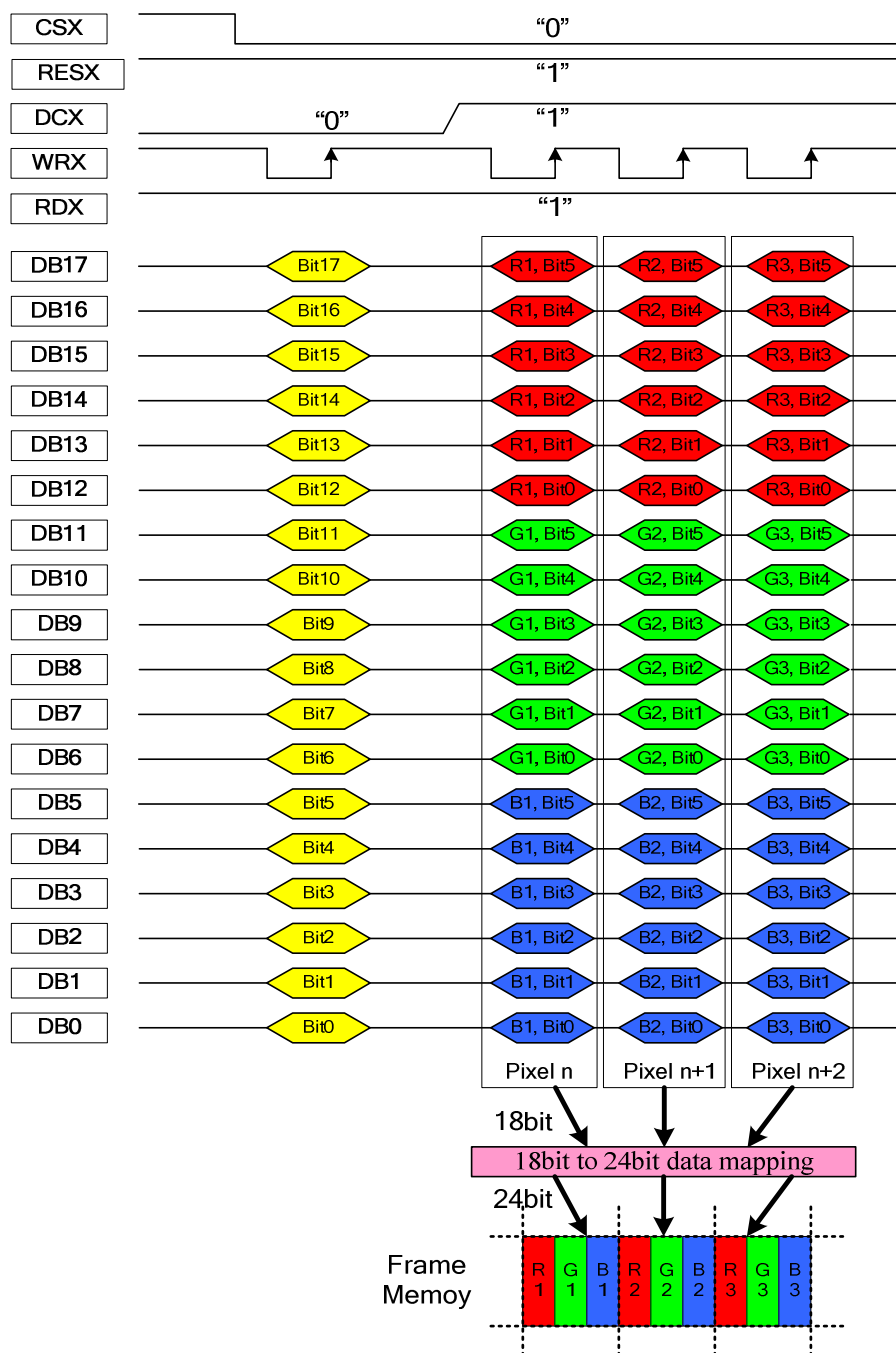


**Figure 136: 18-bit Data Bus for 16-bit/pixel (RGB 5-6-5 bits input), 65K-color**

**Notes:**

1. The data order is as follows: MSB = DB17, LSB = DB0, and picture data is MSB = Bit 5, LSB = Bit 0 for Green and MSB = Bit4, LSB = Bit0 for Red and Blue data.
2. 1-time transfer is used to transmit 1 pixel data to the 16-bit color depth information.
3. '-' = void

### 18-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color

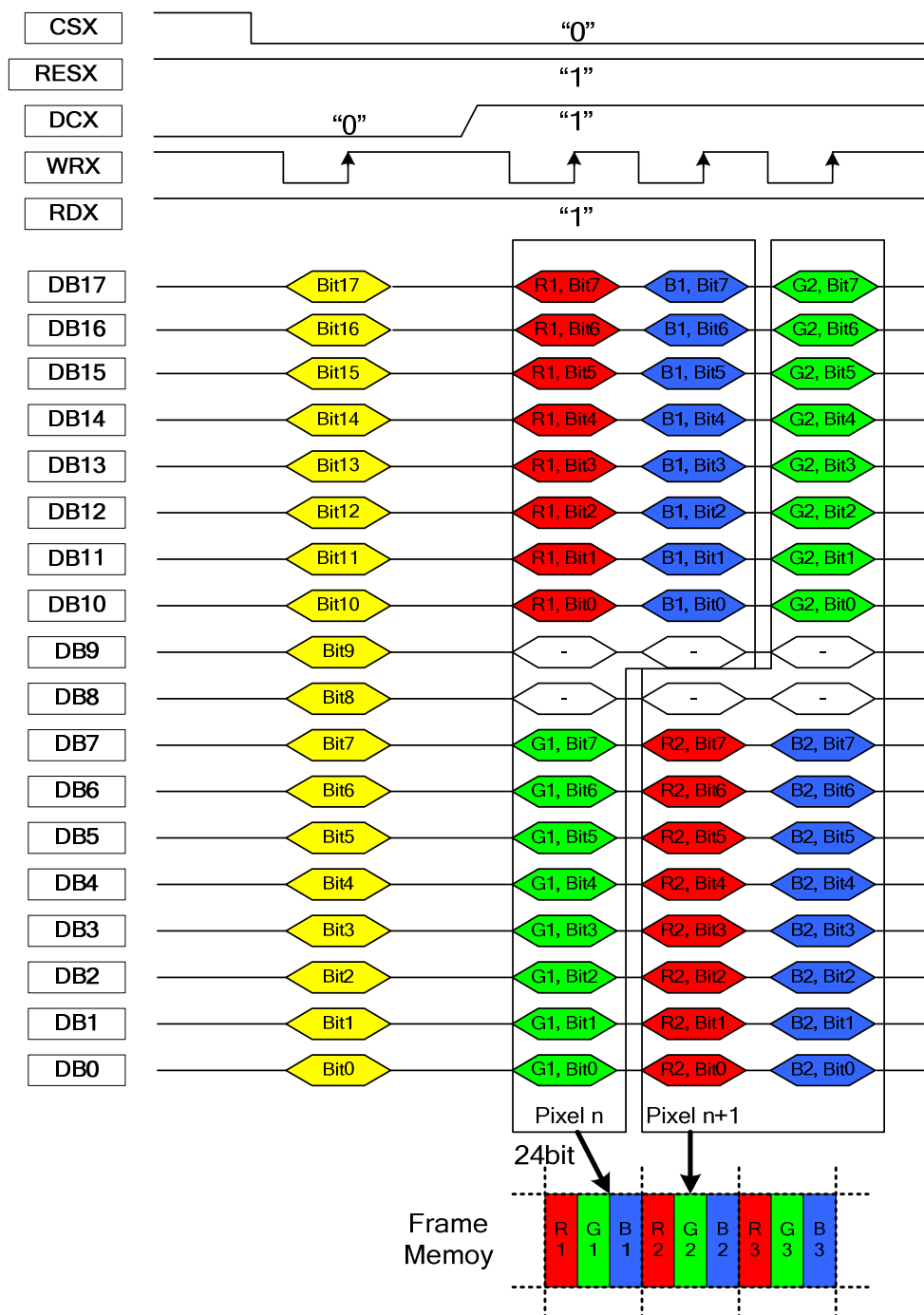


**Figure 137: 18-bit Data Bus for 18-bit/pixel (RGB 6-6-6 bits input), 262K-color**

Notes:

1. The data order is as follows: MSB = DB17, LSB = DB0, and picture data is MSB = Bit 5, LSB = Bit 0 for Green, Red and Blue data.
2. 1-time transfer is used to transmit 1 pixel data to the 18-bit color depth information.
3. '-' = void

### 18-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color



**Figure 138: 18-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color**

Notes:

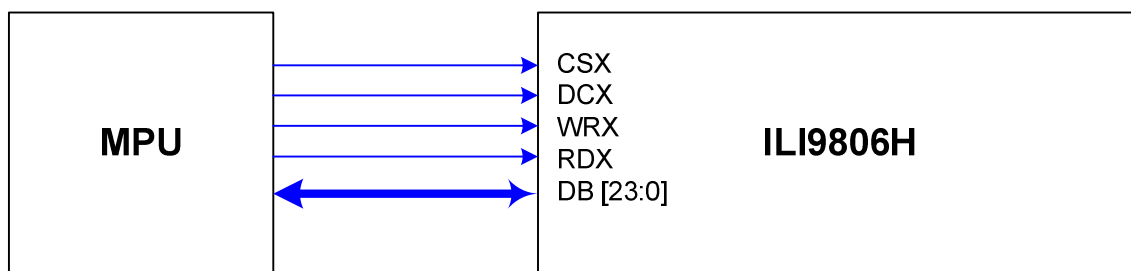
1. The data order is as follows: MSB = DB17, LSB = DB0, and picture data is MSB = Bit 7, LSB = Bit 0 for Green, Red and Blue data.
2. 2-times transfer is used to transmit 1 pixel data to the 24-bit color depth information.
3. '-' = void



## 24-bit Parallel MPU Interface

The DBI TYPE B 24-bit parallel bus interface of the ILI9806H can be used by setting the external pin IM [3:0] to 0010

The Figure 139 shows this system interface.

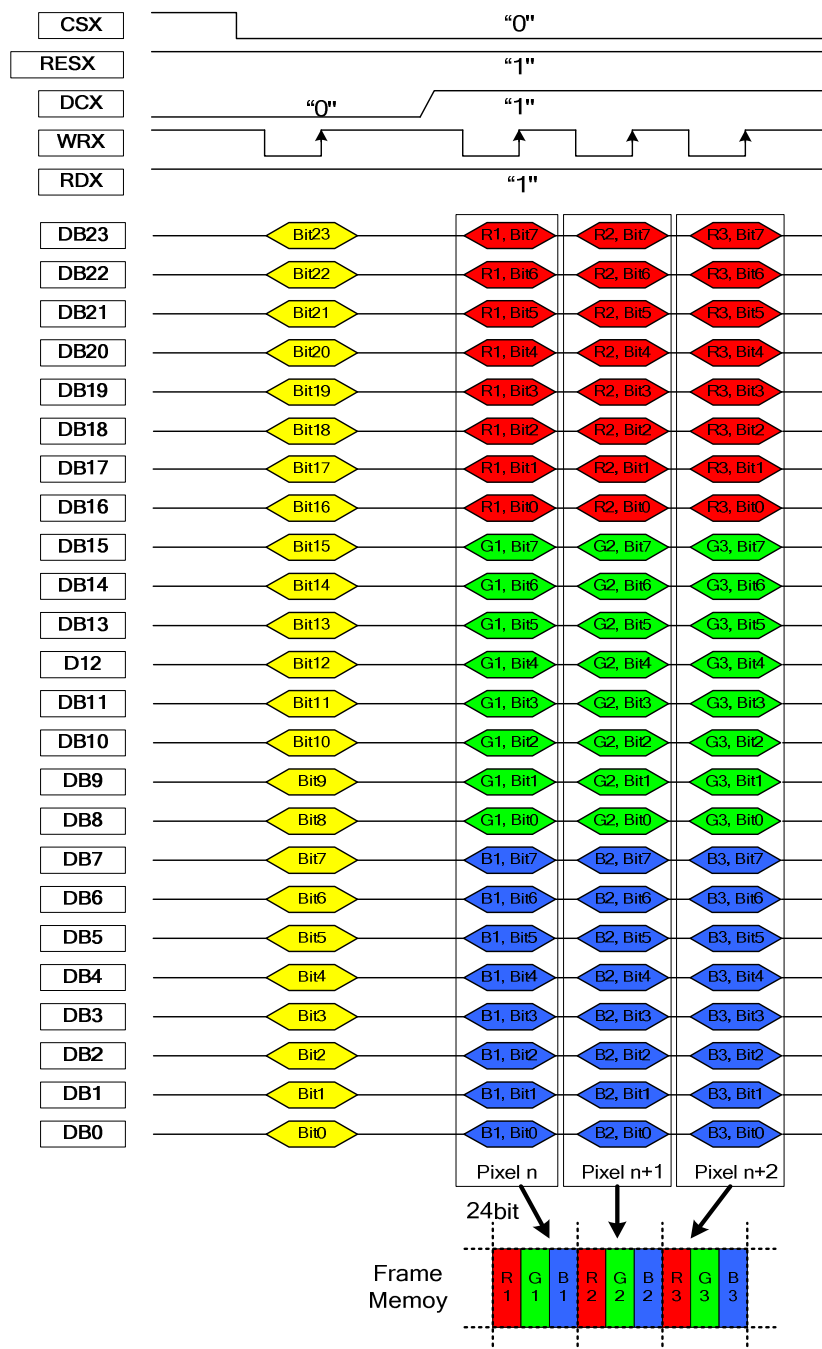


**Figure 139: 24-bit Parallel MPU Interface**

The display data format available for this type of color depth is:

- 16.7M-Colors, RGB 8, 8, 8 bits input data (Set Standard Command 3Ah, DBI [2:0] = 111)

## 24-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color



**Figure 140: 24-bit Data Bus for 24-bit/pixel (RGB 8-8-8 bits input), 16.7M-color**

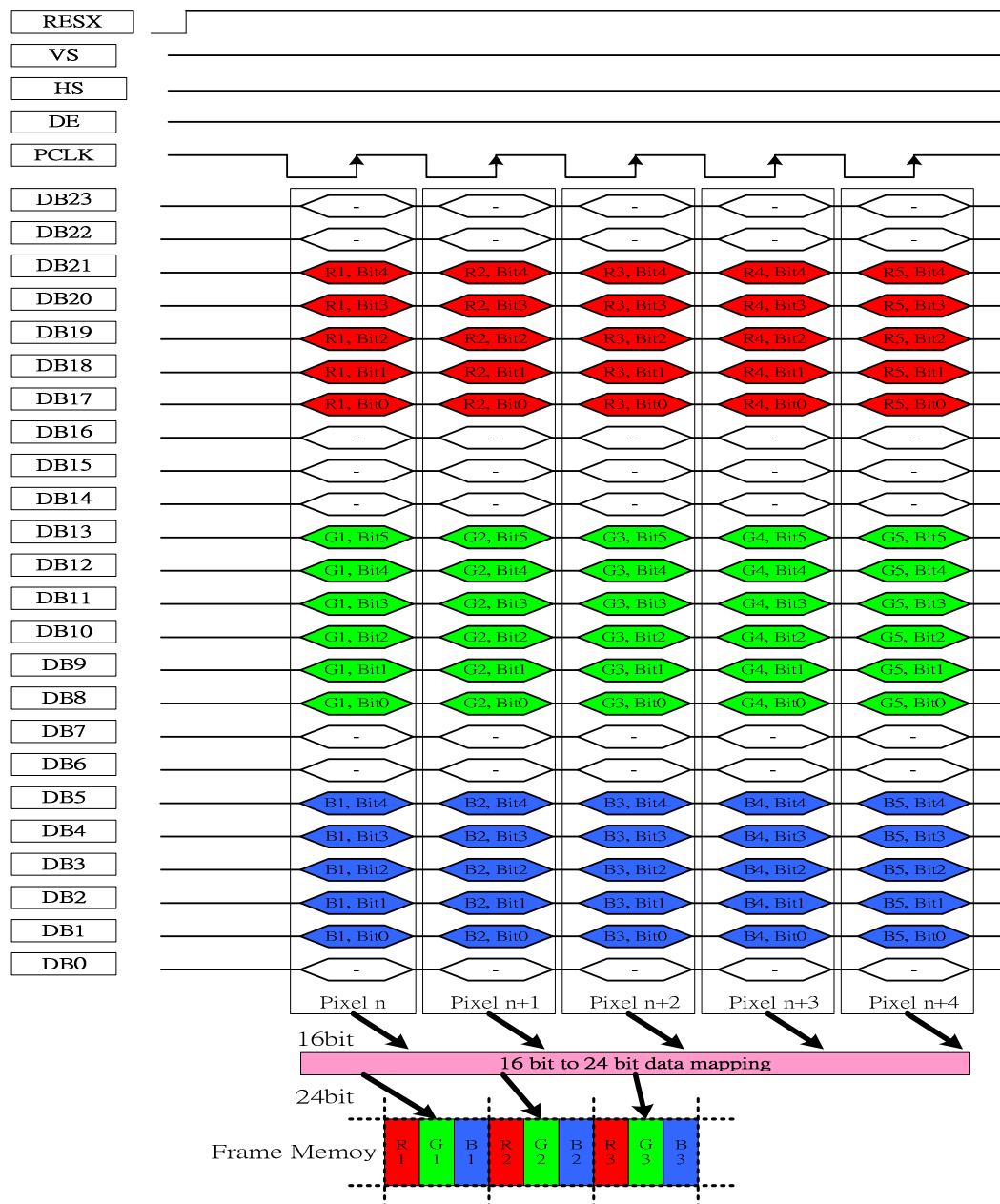
### Notes:

1. The data order is as follows: MSB = DB23, LSB = DB0 and picture data is MSB = Bit 7, LSB = Bit 0 for Green, Red and Blue data.
2. 1-time transfer is used to transmit 1 pixel data to the 24-bit color depth information.
3. '-' = void

## DPI (RGB) Interface

### 16-bit/pixel 65K colors order on the DPI Interface

The 16-bit RGB interface is selected by setting the DPI [2:0] bits to 101. The display operation is synchronized with VS, HS, DE and PCLK signals. Display data is transferred to the internal GRAM through the 16-bit RGB data bus in synchronization with the display operation.



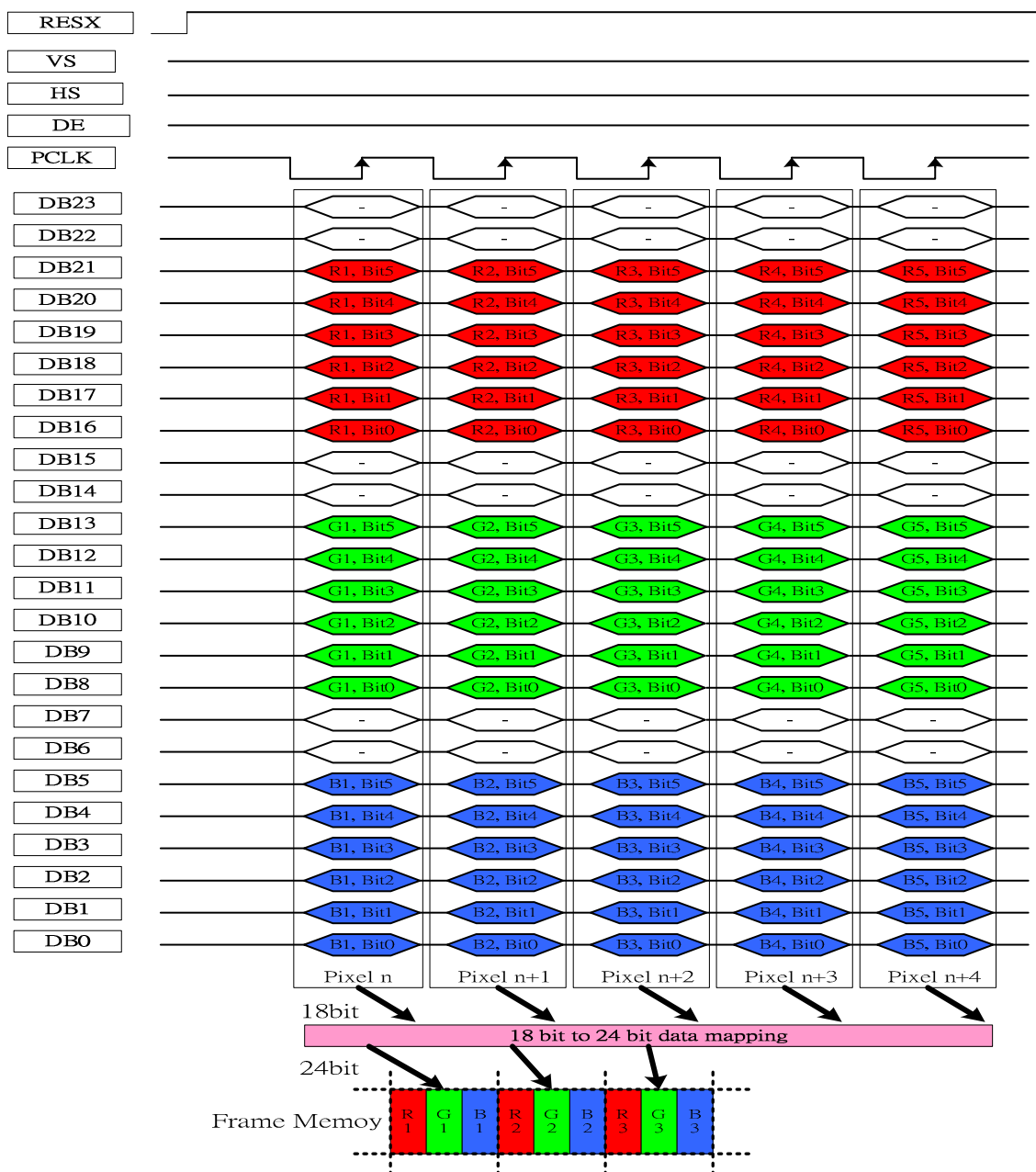
**Figure 141: 16-bit/pixel 65K Colors Order on the DPI Interface**

Notes:

1. The data order is as follows: MSB = DB23, LSB = DB0, and picture data is MSB = Bit 5, LSB = Bit 0 for Green, MSB = Bit 4, LSB = Bit 0 for Red and Blue data.
2. 1-time transfer is used to transmit 1 pixel data to the 16-bit color depth information.
3. '-' = void

## 18-bit/pixel 262K Colors Order on the DPI Interface

The 18-bit RGB interface is selected by setting the DPI [2:0] bits to 110. The display operation is synchronized with VS, HS, DE and PCLK signals. Display data is transferred to the internal GRAM through the 18-bit RGB data bus in synchronization with the display operation



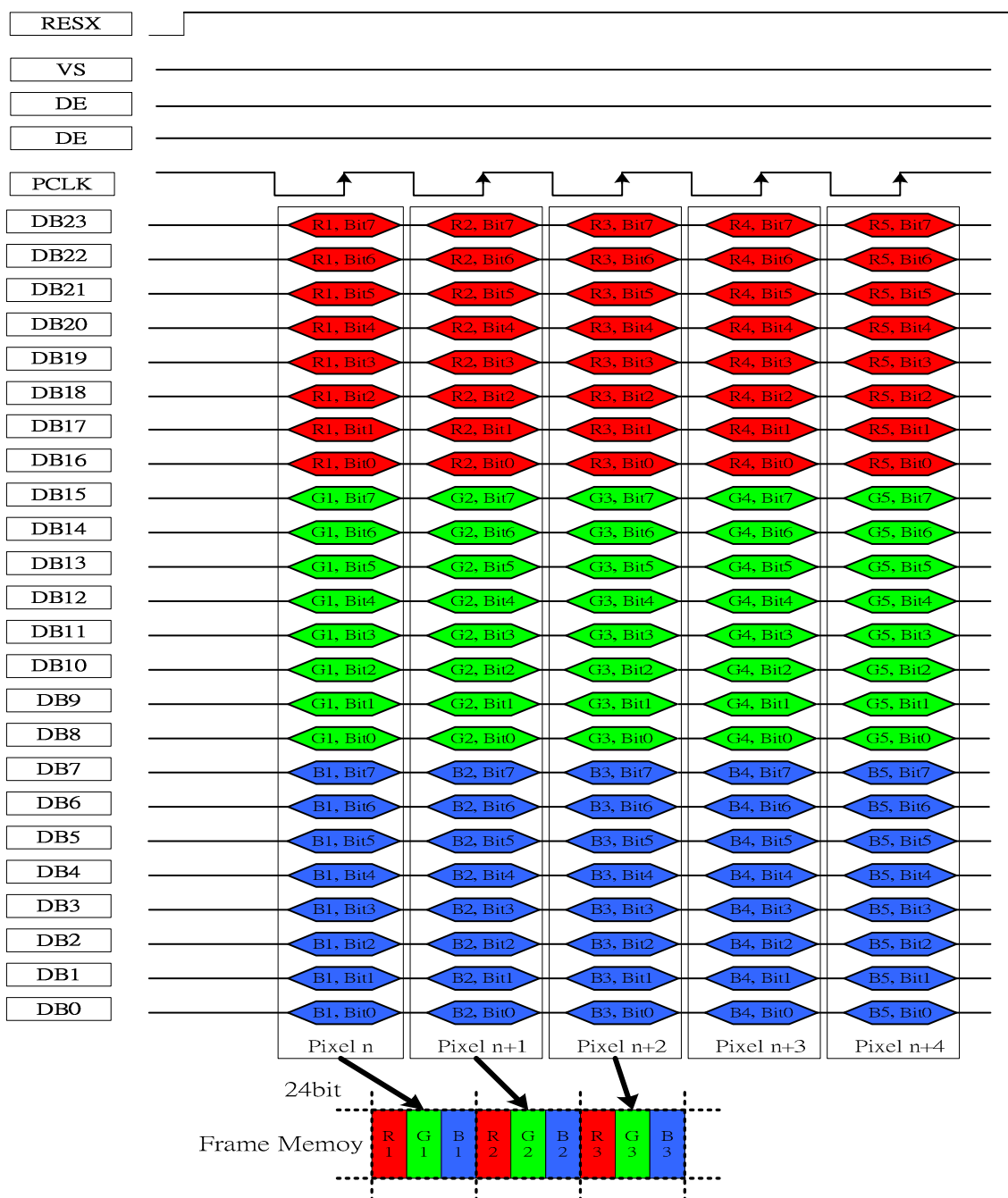
**Figure 142: 18-bit/pixel 262K colors order on the DPI Interface**

Notes:

1. The data order is as follows: MSB = DB23, LSB = DB0, and picture data is MSB = Bit 5, LSB = Bit 0 for Green, Red and Blue data.
2. 1-time transfer is used to transmit 1 pixel data to the 18-bit color depth information.
3. '-' = void

## 24-bit/pixel 16.7M colors order on the DPI Interface

The 24-bit RGB interface is selected by setting the DPI [2:0] bits to 111. The display operation is synchronized with VS, HS, DE and PCLK signals. Display data is transferred to the internal GRAM through the 24-bit RGB data bus in synchronization with the display operation.



**Figure 143: 24-bit/pixel 16.7M Colors Order on the DPI Interface**

Notes:

1. The data order is as follows: MSB = DB23, LSB = DB0, and picture data is MSB = Bit 7, LSB = Bit 0 for Green, Red and Blue data.
2. 1-time transfer is used to transmit 1 pixel data to the 24-bit color depth information.

## 16/18-bit Color Data Mapping to 24-bit Pixel Data Operation

Table 40 below lists settings for 24-bit data mapping. Set the EPF [1:0] bits of the register “Interface Setting (B8H)” that define three types of data formats for 24-bit data (pixel data r, g, b) mapping that pixel data is stored in the internal GRAM.

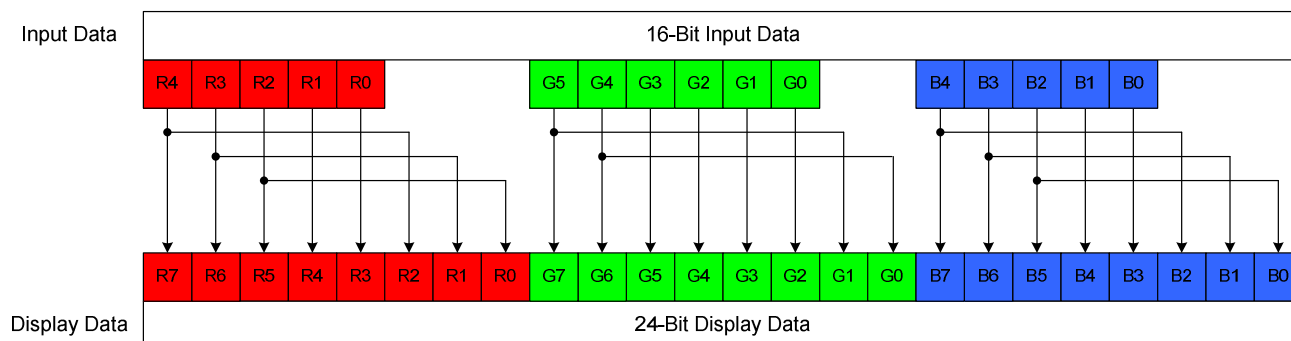
**Table 40: 16/18-bit Color Data Mapping to 24-bit Pixel Data Operation**

| EPF [1:0] | Expand 16-bit color data (R,G,B) to 24-bit subpixel data (r, g, b)                                                                                                                                                                                                                                                                                                                                                | Expand 18-bit color data (R,G,B) to 24-bit subpixel data (r, g, b)                                                                                                                                                                                                                                                                                                                                                |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 00        | “0” is written to the LSB.<br>8 bits subpixel, data r [7:0] = {16-bit color data R [4:0], 3'h0}<br>8 bits subpixel, data g [7:0] = {16-bit color data G [5:0], 2'h0}<br>8 bits subpixel, data b [7:0] = {16-bit color data B [4:0], 3'h0}<br>(Note3): the data are converted as follows.<br>16-bit color data R [4:0] = 5'h1F, G [5:0] = 6'h3F, B [4:0] = 5'h1F<br>→ 24-bit pixel data r, g, b [7:0] = 24'hFFFFFF | “0” is written to the LSB.<br>8 bits subpixel, data r [7:0] = {18-bit color data R [5:0], 2'h0}<br>8 bits subpixel, data g [7:0] = {18-bit color data G [5:0], 2'h0}<br>8 bits subpixel, data b [7:0] = {18-bit color data B [5:0], 2'h0}<br>(Note1): the data are converted as follows.<br>18-bit color data R [5:0] = 6'h3F, G [5:0] = 6'h3F, B [5:0] = 6'h3F<br>→ 24-bit pixel data r, g, b [7:0] = 24'hFFFFFF |
| 01        | “1” is written to the LSB.<br>8 bits subpixel, data r [7:0] = {16-bit color data R [4:0], 3'h7}<br>8 bits subpixel, data g [7:0] = {16-bit color data G [5:0], 2'h3}<br>8 bits subpixel, data b [7:0] = {16-bit color data B [4:0], 3'h7}<br>(Note4): the data are converted as follows.<br>16-bit color data R [4:0] = 5'h0, G [5:0] = 6'h0, B [4:0] = 5'h0<br>→ 24-bit pixel data r, g, b [7:0] = 24'h000000    | “1” is written to the LSB.<br>8 bits subpixel, data r [7:0] = {18-bit color data R [5:0], 2'h3}<br>8 bits subpixel, data g [7:0] = {18-bit color data G [5:0], 2'h3}<br>8 bits subpixel, data b [7:0] = {18-bit color data B [5:0], 2'h3}<br>(Note2): the data are converted as follows.<br>18-bit color data R [5:0] = 6'h0, G [5:0] = 6'h0, B [5:0] = 6'h0<br>→ 24-bit pixel data r, g, b [7:0] = 24'h000000    |
| 10        | The MSB value is written to the LSB.<br>8 bits subpixel, data r [7:0] = {16-bit color data R [4:0], R [4:2]}<br>8 bits subpixel, data g [7:0] = {16-bit color data G [5:0], G [5:4]}<br>8 bits subpixel, data b [7:0] = {16-bit color data B [4:0], B [4:2]}                                                                                                                                                      | The MSB value is written to the LSB.<br>8 bits subpixel, data r [7:0] = {18-bit color data R [5:0], R [5:4]}<br>8 bits subpixel, data g [7:0] = {18-bit color data G [5:0], G [5:4]}<br>8 bits subpixel, data b [7:0] = {18-bit color data B [5:0], B [5:4]}                                                                                                                                                      |
| 11        | Setting disabled                                                                                                                                                                                                                                                                                                                                                                                                  | Setting disabled                                                                                                                                                                                                                                                                                                                                                                                                  |

|                                   | Frame memory data (24 bits) |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-----------------------------------|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
|                                   | R7                          | R6   | R5   | R4   | R3   | R2   | R1   | R0   | G7   | G6   | G5   | G4   | G3   | G2   | G1   | G0   | B7   | B6   | B5   | B4   | B3   | B2   | B1   | B0   |
| 24-bit                            | R[7]                        | R[6] | R[5] | R[4] | R[3] | R[2] | R[1] | R[0] | G[7] | G[6] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | B[7] | B[6] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] |
| 18-bit<br>EPF[1:0]=00<br>(Note 1) | R[5]                        | R[4] | R[3] | R[2] | R[1] | R[0] | 0    | 0    | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | 0    | 0    | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] | 0    | 0    |
| 18-bit<br>EPF[1:0]=01<br>(Note 2) | R[5]                        | R[4] | R[3] | R[2] | R[1] | R[0] | 1    | 1    | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | 1    | 1    | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] | 1    | 1    |
| 18-bit<br>EPF[1:0]=10             | R[5]                        | R[4] | R[3] | R[2] | R[1] | R[0] | R[5] | R[4] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | G[5] | G[4] | B[5] | B[4] | B[3] | B[2] | B[1] | B[0] | B[5] | B[4] |
| 16-bit<br>EPF[1:0]=00<br>(Note 3) | R[4]                        | R[3] | R[2] | R[1] | R[0] | 0    | 0    | 0    | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | 0    | 0    | B[4] | B[3] | B[2] | B[1] | B[0] | 0    | 0    | 0    |
| 16-bit<br>EPF[1:0]=01<br>(Note 4) | R[4]                        | R[3] | R[2] | R[1] | R[0] | 1    | 1    | 1    | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | 1    | 1    | B[4] | B[3] | B[2] | B[1] | B[0] | 1    | 1    | 1    |
| 16-bit<br>EPF[1:0]=10             | R[4]                        | R[3] | R[2] | R[1] | R[0] | R[4] | R[3] | R[2] | G[5] | G[4] | G[3] | G[2] | G[1] | G[0] | G[5] | G[4] | B[4] | B[3] | B[2] | B[1] | B[0] | B[4] | B[3] | B[2] |

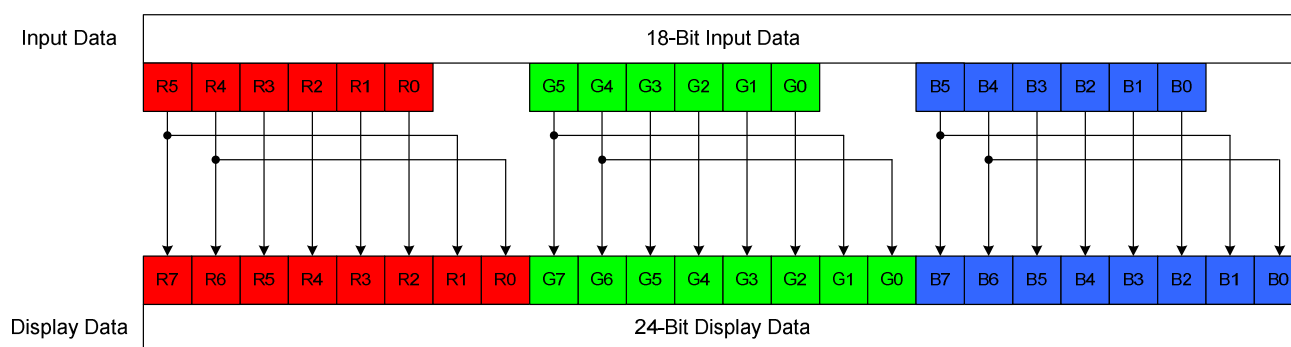
For example:

16-bit data mapping to 24-bit, EPF [1:0] = 10



**Figure 144: EPF [1:0] = 10, 16-bit data mapping to 24-bit**

18-bit data mapping to 24-bit, EPF [1:0] = 10



**Figure 145: EPF [1:0] = 10, 18-bit data mapping to 24-bit**

## DSI Transmission Data Format

### 16-bit per Pixel, Long Packet, Data Type 00 1110 (0Eh)

Packed Pixel Stream 16-Bit Format is a Long Packet used to transmit image data formatted as 16-bit pixels to a Video Mode display module. The packet consists of the DI byte, a two-byte WC, an ECC byte, a payload of length WC bytes and a two-byte checksum. Pixel format is red (5 bits), green (6 bits), and blue (5 bits), in that order. Note that the Green component is split across two bytes. Within a color component, the LSB is sent first, the MSB last. With this format, pixel boundaries align with byte boundaries every two bytes. The total line width (displayed plus non-displayed pixels) should be a multiple of two bytes.

Normally, the ILI9806H has no frame buffer of its own, so all image data shall be supplied by the host processor at a sufficiently high rate to avoid flicker or other visible artifact.

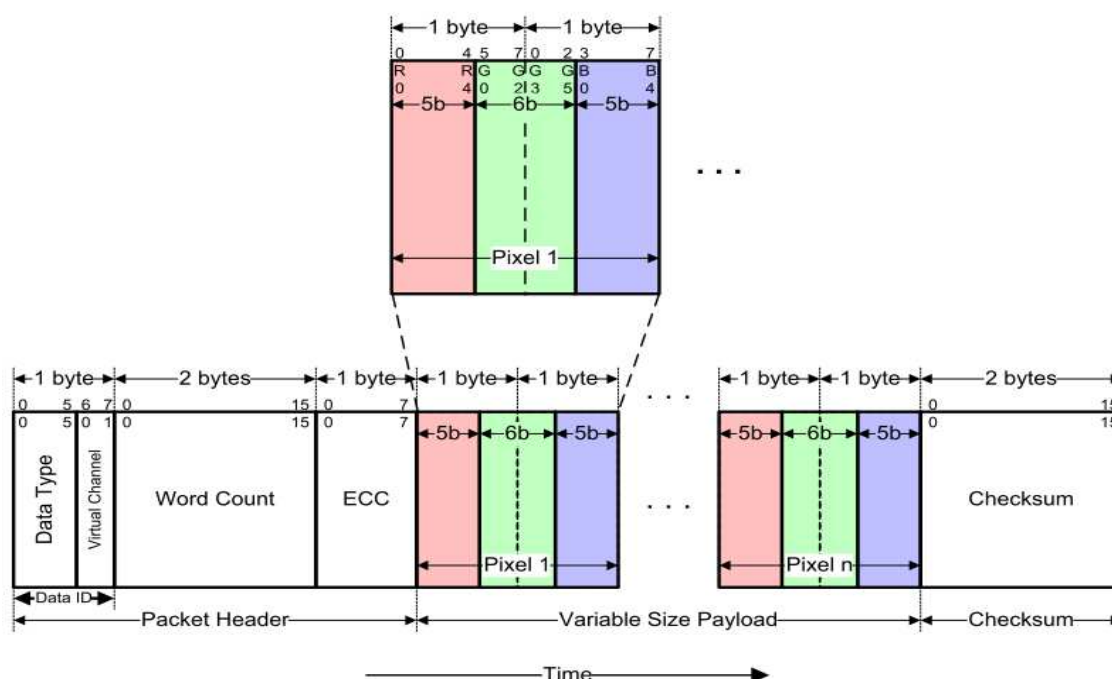


Figure 146: 16-bit per Pixel, Data Type 00 1110 (0Eh)



## 18-bit per Pixel, Long Packet, Data Type = 01 1110 (1Eh)

Packed Pixel Stream 18-Bit Format (Packed) is a Long packet. It is used to transmit RGB image data formatted as pixels to a Video Mode display module that displays 18-bit pixels. The packet consists of the DI byte, a two-byte WC, an ECC byte, a payload of length WC bytes, and a two-byte Checksum. Pixel format is red (6 bits), green (6 bits) and blue (6 bits), in that order. Within a color component, the LSB is sent first, the MSB last.

Note that pixel boundaries only align with byte boundaries every four pixels (nine bytes). Preferably, display modules employing this format have a horizontal extent (width in pixels) evenly divisible by four, so no partial bytes remain at the end of the display line data. If the active (displayed) horizontal width is not a multiple of four pixels, the transmitter shall send additional filled pixels at the end of the display line to make the transmitted width a multiple of four pixels. The receiving peripheral shall not display the filled pixels when refreshing the display device. For example, if a display device has an active display width of 399 pixels, the transmitter should send 400 pixels in one or more packets. The receiver should display the first 399 pixels and discard the last pixel of the transmission. With this format, the total line width (displayed and non-displayed pixels) should be a multiple of four 1246 pixels (nine bytes).

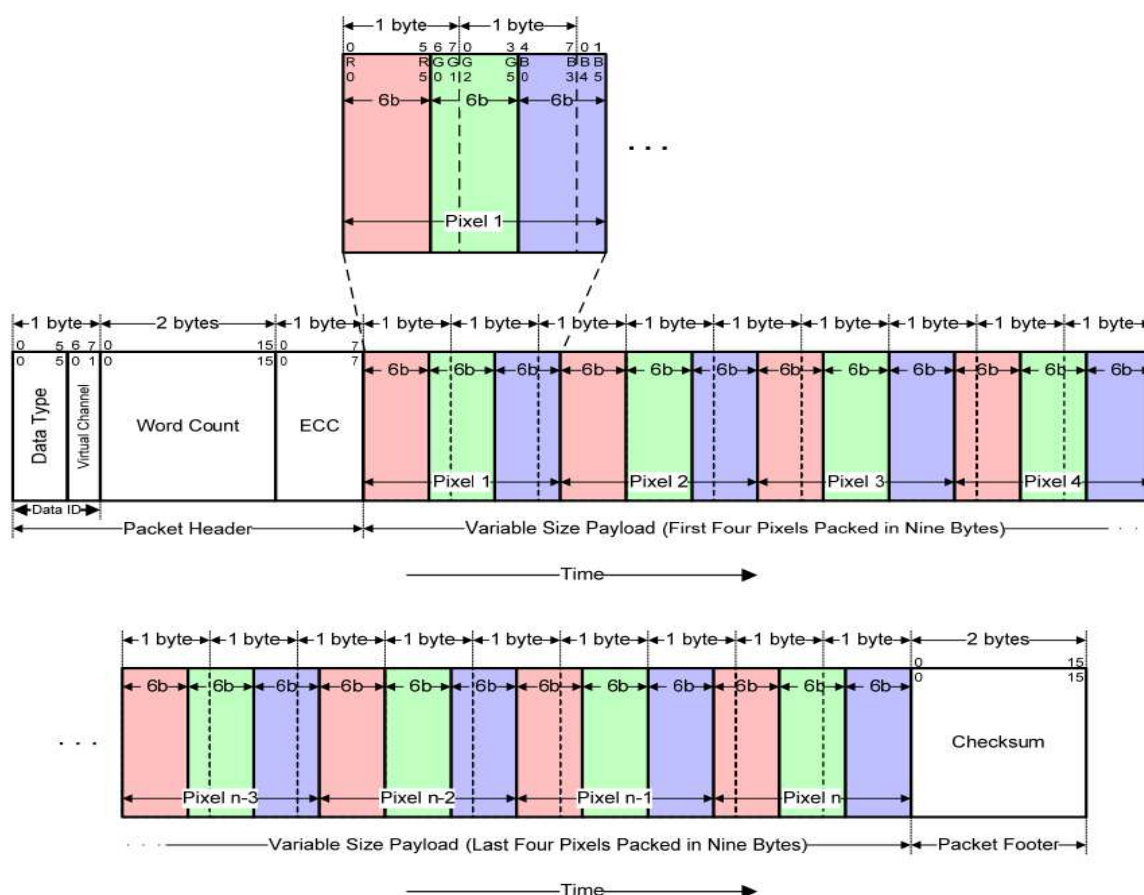


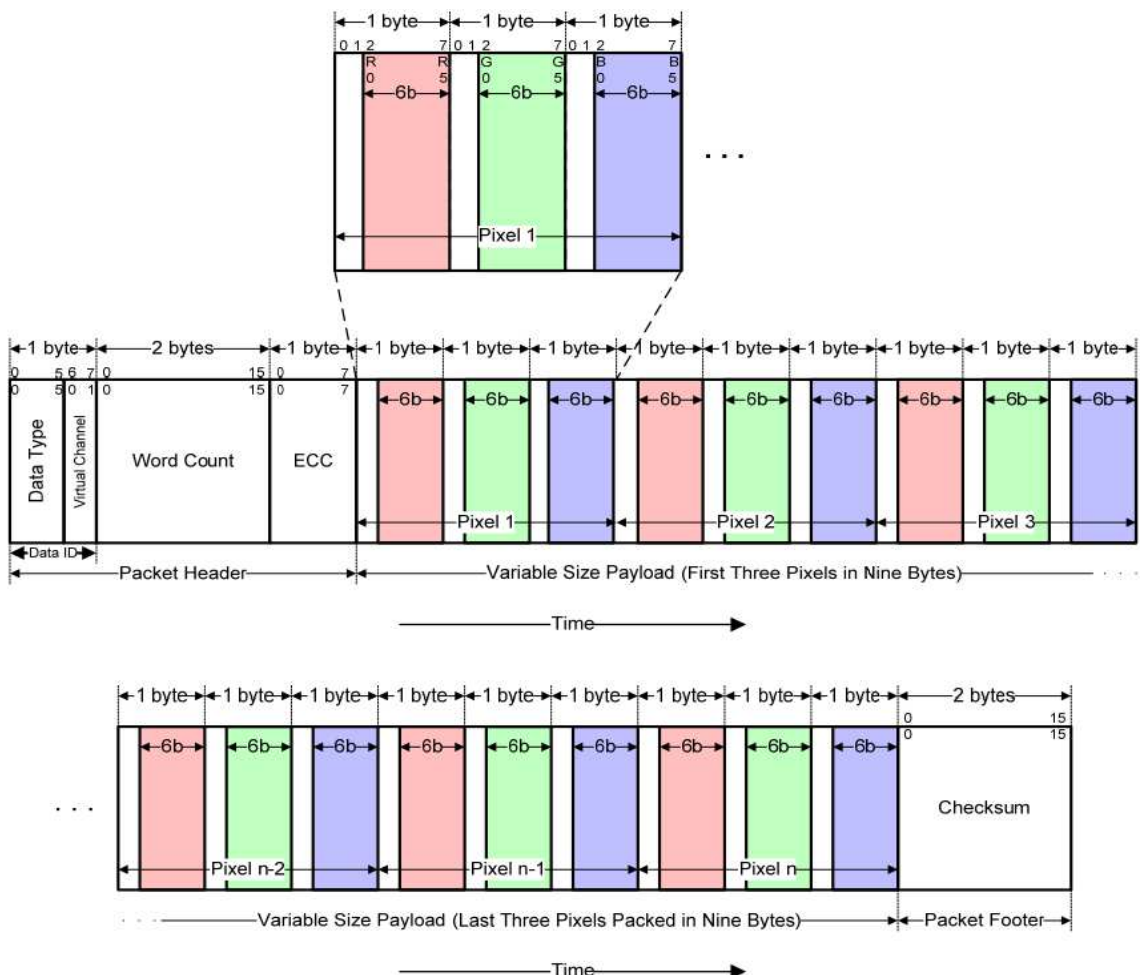
Figure 147: 18-bit per Pixel, Data Type = 01 1110 (1Eh)

### 18-bit per Pixel, Long Packet, Data Type = 10 1110 (2Eh)

In the 18-bit Pixel Loosely Packed format, each R, G, or B color component is six bits but is shifted to the upper bits of the byte, such that the valid pixel bits occupy bits [7:2] of each byte. Bits [1:0] of each payload byte representing active pixels are ignored. As a result, each pixel requires three bytes as it is transmitted across the link. This requires more bandwidth than the “packed” format, but requires less shifting and multiplexing logic in the packing and unpacking functions on each end of the Link.

This format is used to transmit RGB image data formatted as pixels to a Video Mode display module that displays 18-bit pixels. The packet consists of the DI byte, a two-byte WC, an ECC byte, a payload of length WC bytes and a two-byte Checksum. The pixel format is red (6 bits), green (6 bits) and blue (6 bits) in that order. Within a color component, the LSB is sent first, the MSB last.

With this format, pixel boundaries align with byte boundaries every three bytes. The total line width (displayed and non-displayed pixels) should be a multiple of three bytes.

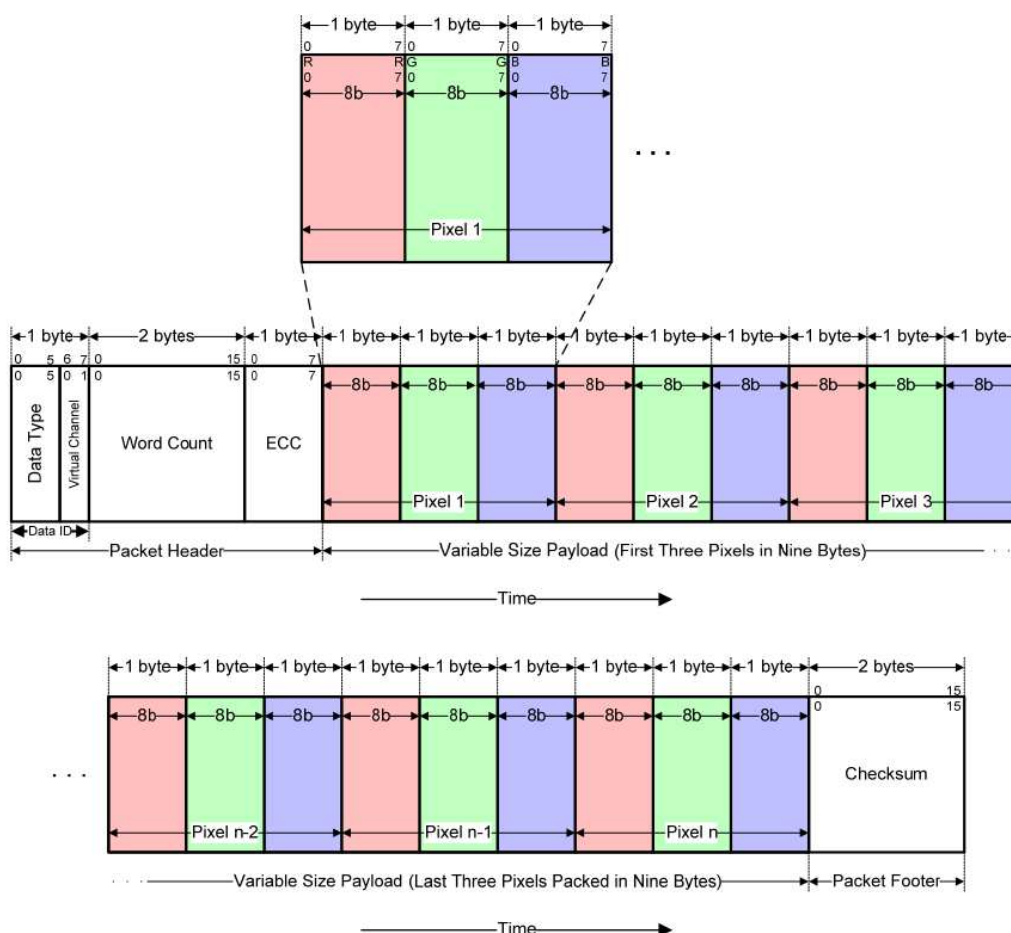


**Figure 148: 18-bit per Pixel, Data Type = 10 1110 (2Eh)**

## 24-bit per Pixel, Long Packet, Data Type = 11 1110 (3Eh)

Packed Pixel Stream 24-Bit Format is a Long packet. It is used to transmit image data formatted as 24-bit pixels to a Video Mode display module. The packet consists of the DI byte, a two-byte WC, an ECC byte, a payload of length WC bytes and a two-byte Checksum. The pixel format is red (8 bits), green (8 bits) and blue (8 bits), in that order. Each color component occupies one byte in the pixel stream; no components are split across byte boundaries. Within a color component, the LSB is sent first, the MSB last.

With this format, pixel boundaries align with byte boundaries every three bytes. The total line width (displayed and non-displayed pixels) should be a multiple of three bytes.



**Figure 149: 24-bit per Pixel, Data Type = 11 1110 (3Eh)**

## 5. Command

### 5.1. Command List

#### Standard Command List

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| NOP              | 0   | 1   | ↑   | xx       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 00h |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Software Reset   | 0   | 1   | ↑   | xx       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 01h |

| Command Function                        | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-----------------------------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Read Display Identification Information | 0   | 1   | ↑   | xx       | 0         | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 04h |
|                                         | 1   | ↑   | 1   | xx       | x         | x  | x  | x  | x  | x  | x  | x  | xx  |
|                                         | 1   | ↑   | 1   | xx       | ID1 [7:0] |    |    |    |    |    |    |    | xx  |
|                                         | 1   | ↑   | 1   | xx       | ID2 [7:0] |    |    |    |    |    |    |    | xx  |
|                                         | 1   | ↑   | 1   | xx       | ID3 [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function                 | DCX | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|----------------------------------|-----|-----|-----|----------|---------|----|----|----|----|----|----|----|-----|
| Read Number of the Errors on DSI | 0   | 1   | ↑   | xx       | 0       | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 05h |
|                                  | 1   | ↑   | 1   | xx       | x       | x  | x  | x  | x  | x  | x  | x  | xx  |
|                                  | 1   | ↑   | 1   | xx       | P [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function    | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|---------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Read Display Status | 0   | 1   | ↑   | xx       | 0         | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 09h |
|                     | 1   | ↑   | 1   | xx       | x         | x  | x  | x  | x  | x  | x  | x  | xx  |
|                     | 1   | ↑   | 1   | xx       | D [31:24] |    |    |    |    |    |    |    | xx  |
|                     | 1   | ↑   | 1   | xx       | D [23:16] |    |    |    |    |    |    |    | xx  |
|                     | 1   | ↑   | 1   | xx       | D [15:8]  |    |    |    |    |    |    |    | xx  |
|                     | 1   | ↑   | 1   | xx       | D [7:0]   |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|---------|----|----|----|----|----|----|----|-----|
| Read Power Mode  | 0   | 1   | ↑   | xx       | 0       | 0  | 0  | 0  | 1  | 0  | 1  | 0  | 0Ah |
|                  | 1   | ↑   | 1   | xx       | x       | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | D [7:2] |    |    |    |    |    | 0  | 0  | xx  |

| Command Function         | DCX | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|--------------------------|-----|-----|-----|----------|---------|----|----|----|----|----|----|----|-----|
| Read Display MADCTL Mode | 0   | 1   | ↑   | xx       | 0       | 0  | 0  | 0  | 1  | 0  | 1  | 1  | 0Bh |
|                          | 1   | ↑   | 1   | xx       | x       | x  | x  | x  | x  | x  | x  | x  | xx  |
|                          | 1   | ↑   | 1   | xx       | D [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function  | DCX | RDX | WRX | D [23:8] | D7 | D6        | D5 | D4 | D3 | D2        | D1 | D0 | Hex |
|-------------------|-----|-----|-----|----------|----|-----------|----|----|----|-----------|----|----|-----|
| Read Pixel Format | 0   | 1   | ↑   | xx       | 0  | 0         | 0  | 0  | 1  | 1         | 0  | 0  | 0Ch |
|                   | 1   | ↑   | 1   | xx       | x  | x         | x  | x  | x  | x         | x  | x  | xx  |
|                   | 1   | ↑   | 1   | xx       | 0  | DPI [2:0] |    |    | 0  | DBI [2:0] |    |    | xx  |

| Command Function        | DCX | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-------------------------|-----|-----|-----|----------|---------|----|----|----|----|----|----|----|-----|
| Read Display Image Mode | 0   | 1   | ↑   | xx       | 0       | 0  | 0  | 0  | 1  | 1  | 0  | 1  | 0Dh |
|                         | 1   | ↑   | 1   | xx       | x       | x  | x  | x  | x  | x  | x  | x  | xx  |
|                         | 1   | ↑   | 1   | xx       | D [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function         | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|--------------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Read Display Signal Mode | 0   | 1   | ↑   | xx       | 0  | 0  | 0  | 0  | 1  | 1  | 1  | 0  | 0Eh |
|                          | 1   | ↑   | 1   | xx       | x  | x  | x  | x  | x  | x  | x  | x  | xx  |

The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.

|  |   |   |   |    |    |    |    |    |    |    |    |    |    |
|--|---|---|---|----|----|----|----|----|----|----|----|----|----|
|  | 1 | ↑ | 1 | xx | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | xx |
|--|---|---|---|----|----|----|----|----|----|----|----|----|----|

| Command Function                       | DCX | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|----------------------------------------|-----|-----|-----|----------|---------|----|----|----|----|----|----|----|-----|
| Read Display<br>Self-Diagnostic Result | 0   | 1   | ↑   | xx       | 0       | 0  | 0  | 0  | 1  | 1  | 1  | 1  | 0Fh |
|                                        | 1   | ↑   | 1   | xx       | x       | x  | x  | x  | x  | x  | x  | x  | xx  |
|                                        | 1   | ↑   | 1   | xx       | D [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Sleep In         | 0   | 1   | ↑   | xx       | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 10h |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Sleep Out        | 0   | 1   | ↑   | xx       | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 1  | 11h |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Partial Mode On  | 0   | 1   | ↑   | xx       | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 12h |

| Command Function       | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Normal Display Mode On | 0   | 1   | ↑   | xx       | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 1  | 13h |

| Command Function      | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-----------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Display Inversion Off | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 20h |

| Command Function     | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|----------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Display Inversion ON | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 1  | 21h |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| All Pixel Off    | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 0  | 0  | 0  | 1  | 0  | 22h |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| All Pixel On     | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 0  | 0  | 0  | 1  | 1  | 23h |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Display Off      | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 0  | 28h |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Display ON       | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 1  | 29h |

| Command Function   | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|--------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Set Column Address | 0   | 1   | ↑   | xx       | 0         | 0  | 1  | 0  | 1  | 0  | 1  | 0  | 2Ah |
|                    | 1   | 1   | ↑   | xx       | SC [15:8] |    |    |    |    |    |    |    | xx  |
|                    | 1   | 1   | ↑   | xx       | SC [7:0]  |    |    |    |    |    |    |    | xx  |
|                    | 1   | 1   | ↑   | xx       | EC [15:8] |    |    |    |    |    |    |    | xx  |
|                    | 1   | 1   | ↑   | xx       | EC [7:0]  |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Set Page Address | 0   | 1   | ↑   | xx       | 0         | 0  | 1  | 0  | 1  | 0  | 1  | 1  | 2Bh |
|                  | 1   | 1   | ↑   | xx       | SP [15:8] |    |    |    |    |    |    | xx |     |
|                  | 1   | 1   | ↑   | xx       | SP [7:0]  |    |    |    |    |    |    | xx |     |
|                  | 1   | 1   | ↑   | xx       | EP [15:8] |    |    |    |    |    |    | xx |     |
|                  | 1   | 1   | ↑   | xx       | EP [7:0]  |    |    |    |    |    |    | xx |     |

| Command Function   | DCX | RDX | WRX | D [23:8]              | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|--------------------|-----|-----|-----|-----------------------|----|----|----|----|----|----|----|----|-----|
| Write Memory Start | 0   | 1   | ↑   | xx                    | 0  | 0  | 1  | 0  | 1  | 1  | 0  | 0  | 2Ch |
|                    | 1   | 1   | ↑   | Image Data 1 [D23:D0] |    |    |    |    |    |    |    |    | xx  |
|                    | 1   | 1   | ↑   | Image Data x [D23:D0] |    |    |    |    |    |    |    |    | xx  |
|                    | 1   | 1   | ↑   | Image Data n [D23:D0] |    |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8]              | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|-----------------------|----|----|----|----|----|----|----|----|-----|
| Memory Read      | 0   | 1   | ↑   | xx                    | 0  | 0  | 1  | 0  | 1  | 1  | 1  | 0  | 2Eh |
|                  | 1   | ↑   | 1   | xx                    | x  | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | Image Data 1 [D23:D0] |    |    |    |    |    |    |    |    | xx  |
|                  | 1   | ↑   | 1   | Image Data x [D23:D0] |    |    |    |    |    |    |    |    | xx  |
|                  | 1   | ↑   | 1   | Image Data n [D23:D0] |    |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Partial Area     | 0   | 1   | ↑   | xx       | 0         | 0  | 1  | 1  | 0  | 0  | 0  | 0  | 30h |
|                  | 1   | 1   | ↑   | xx       | SR [15:8] |    |    |    |    |    |    |    | xx  |
|                  | 1   | 1   | ↑   | xx       | SR [7:0]  |    |    |    |    |    |    |    | xx  |
|                  | 1   | 1   | ↑   | xx       | ER [15:8] |    |    |    |    |    |    |    | xx  |
|                  | 1   | 1   | ↑   | xx       | ER [7:0]  |    |    |    |    |    |    |    | xx  |

| Command Function              | DCX | RDX | WRX | D [23:8] | D7         | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-------------------------------|-----|-----|-----|----------|------------|----|----|----|----|----|----|----|-----|
| Vertical Scrolling Definition | 0   | 1   | ↑   | xx       | 0          | 0  | 1  | 1  | 0  | 0  | 1  | 1  | 33h |
|                               | 1   | 1   | ↑   | xx       | TFA [15:8] |    |    |    |    |    |    |    | xx  |
|                               | 1   | 1   | ↑   | xx       | TFA [7:0]  |    |    |    |    |    |    |    | xx  |
|                               | 1   | 1   | ↑   | xx       | VSA [15:8] |    |    |    |    |    |    |    | xx  |
|                               | 1   | 1   | ↑   | xx       | VSA [7:0]  |    |    |    |    |    |    |    | xx  |
|                               | 1   | 1   | ↑   | xx       | BFA [15:8] |    |    |    |    |    |    |    | xx  |
|                               | 1   | 1   | ↑   | xx       | BFA [7:0]  |    |    |    |    |    |    |    | xx  |

| Command Function        | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-------------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Tearing Effect Line OFF | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 0  | 34h |

| Command Function       | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Tearing Effect Line ON | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 1  | 35h |
|                        | 1   | 1   | ↑   | xx       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | M  | xx  |

| Command Function      | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3  | D2 | D1 | D0 | Hex |
|-----------------------|-----|-----|-----|----------|----|----|----|----|-----|----|----|----|-----|
| Memory Access Control | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 1  | 0   | 1  | 1  | 0  | 36h |
|                       | 1   | 1   | ↑   | xx       | MY | MX | MV | ML | BGR | MH | SS | GS | xx  |

| Command Function                 | DCX | RDX | WRX | D [23:8] | D7         | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|----------------------------------|-----|-----|-----|----------|------------|----|----|----|----|----|----|----|-----|
| Vertical Scrolling Start Address | 0   | 1   | ↑   | xx       | 0          | 0  | 1  | 1  | 0  | 1  | 1  | 1  | 37h |
|                                  | 1   | 1   | ↑   | xx       | VSP [15:8] |    |    |    |    |    |    |    | xx  |
|                                  | 1   | 1   | ↑   | xx       | VSP [7:0]  |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Idle Mode Off    | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 1  | 1  | 0  | 0  | 0  | 38h |

| Command Function | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
| Idle Mode On     | 0   | 1   | ↑   | xx       | 0  | 0  | 1  | 1  | 1  | 0  | 0  | 1  | 39h |

| Command Function       | DCX | RDX | WRX | D [23:8] | D7 | D6        | D5 | D4 | D3 | D2        | D1 | D0 | Hex |
|------------------------|-----|-----|-----|----------|----|-----------|----|----|----|-----------|----|----|-----|
| Interface Pixel Format | 0   | 1   | ↑   | xx       | 0  | 0         | 1  | 1  | 1  | 0         | 1  | 0  | 3Ah |
|                        | 1   | 1   | ↑   | xx       | 0  | DPI [2:0] |    |    | 0  | DBI [2:0] |    |    | xx  |

| Command Function      | DCX | RDX | WRX | D [23:8]              | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-----------------------|-----|-----|-----|-----------------------|----|----|----|----|----|----|----|----|-----|
| Memory Write Continue | 0   | 1   | ↑   | xx                    | 0  | 0  | 1  | 1  | 1  | 1  | 0  | 0  | 3Ch |
|                       | 1   | 1   | ↑   | Image Data 1 [D23:D0] |    |    |    |    |    |    |    |    | xx  |
|                       | 1   | 1   | ↑   | Image Data x [D23:D0] |    |    |    |    |    |    |    |    | xx  |
|                       | 1   | 1   | ↑   | Image Data n [D23:D0] |    |    |    |    |    |    |    |    | xx  |

| Command Function     | DCX | RDX | WRX | D [23:8]              | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|----------------------|-----|-----|-----|-----------------------|----|----|----|----|----|----|----|----|-----|
| Memory Read Continue | 0   | 1   | ↑   | xx                    | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 0  | 3Eh |
|                      | 1   | ↑   | 1   | xx                    | x  | x  | x  | x  | x  | x  | x  | x  | xx  |
|                      | 1   | ↑   | 1   | Image Data 1 [D23:D0] |    |    |    |    |    |    |    |    | xx  |
|                      | 1   | ↑   | 1   | Image Data x [D23:D0] |    |    |    |    |    |    |    |    | xx  |
|                      | 1   | ↑   | 1   | Image Data n [D23:D0] |    |    |    |    |    |    |    |    | xx  |

| Command Function     | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|----------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Write Tear Scan line | 0   | 1   | ↑   | xx       | 0        | 1  | 0  | 0  | 0  | 1  | 0  | 0  | 44h |
|                      | 1   | 1   | ↑   | xx       | N [15:8] |    |    |    |    |    |    |    | xx  |
|                      | 1   | 1   | ↑   | xx       | N [7:0]  |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Tear Line   | 0   | 1   | ↑   | xx       | 0        | 1  | 0  | 0  | 0  | 1  | 0  | 1  | 45h |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | N [15:8] |    |    |    |    |    |    |    | xx  |
|                  | 1   | ↑   | 1   | xx       | N [7:0]  |    |    |    |    |    |    |    | xx  |

| Command Function         | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|--------------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Write Display Brightness | 0   | 1   | ↑   | xx       | 0         | 1  | 0  | 1  | 0  | 0  | 0  | 1  | 51h |
|                          | 1   | 1   | ↑   | xx       | DBV [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function              | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-------------------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Read Display Brightness Value | 0   | 1   | ↑   | xx       | 0         | 1  | 0  | 1  | 0  | 0  | 1  | 0  | 52h |
|                               | 1   | ↑   | 1   | xx       | x         | x  | x  | x  | x  | x  | x  | x  | xx  |
|                               | 1   | ↑   | 1   | xx       | DBV [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function   | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5    | D4 | D3 | D2 | D1 | D0 | Hex |
|--------------------|-----|-----|-----|----------|----|----|-------|----|----|----|----|----|-----|
| Write CTRL Display | 0   | 1   | ↑   | xx       | 0  | 1  | 0     | 1  | 0  | 0  | 1  | 1  | 53h |
|                    | 1   | 1   | ↑   | xx       | 0  | 0  | BCTRL | 0  | DD | BL | 0  | 0  | xx  |

| Command Function  | DCX | RDX | WRX | D [23:8] | D7 | D6 | D5    | D4 | D3 | D2 | D1 | D0 | Hex |
|-------------------|-----|-----|-----|----------|----|----|-------|----|----|----|----|----|-----|
| Read CTRL Display | 0   | 1   | ↑   | xx       | 0  | 1  | 0     | 1  | 0  | 1  | 0  | 0  | 54h |
|                   | 1   | ↑   | 1   | xx       | x  | x  | x     | x  | x  | x  | x  | x  | xx  |
|                   | 1   | ↑   | 1   | xx       | 0  | 0  | BCTRL | 0  | DD | BL | 0  | 0  | xx  |

| Command Function                          | DCX | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3      | D2 | D1 | D0 | Hex |
|-------------------------------------------|-----|-----|-----|----------|---------|----|----|----|---------|----|----|----|-----|
| Write Content Adaptive Brightness Control | 0   | 1   | ↑   | xx       | 0       | 1  | 0  | 1  | 0       | 1  | 0  | 1  | 55h |
|                                           | 1   | 1   | ↑   | xx       | C [7:4] |    |    |    | C [3:0] |    |    |    | xx  |

| Command Function                         | DCX | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3      | D2 | D1 | D0 | Hex |
|------------------------------------------|-----|-----|-----|----------|---------|----|----|----|---------|----|----|----|-----|
| Read Content Adaptive Brightness Control | 0   | 1   | ↑   | xx       | 0       | 1  | 0  | 1  | 0       | 1  | 1  | 0  | 56h |
|                                          | 1   | ↑   | 1   | xx       | x       | x  | x  | x  | x       | x  | x  | x  | xx  |
|                                          | 1   | ↑   | 1   | xx       | C [7:4] |    |    |    | C [3:0] |    |    |    | xx  |

| Command Function   | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|--------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Write CABC Minimum | 0   | 1   | ↑   | xx       | 0         | 1  | 0  | 1  | 1  | 1  | 1  | 0  | 5Eh |
| Brightness         | 1   | 1   | ↑   | xx       | CMB [7:0] |    |    |    |    |    |    |    | xx  |



| Command Function             | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Read CABC Minimum Brightness | 0   | 1   | ↑   | xx       | 0         | 1  | 0  | 1  | 1  | 1  | 1  | 1  | 5Fh |
|                              | 1   | ↑   | 1   | xx       | x         | x  | x  | x  | x  | x  | x  | x  | xx  |
|                              | 1   | ↑   | 1   | xx       | CMB [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function                                         | DCX | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|----------------------------------------------------------|-----|-----|-----|----------|---------|----|----|----|----|----|----|----|-----|
| Read Automatic Brightness Control Self-Diagnostic Result | 0   | 1   | ↑   | xx       | 0       | 1  | 1  | 0  | 1  | 0  | 0  | 0  | 68h |
|                                                          | 1   | ↑   | 1   | xx       | x       | x  | x  | x  | x  | x  | x  | x  | xx  |
|                                                          | 1   | ↑   | 1   | xx       | D [7:6] |    | 0  | 0  | 0  | 0  | 0  | 0  | xx  |

| Command Function          | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5        | D4 | D3       | D2 | D1       | D0 | Hex |
|---------------------------|-----|-----|-----|----------|-----------|----|-----------|----|----------|----|----------|----|-----|
| Read Black/White Low Bits | 0   | 1   | ↑   | xx       | 0         | 1  | 1         | 1  | 0        | 0  | 0        | 0  | 70h |
|                           | 1   | ↑   | 1   | xx       | x         | x  | x         | x  | x        | x  | x        | x  | xx  |
|                           | 1   | ↑   | 1   | xx       | BKx [1:0] |    | BKy [1:0] |    | Wx [1:0] |    | Wy [1:0] |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Read Bkx         | 0   | 1   | ↑   | xx       | 0         | 1  | 1  | 1  | 0  | 0  | 0  | 1  | 71h |
|                  | 1   | ↑   | 1   | xx       | x         | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | BKx [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Read Bky         | 0   | 1   | ↑   | xx       | 0         | 1  | 1  | 1  | 0  | 0  | 1  | 0  | 72h |
|                  | 1   | ↑   | 1   | xx       | x         | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | BKy [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Wx          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 0  | 0  | 1  | 1  | 73h |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | Wx [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Wy          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 0  | 1  | 0  | 0  | 74h |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | Wy [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function        | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5       | D4 | D3       | D2 | D1       | D0 | Hex |
|-------------------------|-----|-----|-----|----------|----------|----|----------|----|----------|----|----------|----|-----|
| Read Red/Green Low bits | 0   | 1   | ↑   | xx       | 0        | 1  | 1        | 1  | 0        | 1  | 0        | 1  | 75h |
|                         | 1   | ↑   | 1   | xx       | x        | x  | x        | x  | x        | x  | x        | x  | xx  |
|                         | 1   | ↑   | 1   | xx       | Rx [1:0] |    | Ry [1:0] |    | Gx [1:0] |    | Gy [1:0] |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Rx          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 0  | 1  | 1  | 0  | 76h |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | Rx [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Ry          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 0  | 1  | 1  | 1  | 77h |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | Ry [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Gx          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 78h |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | Gx [9:2] |    |    |    |    |    |    |    | 00  |



| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Gy          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 1  | 0  | 0  | 1  | 79h |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | Gy [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function      | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5       | D4 | D3       | D2 | D1       | D0 | Hex |
|-----------------------|-----|-----|-----|----------|----------|----|----------|----|----------|----|----------|----|-----|
| Blue/AColour Low Bits | 0   | 1   | ↑   | xx       | 0        | 1  | 1        | 1  | 1        | 0  | 1        | 0  | 7Ah |
|                       | 1   | ↑   | 1   | xx       | x        | x  | x        | x  | x        | x  | x        | x  | xx  |
|                       | 1   | ↑   | 1   | xx       | Bx [1:0] |    | By [1:0] |    | Ax [1:0] |    | Ay [1:0] |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Bx          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 1  | 0  | 1  | 1  | 7Bh |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | Bx [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read By          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 7Ch |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | By [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Ax          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 7Dh |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | Ax [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Read Ay          | 0   | 1   | ↑   | xx       | 0        | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 7Eh |
|                  | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | Ay [9:2] |    |    |    |    |    |    |    | 00  |

| Command Function                        | DCX | RDX | WRX | D [23:8] | D7          | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-----------------------------------------|-----|-----|-----|----------|-------------|----|----|----|----|----|----|----|-----|
| Read the DDB from the provided location | 0   | 1   | ↑   | xx       | 1           | 0  | 1  | 0  | 0  | 0  | 0  | 1  | A1h |
|                                         | 1   | ↑   | 1   | xx       | x           | x  | x  | x  | x  | x  | x  | x  | xx  |
|                                         | 1   | ↑   | 1   | xx       | SID [7:0]   |    |    |    |    |    |    |    | xx  |
|                                         | 1   | ↑   | 1   | xx       | SID [15:8]  |    |    |    |    |    |    |    | xx  |
|                                         | 1   | ↑   | 1   | xx       | MRID [7:0]  |    |    |    |    |    |    |    | xx  |
|                                         | 1   | ↑   | 1   | xx       | MRID [15:8] |    |    |    |    |    |    |    | xx  |
|                                         | 1   | ↑   | 1   | xx       | D [7:0]     |    |    |    |    |    |    |    | FFh |

| Command Function                                        | DCX | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|---------------------------------------------------------|-----|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|
| Continue reading the DDB<br>from the last read location | 0   | 1   | ↑   | xx       | 1        | 0  | 1  | 0  | 1  | 0  | 0  | 0  | A8h |
|                                                         | 1   | ↑   | 1   | xx       | x        | x  | x  | x  | x  | x  | x  | x  | xx  |
|                                                         | 1   | ↑   | 1   | xx       | D1 [7:0] |    |    |    |    |    |    |    | xx  |
|                                                         | 1   | ↑   | 1   | xx       | Dx [7:0] |    |    |    |    |    |    |    | xx  |
|                                                         | 1   | ↑   | 1   | xx       | Dn [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Read ID1         | 0   | 1   | ↑   | xx       | 1         | 1  | 0  | 1  | 1  | 0  | 1  | 0  | DAh |
|                  | 1   | ↑   | 1   | xx       | x         | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | ID1 [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Read ID2         | 0   | 1   | ↑   | xx       | 1         | 1  | 0  | 1  | 1  | 0  | 1  | 1  | DBh |
|                  | 1   | ↑   | 1   | xx       | x         | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | ID2 [7:0] |    |    |    |    |    |    |    | xx  |

| Command Function | DCX | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
| Read ID3         | 0   | 1   | ↑   | xx       | 1         | 1  | 0  | 1  | 1  | 1  | 0  | 0  | DCh |
|                  | 1   | ↑   | 1   | xx       | x         | x  | x  | x  | x  | x  | x  | x  | xx  |
|                  | 1   | ↑   | 1   | xx       | ID3 [7:0] |    |    |    |    |    |    |    | xx  |

## Extended Command List

| Extended Command Set   |     |     |     |    |    |    |    |      |          |     |     |     |
|------------------------|-----|-----|-----|----|----|----|----|------|----------|-----|-----|-----|
| Command Function       | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3   | D2       | D1  | D0  | Hex |
| Interface Mode Control | 0   | 1   | ↑   | 1  | 0  | 1  | 1  | 0    | 0        | 0   | 0   | B0h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | VSPL | HSPL     | DPL | EPL | 00h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | 0    | RSO[2:0] |     |     | 00h |

| Command Function     | DCX | RDX | WRX | D7         | D6 | D5         | D4 | D3 | D2 | D1         | D0 | Hex |
|----------------------|-----|-----|-----|------------|----|------------|----|----|----|------------|----|-----|
| Frame Rate Control 1 | 0   | 1   | ↑   | 1          | 0  | 1          | 1  | 0  | 0  | 0          | 1  | B1h |
|                      | 1   | 1   | ↑   | 0          | 0  | 0          | 0  | 0  | 0  | DIVA [1:0] |    | 00h |
|                      | 1   | 1   | ↑   | RTNA [7:0] |    |            |    |    |    |            |    | 57h |
|                      | 1   | 1   | ↑   | 0          | 0  | FRSA [5:0] |    |    |    |            |    | 03h |

| Command Function     | DCX | RDX | WRX | D7         | D6 | D5         | D4 | D3 | D2 | D1         | D0 | Hex |
|----------------------|-----|-----|-----|------------|----|------------|----|----|----|------------|----|-----|
| Frame Rate Control 2 | 0   | 1   | ↑   | 1          | 0  | 1          | 1  | 0  | 0  | 1          | 0  | B2h |
|                      | 1   | 1   | ↑   | 0          | 0  | 0          | 0  | 0  | 0  | DIVB [1:0] |    | 00h |
|                      | 1   | 1   | ↑   | RTNB [7:0] |    |            |    |    |    |            |    | 57h |
|                      | 1   | 1   | ↑   | 0          | 0  | FRSB [5:0] |    |    |    |            |    | 03h |

| Command Function     | DCX | RDX | WRX | D7         | D6 | D5         | D4 | D3 | D2 | D1         | D0 | Hex |
|----------------------|-----|-----|-----|------------|----|------------|----|----|----|------------|----|-----|
| Frame Rate Control 3 | 0   | 1   | ↑   | 1          | 0  | 1          | 1  | 0  | 0  | 1          | 1  | B3h |
|                      | 1   | 1   | ↑   | 0          | 0  | 0          | 0  | 0  | 0  | DIVC [1:0] |    | 00h |
|                      | 1   | 1   | ↑   | RTNC [7:0] |    |            |    |    |    |            |    | 57h |
|                      | 1   | 1   | ↑   | 0          | 0  | FRSC [5:0] |    |    |    |            |    | 03h |

| Command Function          | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3        | D2 | D1 | D0 | Hex |
|---------------------------|-----|-----|-----|----|----|----|----|-----------|----|----|----|-----|
| Display Inversion Control | 0   | 1   | ↑   | 1  | 0  | 1  | 1  | 0         | 1  | 0  | 0  | B4h |
|                           | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | NLA [3:0] |    |    |    | 00h |
|                           | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | NLB [3:0] |    |    |    | 00h |
|                           | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | NLC [3:0] |    |    |    | 00h |

| Command Function       | DCX | RDX | WRX | D7        | D6 | D5 | D4 | D3 | D2 | D1        | D0 | Hex |
|------------------------|-----|-----|-----|-----------|----|----|----|----|----|-----------|----|-----|
| Blanking Porch Control | 0   | 1   | ↑   | 1         | 0  | 1  | 1  | 0  | 1  | 0         | 1  | B5h |
|                        | 1   | 1   | ↑   | VFP [7:0] |    |    |    |    |    |           |    | 14h |
|                        | 1   | 1   | ↑   | VBP [7:0] |    |    |    |    |    |           |    | 14h |
|                        | 1   | 1   | ↑   | HBP [7:0] |    |    |    |    |    |           |    | 04h |
|                        | 1   | 1   | ↑   | 0         | 0  | 0  | 0  | 0  | 0  | HBP [9:8] |    | 00h |

| Command Function         | DCX | RDX | WRX | D7        | D6     | D5 | D4 | D3 | D2 | D1       | D0 | Hex |
|--------------------------|-----|-----|-----|-----------|--------|----|----|----|----|----------|----|-----|
| Display Function Control | 0   | 1   | ↑   | 1         | 0      | 1  | 1  | 0  | 1  | 1        | 0  | B6h |
|                          | 1   | 1   | ↑   | SYNC mode | BPGRAM | RM | DM | 0  | 0  | PT [1:0] |    | 02h |

| Command Function | DCX | RDX | WRX | D7 | D6 | D5 | D4  | D3   | D2 | D1 | D0  | Hex |
|------------------|-----|-----|-----|----|----|----|-----|------|----|----|-----|-----|
| Entry Mode Set   | 0   | 1   | ↑   | 1  | 0  | 1  | 1   | 0    | 1  | 1  | 1   | B7h |
|                  | 1   | 1   | ↑   | 0  | 0  | 0  | PDR | DSTB | 1  | 1  | LVD | 10h |

| Command Function  | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-------------------|-----|-----|-----|----|----|----|----|----|----|----|----|-----|
| Interface Setting | 0   | 1   | ↑   | 1  | 0  | 1  | 1  | 1  | 0  | 0  | 0  | B8h |

The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.

|  |   |   |   |   |        |         |         |   |   |   |   |     |
|--|---|---|---|---|--------|---------|---------|---|---|---|---|-----|
|  | 1 | 1 | ↑ | 0 | WEMODE | EPF [1] | EPF [0] | 0 | 0 | 0 | 0 | 70h |
|--|---|---|---|---|--------|---------|---------|---|---|---|---|-----|

| Command Function | DCX | RDX | WRX | D7           | D6           | D5           | D4           | D3            | D2           | D1            | D0           | Hex |
|------------------|-----|-----|-----|--------------|--------------|--------------|--------------|---------------|--------------|---------------|--------------|-----|
| Panel Control    | 0   | 1   | ↑   | 1            | 0            | 1            | 1            | 1             | 0            | 0             | 1            | B9h |
|                  | 1   | 1   | ↑   | MY_<br>Panel | MX_<br>Panel | MV_<br>Panel | ML_<br>Panel | BGR_<br>Panel | MH_<br>Panel | SS_<br>Panel  | GS_<br>Panel | 00h |
|                  | 1   | 1   | ↑   | 0            | 0            | 0            | 0            | 0             | 0            | REV_<br>Panel | 0            | 00h |

| Command Function      | DCX | RDX | WRX | D7      | D6 | D5 | D4 | D3 | D2        | D1 | D0 | Hex |
|-----------------------|-----|-----|-----|---------|----|----|----|----|-----------|----|----|-----|
| SPI Interface Setting | 0   | 1   | ↑   | 1       | 0  | 1  | 1  | 1  | 0         | 1  | 0  | BAh |
|                       | 1   | 1   | ↑   | Spitype | 1  | 1  | 0  | 0  | Spi8color | 0  | 0  | E0h |

| Command Function | DCX | RDX | WRX | D7      | D6 | D5 | D4 | D3      | D2 | D1 | D0 | HEX |
|------------------|-----|-----|-----|---------|----|----|----|---------|----|----|----|-----|
| Power Control 1  | 0   | 1   | ↑   | 1       | 1  | 0  | 0  | 0       | 0  | 0  | 0  | C0h |
|                  | 1   | 1   | ↑   | BH[1:0] |    | 0  | 0  | BL[1:0] |    | 1  | 0  | 0Ah |

| Command Function | DCX | RDX | WRX | D7        | D6 | D5           | D4           | D3      | D2                | D1 | D0    | Hex |
|------------------|-----|-----|-----|-----------|----|--------------|--------------|---------|-------------------|----|-------|-----|
| Power Control 2  | 0   | 1   | ↑   | 1         | 1  | 0            | 0            | 0       | 0                 | 0  | 1     | C1h |
|                  | 1   | 1   | ↑   | 0         | 0  | BG_ISC [1:0] |              | BT[3:0] |                   |    |       | 15h |
|                  | 1   | 1   | ↑   | VRH1[7:0] |    |              |              |         |                   |    |       | 78h |
|                  | 1   | 1   | ↑   | VRH2[7:0] |    |              |              |         |                   |    |       | 78h |
|                  | 1   | 1   | ↑   | VGSP[7:0] |    |              |              |         |                   |    |       | 00h |
|                  | 1   | 1   | ↑   | VGSN[7:0] |    |              |              |         |                   |    |       | 00h |
|                  | 1   | 1   | ↑   | VRGH[7:0] |    |              |              |         |                   |    |       | 5Ah |
|                  | 1   | 1   | ↑   | 0         | 0  | 0            | VGL_REG[4:0] |         |                   |    |       | 10h |
|                  | 1   | 1   | ↑   | 0         | 0  | 0            | 0            | 0       | EXT_CPK_SEL [1:0] |    | EXB1T | 04h |

| Command Function       | DCX | RDX | WRX | D7 | D6        | D5 | D4 | D3 | D2        | D1 | D0 | Hex |
|------------------------|-----|-----|-----|----|-----------|----|----|----|-----------|----|----|-----|
| Pump Frequency Control | 0   | 1   | ↑   | 1  | 1         | 0  | 0  | 0  | 1         | 1  | 0  | C6h |
|                        | 1   | 1   | ↑   | 0  | PCK1[2:0] |    |    | 0  | PCK2[2:0] |    |    | 33h |
|                        | 1   | 1   | ↑   | 0  | PCK3[2:0] |    |    | 0  | PCK4[2:0] |    |    | 33h |

| Command Function | DCX | RDX | WRX | D7         | D6 | D5 | D4 | D3   | D2 | D1 | D0       | Hex |
|------------------|-----|-----|-----|------------|----|----|----|------|----|----|----------|-----|
| VCOM Control     | 0   | 1   | ↑   | 1          | 1  | 0  | 0  | 0    | 1  | 1  | 1        | C7h |
|                  | 1   | 1   | ↑   | VCM1 [7:0] |    |    |    |      |    |    |          | 69h |
|                  | 1   | 1   | ↑   | 0          | 0  | 0  | 0  | 0    | 0  | 0  | VCM1 [8] | 00h |
|                  | 1   | 1   | ↑   | VCM2 [7:0] |    |    |    |      |    |    |          | 8Fh |
|                  | 1   | 1   | ↑   | 0          | 0  | 0  | 0  | 0    | 0  | 0  | VCM2 [8] | 00h |
|                  | 1   | 1   | ↑   | nVM1       | 0  | 0  | 0  | nVM2 | 0  | 0  | 0        | 00h |

| Command Function    | DCX | RDX | WRX | D7              | D6            | D5 | D4 | D3                | D2              | D1 | D0 | Hex |
|---------------------|-----|-----|-----|-----------------|---------------|----|----|-------------------|-----------------|----|----|-----|
| Backlight Control 1 | 0   | 1   | ↑   | 1               | 1             | 0  | 0  | 1                 | 0               | 0  | 0  | C8h |
|                     | 1   | 1   | ↑   | PWM_DIV [7:0]   |               |    |    |                   |                 |    |    | E8h |
|                     | 1   | 1   | ↑   | THRES_MOV [3:0] |               |    |    | THRES_STILL [3:0] |                 |    |    | BBh |
|                     | 1   | 1   | ↑   | 0               | 0             | 0  | 0  | THRES_UI [3:0]    |                 |    |    | 0Bh |
|                     | 1   | 1   | ↑   | DTH_MOV [3:0]   |               |    |    | DTH_STILL [3:0]   |                 |    |    | A8h |
|                     | 1   | 1   | ↑   | 0               | 0             | 0  | 0  | DTH_UI [3:0]      |                 |    |    | 34h |
|                     | 1   | 1   | ↑   | 0               | DIM_MOV [2:0] |    |    | 0                 | DIM_STILL [2:0] |    |    | 43h |
|                     | 1   | 1   | ↑   | DIM_MIN [3:0]   |               |    |    | 1                 | DIM_UI [2:0]    |    |    | 0Bh |

| Command Function    | DCX | RDX | WRX | D7                | D6 | D5 | D4 | D3              | D2     | D1        | D0      | Hex |
|---------------------|-----|-----|-----|-------------------|----|----|----|-----------------|--------|-----------|---------|-----|
| Backlight Control 2 | 0   | 1   | ↑   | 1                 | 1  | 0  | 0  | 1               | 0      | 0         | 1       | C9h |
|                     | 1   | 1   | ↑   | LABC_SRE_THR[3:0] |    |    |    | LABC_SRE_ENABLE | LEDONR | LEDON POL | PWM POL | 80h |

| Command Function | DCX | RDX | WRX | D7                               | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----------------------------------|----|----|----|----|----|----|----|-----|
| NV Memory Write  | 0   | 1   | ↑   | 1                                | 1  | 0  | 1  | 0  | 0  | 0  | 0  | D0h |
|                  | 1   | 1   | ↑   | PGM_DATA [7:0]                   |    |    |    |    |    |    |    | XX  |
|                  | 1   | 1   | ↑   | PGM_ADR [7:0]/NVM_Read_ADR [7:0] |    |    |    |    |    |    |    | XX  |

| Command Function         | DCX | RDX | WRX | D7          | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|--------------------------|-----|-----|-----|-------------|----|----|----|----|----|----|----|-----|
| NV Memory Protection Key | 0   | 1   | ↑   | 1           | 1  | 0  | 1  | 0  | 0  | 0  | 1  | D1h |
|                          | 1   | 1   | ↑   | KEY [23:16] |    |    |    |    |    |    |    | XX  |
|                          | 1   | 1   | ↑   | KEY [15:8]  |    |    |    |    |    |    |    | XX  |
|                          | 1   | 1   | ↑   | KEY [7:0]   |    |    |    |    |    |    |    | XX  |

| Command Function      | DCX | RDX | WRX | D7                    | D6            | D5 | D4 | D3        | D2           | D1        | D0 | Hex |
|-----------------------|-----|-----|-----|-----------------------|---------------|----|----|-----------|--------------|-----------|----|-----|
| NV Memory Status Read | 0   | 1   | ↑   | 1                     | 1             | 0  | 1  | 0         | 0            | 1         | 0  | D2h |
|                       | 1   | ↑   | 1   | Dummy read            |               |    |    |           |              |           |    | XX  |
|                       | 1   | ↑   | 1   | 0                     | ID2_Mk [2:0]  |    |    | 0         | ID1_Mk [2:0] |           |    | 00  |
|                       | 1   | ↑   | 1   | OTP<br>Busy           | VCM1_Mk [2:0] |    |    | 0         | ID3_Mk [2:0] |           |    | 00  |
|                       | 1   | ↑   | 1   | 0                     | VCM2_Mk [2:0] |    |    | RB9_P2_Mk |              | RB9_P1_Mk |    | 00  |
|                       | 1   | ↑   | 1   | NVM_Read_Data 1 [7:0] |               |    |    |           |              |           |    | 00  |
|                       | 1   | ↑   | 1   | NVM_Read_Data 2 [7:0] |               |    |    |           |              |           |    | 00  |
|                       | 1   | ↑   | 1   | NVM_Read_Data 3 [7:0] |               |    |    |           |              |           |    | 00  |

| Command Function | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|----|----|----|----|----|----|----|----|-----|
| Read Device Code | 0   | 1   | ↑   | 1  | 1  | 0  | 1  | 0  | 0  | 1  | 1  | D3h |
|                  | 1   | ↑   | 1   | X  | X  | X  | X  | X  | X  | X  | X  | XX  |
|                  | 1   | ↑   | 1   | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 00h |
|                  | 1   | ↑   | 1   | 1  | 0  | 0  | 1  | 1  | 0  | 0  | 0  | 98h |
|                  | 1   | ↑   | 1   | 0  | 0  | 1  | 0  | 0  | 1  | 1  | 0  | 26h |

| Command Function | DCX | RDX | WRX | D7         | D6 | D5 | D4            | D3           | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|------------|----|----|---------------|--------------|----|----|----|-----|
| Clamp Control    | 0   | 1   | ↑   | 1          | 1  | 0  | 1             | 0            | 1  | 1  | 1  | D7h |
|                  | 1   | 1   | ↑   | VGH_CLPEN  |    | 0  | 0             | VGH_CLP[4:0] |    |    |    | 10h |
|                  | 1   | 1   | ↑   | VGL_CLPEN  |    | 0  | 0             | VGL_CLP[4:0] |    |    |    | 06h |
|                  | 1   | 1   | ↑   | AVDD_CLPEN |    |    | AVDD_CLP[4:0] |              |    | 0  | 0  | B4h |
|                  | 1   | 1   | ↑   | AVEE_CLPEN |    |    | AVEE_CLP[4:0] |              |    | 1  | 1  | BFh |

| Command Function       | DCX | RDX | WRX | D7 | D6 | D5        | D4         | D3          | D2 | D1 | D0 | Hex |
|------------------------|-----|-----|-----|----|----|-----------|------------|-------------|----|----|----|-----|
| Positive Gamma Control | 0   | 1   | ↑   | 1  | 1  | 1         | 0          | 0           | 0  | 0  | 0  | E0h |
|                        | 1   | 1   | ↑   | 0  | 0  | VP0 [5:0] |            |             |    |    |    | 00h |
|                        | 1   | 1   | ↑   | 0  | 0  | VP4 [5:0] |            |             |    |    |    | 0Fh |
|                        | 1   | 1   | ↑   | 0  | 0  | VP8 [5:0] |            |             |    |    |    | 19h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0         | VP16 [4:0] |             |    |    |    | 12h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0         | VP32 [4:0] |             |    |    |    | 13h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0         | VP52 [4:0] |             |    |    |    | 1Ah |
|                        | 1   | 1   | ↑   | 1  | 1  | 0         | 0          | VP80 [3:0]  |    |    |    | CDh |
|                        | 1   | 1   | ↑   | 0  | 0  | 0         | 0          | VP108 [3:0] |    |    |    | 0Ch |

|  |   |   |   |   |   |   |   |             |     |
|--|---|---|---|---|---|---|---|-------------|-----|
|  | 1 | 1 | ↑ | 0 | 0 | 0 | 0 | VP147 [3:0] | 00h |
|  | 1 | 1 | ↑ | 0 | 0 | 0 | 0 | VP175 [3:0] | 04h |
|  | 1 | 1 | ↑ | 0 | 0 | 0 |   | VP203 [4:0] | 04h |
|  | 1 | 1 | ↑ | 0 | 0 | 0 |   | VP223 [4:0] | 0Dh |
|  | 1 | 1 | ↑ | 0 | 0 | 0 |   | VP239 [4:0] | 0Bh |
|  | 1 | 1 | ↑ | 0 | 0 |   |   | VP247 [5:0] | 2Ah |
|  | 1 | 1 | ↑ | 0 | 0 |   |   | VP251 [5:0] | 20h |
|  | 1 | 1 | ↑ | 0 | 0 |   |   | VP255 [5:0] | 00h |

| Command Function       | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3          | D2 | D1 | D0 | Hex |
|------------------------|-----|-----|-----|----|----|----|----|-------------|----|----|----|-----|
| Negative Gamma Control | 0   | 1   | ↑   | 1  | 1  | 1  | 0  | 0           | 0  | 0  | 1  | E1h |
|                        | 1   | 1   | ↑   | 0  | 0  |    |    | VN0 [5:0]   |    |    |    | 00h |
|                        | 1   | 1   | ↑   | 0  | 0  |    |    | VN4 [5:0]   |    |    |    | 0Fh |
|                        | 1   | 1   | ↑   | 0  | 0  |    |    | VN8 [5:0]   |    |    |    | 19h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  |    | VN16 [4:0]  |    |    |    | 12h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  |    | VN32 [4:0]  |    |    |    | 13h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  |    | VN52 [4:0]  |    |    |    | 1Ah |
|                        | 1   | 1   | ↑   | 0  | 1  | 1  | 1  | VN80 [3:0]  |    |    |    | 7Dh |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | VN108 [3:0] |    |    |    | 0Ch |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | VN147 [3:0] |    |    |    | 00h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | VN175 [3:0] |    |    |    | 04h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  |    | VN203 [4:0] |    |    |    | 04h |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  |    | VN223 [4:0] |    |    |    | 0Dh |
|                        | 1   | 1   | ↑   | 0  | 0  | 0  |    | VN239 [4:0] |    |    |    | 0Bh |
|                        | 1   | 1   | ↑   | 0  | 0  |    |    | VN247 [5:0] |    |    |    | 2Ah |
|                        | 1   | 1   | ↑   | 0  | 0  |    |    | VN251 [5:0] |    |    |    | 20h |
|                        | 1   | 1   | ↑   | 0  | 0  |    |    | VN255 [5:0] |    |    |    | 00h |

| Command Function        | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3           | D2 | D1 | D0 | Hex |
|-------------------------|-----|-----|-----|----|----|----|----|--------------|----|----|----|-----|
| Digital Gamma Control 1 | 0   | 1   | ↑   | 1  | 1  | 1  | 0  | 0            | 0  | 1  | 0  | E2h |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | RCA0 [3:0]   |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | BCA0 [3:0]   |    |    |    | XX  |
|                         | 1   | 1   | ↑   |    |    |    |    | ;            |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | RCAx [3:0]   |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | BCAx [3:0]   |    |    |    | XX  |
|                         | 1   | 1   | ↑   |    |    |    |    | :            |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | RCA63 [3:0]  |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | BCA63 [3:0]  |    |    |    | XX  |
| Command Function        | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3           | D2 | D1 | D0 | Hex |
| Digital Gamma Control 2 | 0   | 1   | ↑   | 1  | 1  | 1  | 0  | 0            | 0  | 1  | 1  | E3h |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | RFA0 [3:0]   |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | BFA0 [3:0]   |    |    |    | XX  |
|                         | 1   | 1   | ↑   |    |    |    |    | :            |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | RFAx [3:0]   |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | BFAx [3:0]   |    |    |    | XX  |
|                         | 1   | 1   | ↑   |    |    |    |    | :            |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | RFA127 [3:0] |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | BFA127 [3:0] |    |    |    | XX  |
| Command Function        | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3           | D2 | D1 | D0 | Hex |
| Digital Gamma Control 3 | 0   | 1   | ↑   | 1  | 1  | 1  | 0  | 0            | 1  | 0  | 0  | E4h |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | RFA128 [3:0] |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | BFA128 [3:0] |    |    |    | XX  |
|                         | 1   | 1   | ↑   |    |    |    |    | :            |    |    |    | XX  |
|                         | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | RFAx [3:0]   |    |    |    | XX  |

The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.

|  |   |   |   |   |   |   |   |              |  |  |    |
|--|---|---|---|---|---|---|---|--------------|--|--|----|
|  | 1 | 1 | ↑ | 0 | 0 | 0 | 0 | BFAx [3:0]   |  |  | XX |
|  | 1 | 1 | ↑ |   |   |   |   | :            |  |  | XX |
|  | 1 | 1 | ↑ | 0 | 0 | 0 | 0 | RFA255 [3:0] |  |  | XX |
|  | 1 | 1 | ↑ | 0 | 0 | 0 | 0 | BFA255 [3:0] |  |  | XX |

| Command Function | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1    | D0      | Hex |
|------------------|-----|-----|-----|----|----|----|----|----|----|-------|---------|-----|
| D3GE             | 0   | 1   | ↑   | 1  | 1  | 1  | 0  | 1  | 0  | 1     | 0       | EAh |
|                  | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | 0  | 0  | En_3G | Dith_en | 00h |

| Command Function | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0      | Hex |
|------------------|-----|-----|-----|----|----|----|----|----|----|----|---------|-----|
| DSILS            | 0   | 1   | ↑   | 1  | 1  | 1  | 0  | 1  | 0  | 1  | 0       | ECh |
|                  | 1   | 1   | ↑   | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 2LAN_EN | 25h |

| Command Function | DCX | RDX | WRX | D7          | D6 | D5               | D4 | D3 | D2 | D1 | D0     | Hex |
|------------------|-----|-----|-----|-------------|----|------------------|----|----|----|----|--------|-----|
| PTCTRL1          | 0   | 1   | ↑   | 1           | 1  | 1                | 1  | 0  | 0  | 0  | 1      | F1h |
|                  | 1   | 1   | ↑   | Chopper_opt | 0  | Chopper_sel[1:0] |    | 1  | 0  | 0  | Outsre | A8h |

| Command Function | DCX | RDX | WRX | D7         | D6       | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|------------------|-----|-----|-----|------------|----------|----|----|----|----|----|----|-----|
| PTCTRL2          | 0   | 1   | ↑   | 1          | 1        | 1  | 1  | 0  | 0  | 1  | 0  | F2h |
|                  | 1   | 1   | ↑   | 0          | CRT[6:0] |    |    |    |    |    |    | 09h |
|                  | 1   | 1   | ↑   | 0          | EQT[6:0] |    |    |    |    |    |    | 06h |
|                  | 1   | 1   | ↑   | 0          | PCT[6:0] |    |    |    |    |    |    | 08h |
|                  | 1   | 1   | ↑   | Creqpc     | SDT[6:0] |    |    |    |    |    |    | 8Ah |
|                  | 1   | 1   | ↑   | GEQ1W[7:0] |          |    |    |    |    |    |    | 00h |
|                  | 1   | 1   | ↑   | GEQ2W[7:0] |          |    |    |    |    |    |    | 00h |

| Command Function | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2       | D1 | D0 | Hex |
|------------------|-----|-----|-----|----|----|----|----|----|----------|----|----|-----|
| RSO              | 0   | 1   | ↑   | 1  | 1  | 1  | 1  | 0  | 1        | 1  | 1  | F7h |
|                  | 1   | 1   | ↑   | 0  | 0  | 0  | 0  | 0  | RSO[2:0] |    |    | 00  |

| Command Function                 | DCX | RDX | WRX | D7              | D6                | D5 | D4 | D3 | D2 | D1                | D0 | Hex |
|----------------------------------|-----|-----|-----|-----------------|-------------------|----|----|----|----|-------------------|----|-----|
| Read EXTC Command<br>In SPI Mode | 0   | 1   | ↑   | 1               | 1                 | 1  | 1  | 1  | 0  | 1                 | 1  | FBh |
|                                  | 1   | 1   | ↑   | ext_spi_read_en | ext_spi_cnt [6:0] |    |    |    |    |                   |    | XX  |
|                                  | 1   | 1   | ↑   | 0               | 0                 | 0  | 0  | 0  | 0  | ext_spi_cnt [8:7] |    | XX  |

| Command Function                    | DCX | RDX | WRX | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | Hex |
|-------------------------------------|-----|-----|-----|----|----|----|----|----|----|----|----|-----|
| EXTC Command Set<br>enable register | 0   | 1   | ↑   | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | FFh |
|                                     | 1   | 1   | ↑   | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | FF  |
|                                     | 1   | 1   | ↑   | 1  | 0  | 0  | 1  | 1  | 0  | 0  | 0  | 98  |
|                                     | 1   | 1   | ↑   | 0  | 0  | 1  | 0  | 0  | 1  | 1  | 0  | 26  |

**Notes:**

- Undefined commands are treated as NOP (00h) command.
- B0 to D9 and DE to FF are for factory use of display supplier. Users can decide if these commands are available

*The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.*

or they are treated as NOP (00h) commands before shipping to Users. The default value is NOP (00h).

3. Commands 10h, 12h, 13h, 26h, 28h, 29h, 30h, 36h (Bit D4 only), 38h and 39h are updated during V-SYNC.

When the module is in the Sleep Out mode to avoid abnormal visual effects. During the Sleep In mode, these commands are updated immediately. Read status (09h), Read display power mode (0Ah), Read display MADCTL (0Bh), Read display pixel format (0Ch), Read display image mode (0Dh), Read display signal mode (0Eh) and Read display self-diagnostic result (0Fh) are updated immediately in both Sleep In mode and Sleep Out mode.



## 5.2. Command Description

### NOP (00h)

| 00h                                       | NOP (No Operation)                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 00h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command is an empty command. It does not have any effect on the ILI9806H. However, it can be used to terminate the Frame Memory Write or Read as described in RAMWR (Memory Write) and RAMRD (Memory Read) Commands.<br><br>X = void                                                                                                                                                  |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | None                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>N/A</td></tr><tr><td>S/W Reset</td><td>N/A</td></tr><tr><td>H/W Reset</td><td>N/A</td></tr></table>                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | N/A | S/W Reset                               | N/A | H/W Reset                                 | N/A |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | N/A                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | N/A                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | N/A                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | None                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Software Reset (01h)

| 01h                                       | SWRESET (Software Reset)                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 1  | 01h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>When the Software Reset command is written, it causes software reset. It resets the commands and parameters to their S/W Reset default values. (See default tables in each command description.)</p> <p>Note: The Frame Memory contents are not affected by this command.</p> <p>X = void</p>                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | <p>It is necessary to wait 5msec before sending a new command after software reset. The display module loads all factory default values of the display supplier to the registers during this 5msec. If Software Reset is applied during the Sleep Out mode, it will be necessary to wait 120msec before sending the Sleep Out command.</p> <p>The Software Reset Command cannot be sent during the Sleep Out sequence.</p> |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                 |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>N/A</td></tr><tr><td>S/W Reset</td><td>N/A</td></tr><tr><td>H/W Reset</td><td>N/A</td></tr></table>                                                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | N/A | S/W Reset                               | N/A | H/W Reset                                 | N/A |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | N/A                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | N/A                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>SWRESET(01h)</div><div>Display whole blank screen</div><div>Set Commands to S/W Default Values</div><div>Sleep In Mode</div></div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                                       |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read display identification information (04h)

| 04h                       | RDDIDIF (Read Display Identification Information)                                                                                                                                                                                                                                                                                                                                                                                                                                |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----------------|-----------------------------------------|-----------------|-------------------------------------------|-----------------|------------------------------------------|-----|----------|-----|
|                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | RDX             | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| Command                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1               | ↑   | XX       | 0         | 0  | 0  | 0  | 0  | 1  | 0  | 0  | 04h |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| 1 <sup>st</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ↑               | 1   | XX       | X         | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ↑               | 1   | XX       | ID1 [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| 3 <sup>rd</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ↑               | 1   | XX       | ID2 [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| 4 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ↑               | 1   | XX       | ID3 [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| Description               | This read byte returns 24 bits of display identification information.                                                                                                                                                                                                                                                                                                                                                                                                            |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | The 1 <sup>st</sup> parameter is a dummy data.                                                                                                                                                                                                                                                                                                                                                                                                                                   |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | The 2 <sup>nd</sup> parameter (ID1 [7:0]): LCD module's manufacturer ID.                                                                                                                                                                                                                                                                                                                                                                                                         |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | The 3 <sup>rd</sup> parameter (ID2 [7:0]): LCD module/driver version ID.                                                                                                                                                                                                                                                                                                                                                                                                         |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | The 4 <sup>th</sup> parameter (ID3 [7:0]): LCD module/driver ID.                                                                                                                                                                                                                                                                                                                                                                                                                 |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| X = void                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| Restriction               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| Register Availability     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                       |                 |     |          |           |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes             | Normal Mode On, Idle Mode On, Sleep Out | Yes             | Partial Mode On, Idle Mode Off, Sleep Out | Yes             | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Availability    |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                         | Yes             |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                          | Yes             |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                        | Yes             |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                         | Yes             |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| Sleep In                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| Default                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>See description</td></tr><tr><td>S/W Reset</td><td>See description</td></tr><tr><td>H/W Reset</td><td>See description</td></tr></table>                                                                                                                                                                                                                                                   |                 |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | See description | S/W Reset                               | See description | H/W Reset                                 | See description |                                          |     |          |     |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Default Value   |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                | See description |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
|                           | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | See description |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| H/W Reset                 | See description                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |
| Flow Chart                | <div><div><div>RDDIDIF(04h)</div><div>Host</div></div><div><div>Driver</div><div>1st Parameter: Dummy Read<br/>2nd Parameter: Send LCD module's manufacturer information<br/>3rd Parameter: Send panel type and LCM/driver version information<br/>4th Parameter: Send module/driver information</div></div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div> |                 |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |                 |                                         |                 |                                           |                 |                                          |     |          |     |

## Read Number of the Errors on DSI (05h)

| 05h                                       | RDNUMED (Read Number of the Errors on DSI)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|---------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|-------------------|-------------------------------------------|-------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 1   | ↑   | XX       | 0       | 0  | 0  | 0  | 0  | 1  | 0  | 1  | 05h |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑   | 1   | XX       | X       | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑   | 1   | XX       | P [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Description                               | <p>The 1<sup>st</sup> parameter is a dummy data.</p> <p>The 2<sup>nd</sup> parameter indicates the amount of errors on the DSI. The more detailed description of the bits is below.</p> <p>P [6..0] bits indicate the amount of the error. P [7] is set to 1 if there is overflow with P [6..0] bits.</p> <p>P [7...0] bits are set to 0 (and RDDSM (0Eh)'s D0 is set 0 at the same time) after the second parameter information is sent (= the read function is completed). This function always returns P [7...0] = 00h if the parallel MPU interface is selected.</p> <p>X = void</p> |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                                                                                                                                                                                                                              |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                               |     |     |          |         |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes               | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00<sub>HEX</sub></td></tr><tr><td>S/W Reset</td><td>00<sub>HEX</sub></td></tr><tr><td>H/W Reset</td><td>00<sub>HEX</sub></td></tr></table>                                                                                                                                                                                                                                                                                                                                                        |     |     |          |         |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00 <sub>HEX</sub> | S/W Reset                               | 00 <sub>HEX</sub> | H/W Reset                                 | 00 <sub>HEX</sub> |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Power On Sequence                         | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| S/W Reset                                 | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| H/W Reset                                 | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDNUMPE (05h)</div><div>↓</div><div>1st Parameter: Dummy Read<br/>2nd Parameter: Read</div><div>↓</div><div>P [7:0] = 00h<br/>RDDSM (0Eh)'s D0 = 0</div></div><div>Host<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                                                                                                                                               |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |

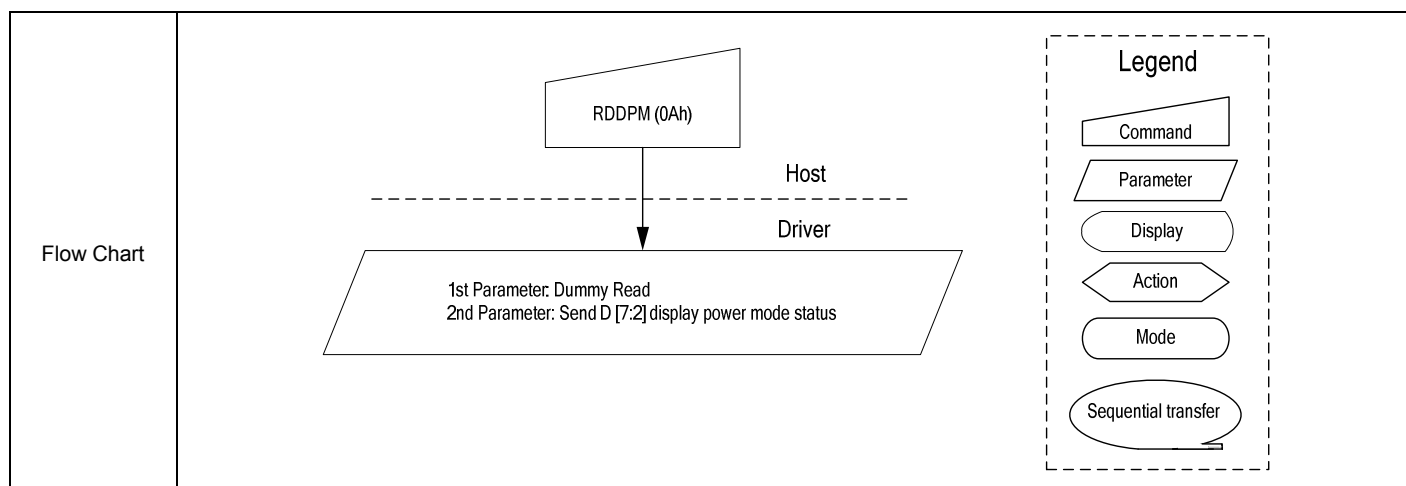
## Read Display Status (09h)

| 09h                       | RDDST (Read Display Status)                                                                |                                         |     |          |           |                                                                |    |    |    |    |    |    |     |
|---------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------|-----|----------|-----------|----------------------------------------------------------------|----|----|----|----|----|----|-----|
|                           | DCX                                                                                        | RDX                                     | WRX | D [23:8] | D7        | D6                                                             | D5 | D4 | D3 | D2 | D1 | D0 | HEX |
| Command                   | 0                                                                                          | 1                                       | ↑   | XX       | 0         | 0                                                              | 0  | 0  | 1  | 0  | 0  | 1  | 09h |
| 1 <sup>st</sup> Parameter | 1                                                                                          | ↑                                       | 1   | XX       | X         | X                                                              | X  | X  | X  | X  | X  | X  | XX  |
| 2 <sup>nd</sup> Parameter | 1                                                                                          | ↑                                       | 1   | XX       | D [31:24] |                                                                |    |    |    |    |    |    | XX  |
| 3 <sup>rd</sup> Parameter | 1                                                                                          | ↑                                       | 1   | XX       | D [23:16] |                                                                |    |    |    |    |    |    | XX  |
| 4 <sup>th</sup> Parameter | 1                                                                                          | ↑                                       | 1   | XX       | D [15:8]  |                                                                |    |    |    |    |    |    | XX  |
| 5 <sup>th</sup> Parameter | 1                                                                                          | ↑                                       | 1   | XX       | D [7:0]   |                                                                |    |    |    |    |    |    | XX  |
| Description               | This command indicates the current status of the display, as described in the table below: |                                         |     |          |           |                                                                |    |    |    |    |    |    |     |
|                           | Bit                                                                                        | Description                             |     |          | Value     | Status                                                         |    |    |    |    |    |    |     |
|                           | D31                                                                                        | Booster voltage status                  |     |          | 0         | Booster Off                                                    |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Booster On                                                     |    |    |    |    |    |    |     |
|                           | D30                                                                                        | Row address order                       |     |          | 0         | Top to Bottom (When MADCTL D7 = 0)                             |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Bottom to Top (When MADCTL D7 = 1)                             |    |    |    |    |    |    |     |
|                           | D29                                                                                        | Column address order                    |     |          | 0         | Left to Right (When MADCTL D6 = 0)                             |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Right to Left (When MADCTL D6 = 1)                             |    |    |    |    |    |    |     |
|                           | D28                                                                                        | Row/column exchange                     |     |          | 0         | Normal Mode (When MADCTL D5 = 0)                               |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Reverse Mode (When MADCTL D5 = 1)                              |    |    |    |    |    |    |     |
|                           | D27                                                                                        | Vertical refresh                        |     |          | 0         | LCD Refresh Top to Bottom (When MADCTL D4 = 0)                 |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | LCD Refresh Bottom to Top (When MADCTL D4 = 1)                 |    |    |    |    |    |    |     |
|                           | D26                                                                                        | RGB/BGR order                           |     |          | 0         | RGB (When MADCTL D3 = 0)                                       |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | BGR (When MADCTL D3= 1)                                        |    |    |    |    |    |    |     |
|                           | D25                                                                                        | Horizontal refresh order                |     |          | 0         | LCD Refresh Left to Right (When MADCTL D2 = 0)                 |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | LCD Refresh Right to Left (When MADCTL D2 = 1)                 |    |    |    |    |    |    |     |
|                           | D24                                                                                        | Source scan sequence                    |     |          | 0         | Source output Left to Right (When MADCTL D1 = 0)               |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Source output Right to Left (When MADCTL D1 = 1)               |    |    |    |    |    |    |     |
|                           | D23                                                                                        | Gate scan sequence                      |     |          | 0         | Gate output Top to Bottom (When MADCTL D0 = 0)                 |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Gate output Bottom to Top (When MADCTL D0 = 1)                 |    |    |    |    |    |    |     |
|                           | D [22:20]                                                                                  | Interface color pixel format definition |     |          | 101       | 16-bit/pixel                                                   |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 110       | 18-bit/pixel                                                   |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 111       | 24-bit/pixel                                                   |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | others    | Not defined                                                    |    |    |    |    |    |    |     |
|                           | D19                                                                                        | Idle Mode On/Off                        |     |          | 0         | Idle Mode Off                                                  |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Idle Mode On                                                   |    |    |    |    |    |    |     |
|                           | D18                                                                                        | Partial Mode On/Off                     |     |          | 0         | Partial Mode Off                                               |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Partial Mode On                                                |    |    |    |    |    |    |     |
|                           | D17                                                                                        | Sleep In/Out                            |     |          | 0         | Sleep In Mode                                                  |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Sleep Out Mode                                                 |    |    |    |    |    |    |     |
|                           | D16                                                                                        | Display Normal Mode On/Off              |     |          | 0         | Display Normal Mode Off (Partial or Scrolling Mode)            |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Display Normal Mode On                                         |    |    |    |    |    |    |     |
|                           | D15                                                                                        | Vertical scrolling status               |     |          | 0         | Vertical Scroll Off                                            |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Vertical Scroll On                                             |    |    |    |    |    |    |     |
|                           | D14                                                                                        | Horizontal Scrolling Status             |     |          | 0         | This bit is not applicable for this project, so it is set to 0 |    |    |    |    |    |    |     |
|                           | D13                                                                                        | Inversion status                        |     |          | 0         | Inversion Off                                                  |    |    |    |    |    |    |     |
|                           |                                                                                            |                                         |     |          | 1         | Inversion On                                                   |    |    |    |    |    |    |     |

|                                                                                    | D12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | All Pixel On                             | 0      | Normal mode                             |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|--------|-----------------------------------------|--------|---------------|------------------------------------------|---------------|-----------------------------------------|-------------------------------------------------------------|-------------------------------------------|---------------|------------------------------------------|-----|----------|-----|
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | All Pixels On                           |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | All Pixel Off                            | 0      | Normal mode                             |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | All Pixels Off                          |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Display ON/OFF                           | 0      | Display is OFF                          |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | Display is ON                           |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Tearing effect line ON/OFF               | 0      | Tearing Effect Line OFF                 |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | Tearing Effect ON                       |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D [8:6]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Gamma curve selection                    | 000    | Gamma Curve (GC0)                       |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | others | Not defined                             |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Tearing Effect Line mode                 | 0      | Mode 1, V-Blanking only                 |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | Mode 2, both H-Blanking and V-Blanking. |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Horizontal Sync. (HS, DPI I/F)<br>(Note) | 0      | Horizontal Sync. line is Off (Low)      |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | Horizontal Sync. line is On (High)      |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Vertical Sync. (VS, DPI I/F)<br>(Note)   | 0      | Vertical Sync. line is Off (Low)        |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | Vertical Sync. line is On (High)        |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | DOT Clock (PCLK, DPI I/F)<br>(Note)      | 0      | PCLK line is Off (Low)                  |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | PCLK line is On (High)                  |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Data Enable (ENABLE, DPI I/F)<br>(Note)  | 0      | DE line is Off (Low)                    |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | DE line is On (High)                    |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    | D0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Parity Error on DSI                      | 0      | No Parity Error                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
|                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          | 1      | Parity Error                            |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Note: This bit indicates the current status of the line when this command is sent. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| X = void                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Restriction                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Register Availability                                                              | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                        |                                          |        |                                         | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes           | Normal Mode On, Idle Mode On, Sleep Out | Yes                                                         | Partial Mode On, Idle Mode Off, Sleep Out | Yes           | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                                                             | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out                                           | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out                                            | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out                                          | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out                                           | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Sleep In                                                                           | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Default                                                                            | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>32'h00710000h</td></tr><tr><td>S/W Reset</td><td>D20~D30 no change, keep the current status before S/W Reset</td></tr><tr><td>H/W Reset</td><td>32'h00710000h</td></tr></table>                                                                                                                                                                                                                                            |                                          |        |                                         | Status | Default Value | Power On Sequence                        | 32'h00710000h | S/W Reset                               | D20~D30 no change, keep the current status before S/W Reset | H/W Reset                                 | 32'h00710000h |                                          |     |          |     |
| Status                                                                             | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Power On Sequence                                                                  | 32'h00710000h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| S/W Reset                                                                          | D20~D30 no change, keep the current status before S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| H/W Reset                                                                          | 32'h00710000h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |
| Flow Chart                                                                         | <div><div><div>RDDST (09h)</div><div>↓</div><div><div>Host</div><div>Driver</div></div></div><div><div>1st Parameter: Dummy Read<br/>2nd Parameter: Send D [31:25] display status<br/>3rd Parameter: Send D [22:16] display status<br/>4th Parameter: Send D [10:8] display status<br/>5th Parameter: Send D [7:0] display status</div></div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div> |                                          |        |                                         |        |               |                                          |               |                                         |                                                             |                                           |               |                                          |     |          |     |

**Read Display Power Mode (0Ah)**

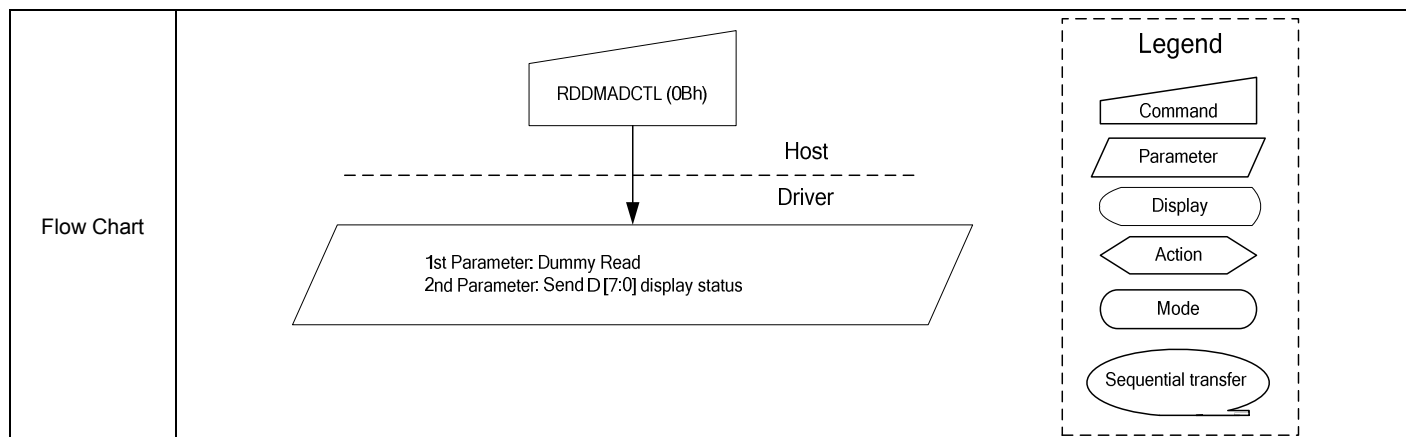
| 0Ah                                       | RDDPM (Read Display Power Mode)                                                                                                                                                                                                                                                                                                                                                            |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-------------|----------------------------|---------------|----------------------------|--------|----|----|----|-----|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|-------------------|-------------------------------------------|-------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7          | D6                         | D5            | D4                         | D3     | D2 | D1 | D0 | HEX |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0           | 0                          | 0             | 0                          | 1      | 0  | 1  | 0  | 0Ah |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X           | X                          | X             | X                          | X      | X  | X  | X  | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | D [7:2]     |                            |               |                            |        |    | 0  | 0  | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Description                               | This command indicates the current status of the display, as described in the table below.                                                                                                                                                                                                                                                                                                 |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          | Bit         | Description                |               | Value                      | Status |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          | D7          | Booster Voltage Status     | 0             | Booster Off or has a fault |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |             |                            | 1             | Booster On and working OK  |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          | D6          | Idle Mode On/Off           | 0             | Idle Mode Off              |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |             |                            | 1             | Idle Mode On               |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          | D5          | Partial Mode On/Off        | 0             | Partial Mode Off           |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |             |                            | 1             | Partial Mode On            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          | D4          | Sleep In/Out               | 0             | Sleep In Mode              |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |             |                            | 1             | Sleep Out Mode             |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          | D3          | Display Normal Mode On/Off | 0             | Display Normal Mode Off    |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |             |                            | 1             | Display Normal Mode On     |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          | D2          | Display On/Off             | 0             | Display is Off             |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     | 1        |             |                            | Display is On |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     | D1       | Not Defined | --                         | Set to 0      |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |     | D0       | Not Defined | --                         | Set to 0      |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| X = void                                  |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |             |                            |               |                            |        |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes               | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>08<sub>HEX</sub></td></tr><tr><td>S/W Reset</td><td>08<sub>HEX</sub></td></tr><tr><td>H/W Reset</td><td>08<sub>HEX</sub></td></tr></table>                                                                                                                                                          |     |     |          |             |                            |               |                            |        |    |    |    |     | Status | Default Value | Power On Sequence                        | 08 <sub>HEX</sub> | S/W Reset                               | 08 <sub>HEX</sub> | H/W Reset                                 | 08 <sub>HEX</sub> |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Power On Sequence                         | 08 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| S/W Reset                                 | 08 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| H/W Reset                                 | 08 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |             |                            |               |                            |        |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |





**Read Display MADCTL (0Bh)**

| 0Bh                                       | RDDMADCTL (Read Display MADCTL)                                                                                                                                                                                                                                                                                                                                                            |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|----------|---------------------------|-----------------------------------------------|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|-----------|-------------------------------------------|-------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX                           | WRX | D [23:8] | D7                        | D6                                            | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1                             | ↑   | XX       | 0                         | 0                                             | 0  | 0  | 1  | 0  | 1  | 1  | 0Bh |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                             | 1   | XX       | X                         | X                                             | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                             | 1   | XX       | D [7:0]                   |                                               |    |    |    |    |    |    | XX  |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Description                               | This command indicates the current status of the display, as described in the table below.                                                                                                                                                                                                                                                                                                 |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           | Bit                                                                                                                                                                                                                                                                                                                                                                                        | Description                   |     |          | Value                     | Status                                        |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           | D7                                                                                                                                                                                                                                                                                                                                                                                         | Page Address Order            |     |          | 0                         | Top to Bottom (When MADCTL D7= 0)             |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          | 1                         | Bottom to Top (When MADCTL D7= 1)             |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           | D6                                                                                                                                                                                                                                                                                                                                                                                         | Column Address Order          |     |          | 0                         | Left to Right (When MADCTL D6= 0)             |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          | 1                         | Right to Left (When MADCTL D6= 1)             |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           | D5                                                                                                                                                                                                                                                                                                                                                                                         | Page/Column Order             |     |          | 0                         | Normal Mode (When MADCTL D5= 0)               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          | 1                         | Reverse Mode (When MADCTL D5= 1)              |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           | D4                                                                                                                                                                                                                                                                                                                                                                                         | Line Address Order            |     |          | 0                         | LCD Refresh Top to Bottom (When MADCTL D4= 0) |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          | 1                         | LCD Refresh Bottom to Top (When MADCTL D4= 1) |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           | D3                                                                                                                                                                                                                                                                                                                                                                                         | RGB/BGR Order                 |     |          | 0                         | RGB (When MADCTL D3= 0)                       |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          | 1                         | BGR (When MADCTL D3= 1)                       |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           | D2                                                                                                                                                                                                                                                                                                                                                                                         | Display Data Latch Data Order |     |          | 0                         | LCD Refresh Left to Right (When MADCTL D2= 0) |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          | 1                         | LCD Refresh Right to Left (When MADCTL D2= 1) |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           | D1                                                                                                                                                                                                                                                                                                                                                                                         | Source scan sequence          |     |          | 0                         | Source output Left to Right                   |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          | 1                         | Source output Right to Left                   |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
|                                           | D0                                                                                                                                                                                                                                                                                                                                                                                         | Gate scan sequence            |     |          | 0                         | Gate output Top to Bottom                     |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| 1                                         |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          | Gate output Bottom to Top |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| X = void                                  |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                               |     |          |                           |                                               |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00<sub>HEX</sub></td></tr><tr><td>S/W Reset</td><td>No Change</td></tr><tr><td>H/W Reset</td><td>00<sub>HEX</sub></td></tr></table>                                                                                                                                                                 |                               |     |          |                           |                                               |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00 <sub>HEX</sub> | S/W Reset                               | No Change | H/W Reset                                 | 00 <sub>HEX</sub> |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| Power On Sequence                         | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| S/W Reset                                 | No Change                                                                                                                                                                                                                                                                                                                                                                                  |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |
| H/W Reset                                 | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |                               |     |          |                           |                                               |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |           |                                           |                   |                                          |     |          |     |

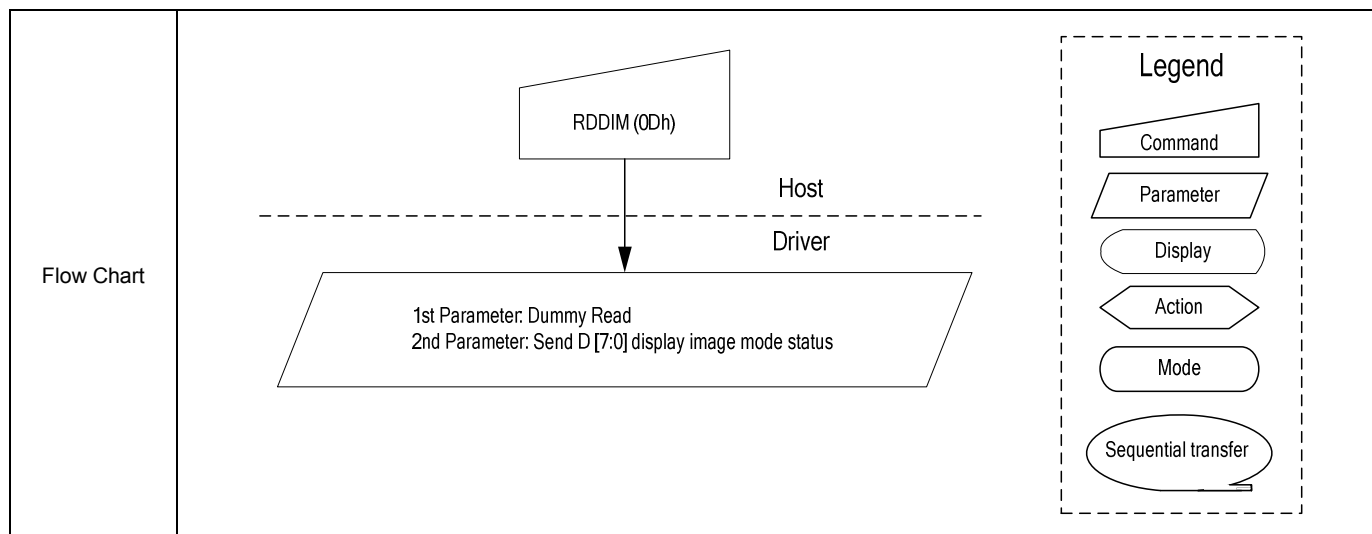


## Read Display Pixel Format (0Ch)

| 0Ch                                       | RDDCOLMOD (Read Display COLMOD)                                                                                                                                                                                                                                                                                                                                                            |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------|----------------------|-----------|-----------|----|----------------------|----|-----------|----|--------------|-----|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|-------------------|-------------------------------------------|-------------------|------------------------------------------|-----|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|-----------|--|--|----------------------|---|---|---|--------------|---|---|---|--------------|---|---|---|--------------|--------|--|--|----------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX                  | D [23:8]             | D7        | D6        | D5 | D4                   | D3 | D2        | D1 | D0           | HEX |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑                    | XX                   | 0         | 0         | 0  | 0                    | 1  | 1         | 0  | 0            | 0Ch |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1                    | XX                   | X         | X         | X  | X                    | X  | X         | X  | X            | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1                    | XX                   | 0         | DPI [2:0] |    |                      | 0  | DBI [2:0] |    |              | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Description                               | This command indicates the current status of the display, as described in the table below:                                                                                                                                                                                                                                                                                                 |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
|                                           | <table><tr><th colspan="3">DPI [2:0]</th><th>RGB Interface Format</th></tr><tr><td>1</td><td>0</td><td>1</td><td>16-bit/pixel</td></tr><tr><td>1</td><td>1</td><td>0</td><td>18-bit/pixel</td></tr><tr><td>1</td><td>1</td><td>1</td><td>24-bit/pixel</td></tr><tr><td colspan="3">Others</td><td>Reserved</td></tr></table>                                                               |     |                      |                      | DPI [2:0] |           |    | RGB Interface Format | 1  | 0         | 1  | 16-bit/pixel | 1   | 1      | 0             | 18-bit/pixel                             | 1                 | 1                                       | 1                 | 24-bit/pixel                              | Others            |                                          |     | Reserved | <table><tr><th colspan="3">DBI [2:0]</th><th>CPU Interface Format</th></tr><tr><td>1</td><td>0</td><td>1</td><td>16-bit/pixel</td></tr><tr><td>1</td><td>1</td><td>0</td><td>18-bit/pixel</td></tr><tr><td>1</td><td>1</td><td>1</td><td>24-bit/pixel</td></tr><tr><td colspan="3">Others</td><td>Reserved</td></tr></table> |  |  |  | DBI [2:0] |  |  | CPU Interface Format | 1 | 0 | 1 | 16-bit/pixel | 1 | 1 | 0 | 18-bit/pixel | 1 | 1 | 1 | 24-bit/pixel | Others |  |  | Reserved |
|                                           | DPI [2:0]                                                                                                                                                                                                                                                                                                                                                                                  |     |                      | RGB Interface Format |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
|                                           | 1                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 1                    | 16-bit/pixel         |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
|                                           | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | 0                    | 18-bit/pixel         |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| 1                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | 24-bit/pixel         |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Others                                    |                                                                                                                                                                                                                                                                                                                                                                                            |     | Reserved             |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| DBI [2:0]                                 |                                                                                                                                                                                                                                                                                                                                                                                            |     | CPU Interface Format |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| 1                                         | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | 16-bit/pixel         |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| 1                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 18-bit/pixel         |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| 1                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | 24-bit/pixel         |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Others                                    |                                                                                                                                                                                                                                                                                                                                                                                            |     | Reserved             |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| X = void                                  |                                                                                                                                                                                                                                                                                                                                                                                            |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |                      |                      |           |           |    |                      |    |           |    |              |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes               | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes                                                                                                                                                                                                                                                                                                                          |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>07<sub>HEX</sub></td></tr><tr><td>S/W Reset</td><td>07<sub>HEX</sub></td></tr><tr><td>H/W Reset</td><td>07<sub>HEX</sub></td></tr></table>                                                                                                                                                          |     |                      |                      |           |           |    |                      |    |           |    |              |     | Status | Default Value | Power On Sequence                        | 07 <sub>HEX</sub> | S/W Reset                               | 07 <sub>HEX</sub> | H/W Reset                                 | 07 <sub>HEX</sub> |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Power On Sequence                         | 07 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| S/W Reset                                 | 07 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| H/W Reset                                 | 07 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |
| Flow Chart                                | <div><div><div>RDDCOLMOD (0Ch)</div><div>↓</div><div>1<sup>st</sup> Parameter: Dummy Read<br/>2<sup>nd</sup> Parameter: Send D [7:0] display pixel format status</div></div><div>Host<br/>-----<br/>Driver</div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>       |     |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |                                                                                                                                                                                                                                                                                                                              |  |  |  |           |  |  |                      |   |   |   |              |   |   |   |              |   |   |   |              |        |  |  |          |

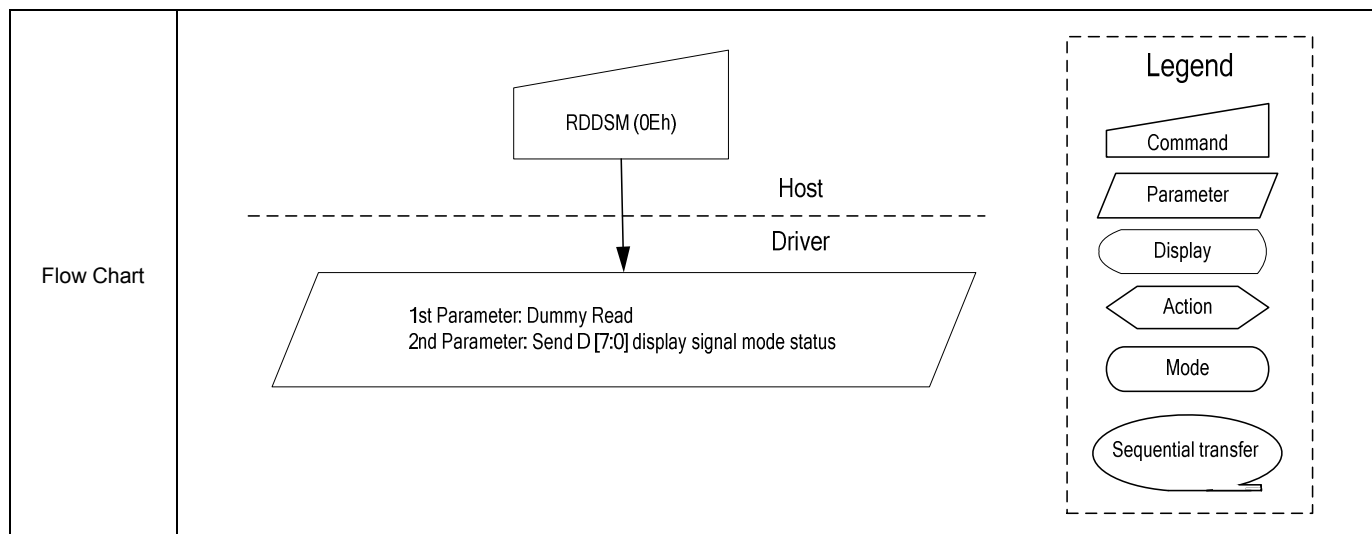
## Read Display Image Mode (0Dh)

| 0Dh                                                                                                                                                                  | RDDIM (Read Display Image Mode)                                                                                                                                                                                                                                                                                                                                                            |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------|----------|---------|---------------|----|----------------------------------------------------|----|----|----|----|-------------|----------------------|---------------|------------------------------------------|-------------------|-----------------------------------------|-------------------|-------------------------------------------|-------------------|------------------------------------------|-----|----------|-----|
|                                                                                                                                                                      | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX                                    | D [23:8] | D7      | D6            | D5 | D4                                                 | D3 | D2 | D1 | D0 | HEX         |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Command                                                                                                                                                              | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑                                      | XX       | 0       | 0             | 0  | 0                                                  | 1  | 1  | 0  | 1  | 0Dh         |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                                                                                                                                            | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1                                      | XX       | X       | X             | X  | X                                                  | X  | X  | X  | X  | XX          |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                                                                                                                                            | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1                                      | XX       | D [7:0] |               |    |                                                    |    |    |    |    | XX          |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Description                                                                                                                                                          | This command indicates the Image Mode status of the display, as described in the Tables below:                                                                                                                                                                                                                                                                                             |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                                                                                                                                                      | Bit                                                                                                                                                                                                                                                                                                                                                                                        |     | Description                            |          |         | Value         |    | Status                                             |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                                                                                                                                                      | D7                                                                                                                                                                                                                                                                                                                                                                                         |     | Vertical Scrolling Status              |          |         | 0             |    | Vertical Scrolling is Off                          |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                            |     |                                        |          |         | 1             |    | Vertical Scrolling is On                           |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                                                                                                                                                      | D6                                                                                                                                                                                                                                                                                                                                                                                         |     | Horizontal Scrolling Status (Reserved) |          |         | 0             |    | It is not applicable for this project, so set to 0 |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                                                                                                                                                      | D5                                                                                                                                                                                                                                                                                                                                                                                         |     | Inversion On/Off                       |          |         | 0             |    | Inversion is Off                                   |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                            |     |                                        |          |         | 1             |    | Inversion is On                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                                                                                                                                                      | D4                                                                                                                                                                                                                                                                                                                                                                                         |     | All Pixels On                          |          |         | 0             |    | Normal Display                                     |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                            |     |                                        |          |         | 1             |    | White Display                                      |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                                                                                                                                                      | D3                                                                                                                                                                                                                                                                                                                                                                                         |     | All Pixels Off                         |          |         | 0             |    | Normal Display                                     |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 1                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                            |     |                                        |          |         | Black Display |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| <table><tr><th>Bit D [2:0]</th><th>Gamma Cure Selection</th></tr><tr><td>000</td><td>Gamma curve (GC0)</td></tr><tr><td>Others</td><td>Not defined</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                            |     |                                        |          |         |               |    |                                                    |    |    |    |    | Bit D [2:0] | Gamma Cure Selection | 000           | Gamma curve (GC0)                        | Others            | Not defined                             |                   |                                           |                   |                                          |     |          |     |
| Bit D [2:0]                                                                                                                                                          | Gamma Cure Selection                                                                                                                                                                                                                                                                                                                                                                       |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 000                                                                                                                                                                  | Gamma curve (GC0)                                                                                                                                                                                                                                                                                                                                                                          |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Others                                                                                                                                                               | Not defined                                                                                                                                                                                                                                                                                                                                                                                |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| X = void                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                            |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Restriction                                                                                                                                                          | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Register Availability                                                                                                                                                | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |                                        |          |         |               |    |                                                    |    |    |    |    |             | Status               | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes               | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                                                                                                                                               | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                             | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                              | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                            | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                             | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Sleep In                                                                                                                                                             | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Default                                                                                                                                                              | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00<sub>HEX</sub></td></tr><tr><td>S/W Reset</td><td>00<sub>HEX</sub></td></tr><tr><td>H/W Reset</td><td>00<sub>HEX</sub></td></tr></table>                                                                                                                                                          |     |                                        |          |         |               |    |                                                    |    |    |    |    |             | Status               | Default Value | Power On Sequence                        | 00 <sub>HEX</sub> | S/W Reset                               | 00 <sub>HEX</sub> | H/W Reset                                 | 00 <sub>HEX</sub> |                                          |     |          |     |
| Status                                                                                                                                                               | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Power On Sequence                                                                                                                                                    | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| S/W Reset                                                                                                                                                            | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| H/W Reset                                                                                                                                                            | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |     |                                        |          |         |               |    |                                                    |    |    |    |    |             |                      |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |



## Read Display Signal Mode (0Eh)

| 0Eh                                       | RDDSM (Read Display Signal Mode)                                                                                                                                                                                                                                                                                                                                                           |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----|----------|----|-------|----|-----------------------------|----|----|----|----|-----|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|-------------------|-------------------------------------------|-------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX                                | WRX | D [23:8] | D7 | D6    | D5 | D4                          | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1                                  | ↑   | XX       | 0  | 0     | 0  | 0                           | 1  | 1  | 1  | 0  | 0Eh |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                                  | 1   | XX       | X  | X     | X  | X                           | X  | X  | X  | X  | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                                  | 1   | XX       | D7 | D6    | D5 | D4                          | D3 | D2 | D1 | D0 | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Description                               | This command indicates the current status of the display, as described in the table below:                                                                                                                                                                                                                                                                                                 |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           | Bit                                                                                                                                                                                                                                                                                                                                                                                        | Description                        |     |          |    | Value |    | Status                      |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           | D7                                                                                                                                                                                                                                                                                                                                                                                         | Tearing Effect Line On/Off         |     |          |    | 0     |    | Tearing Effect Line OFF     |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                                    |     |          |    | 1     |    | Tearing Effect Line ON      |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           | D6                                                                                                                                                                                                                                                                                                                                                                                         | Tearing Effect Line Output Mode,   |     |          |    | 0     |    | Tearing Effect Line Mode 1  |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                                    |     |          |    | 1     |    | Tearing Effect Line Mode 2  |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           | D5                                                                                                                                                                                                                                                                                                                                                                                         | Horizontal Sync. (RGB I/F) On/Off  |     |          |    | 0     |    | HS line is OFF (low)        |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                                    |     |          |    | 1     |    | HS line is ON (high)        |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           | D4                                                                                                                                                                                                                                                                                                                                                                                         | Vertical Sync. (RGB I/F) On/Off    |     |          |    | 0     |    | VS line is OFF (low)        |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                                    |     |          |    | 1     |    | VS line is ON (high)        |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           | D3                                                                                                                                                                                                                                                                                                                                                                                         | Pixel Clock (PCLK, RGB I/F) On/Off |     |          |    | 0     |    | PCLK line is OFF (low)      |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                                    |     |          |    | 1     |    | PCLK line is ON (high)      |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           | D2                                                                                                                                                                                                                                                                                                                                                                                         | Data Enable (DE, RGB I/F) On/Off   |     |          |    | 0     |    | Enable Line is OFF (low)    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                                    |     |          |    | 1     |    | Enable Line is ON (high)    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           | D1                                                                                                                                                                                                                                                                                                                                                                                         | Reserved                           |     |          |    | 0     |    | Reserved, so it is set to 0 |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           | D0                                                                                                                                                                                                                                                                                                                                                                                         | Error on DSI,                      |     |          |    | 0     |    | No Error on DSI             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                                    |     |          |    | 1     |    | Error on DSI                |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| X = void                                  |                                                                                                                                                                                                                                                                                                                                                                                            |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                                    |     |          |    |       |    |                             |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes               | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00<sub>HEX</sub></td></tr><tr><td>S/W Reset</td><td>00<sub>HEX</sub></td></tr><tr><td>H/W Reset</td><td>00<sub>HEX</sub></td></tr></table>                                                                                                                                                          |                                    |     |          |    |       |    |                             |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00 <sub>HEX</sub> | S/W Reset                               | 00 <sub>HEX</sub> | H/W Reset                                 | 00 <sub>HEX</sub> |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Power On Sequence                         | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| S/W Reset                                 | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| H/W Reset                                 | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |                                    |     |          |    |       |    |                             |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |



## Read Display Self-Diagnostic Result (0Fh)

| 0Fh                       | RDDSDR (Read Display Self-Diagnostic Result)                                                                                                                                                                                                                                                                                                                                               |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-----|----------|----|-------------------------------------------------------------------------|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|-------------------|-------------------------------------------|-------------------|------------------------------------------|-----|----------|-----|
|                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX                           | WRX | D [23:8] | D7 | D6                                                                      | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Command                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1                             | ↑   | XX       | 0  | 0                                                                       | 0  | 0  | 1  | 1  | 1  | 1  | 0Fh |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 1 <sup>st</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                             | 1   | XX       | X  | X                                                                       | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                             | 1   | XX       | D7 | D6                                                                      | D5 | D4 | 0  | 0  | 0  | D0 | XX  |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Description               | This command indicates the status of the display self-diagnostic results after the Sleep Out command, as described in the table below:                                                                                                                                                                                                                                                     |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | Bit                                                                                                                                                                                                                                                                                                                                                                                        | Description                   |     |          |    | Action                                                                  |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | D7                                                                                                                                                                                                                                                                                                                                                                                         | Register Loading Detection    |     |          |    | Invert the D7 bit when the OTP and register values are the same.        |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | D6                                                                                                                                                                                                                                                                                                                                                                                         | Functionality Detection       |     |          |    | Invert the D6 bit when the chip meets user's functionality requirements |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | D5                                                                                                                                                                                                                                                                                                                                                                                         | Chip Attachment Detection     |     |          |    | Set bit D5 to 0, if this function is not implemented.                   |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | D4                                                                                                                                                                                                                                                                                                                                                                                         | Display Glass Break Detection |     |          |    | Set bit D4 to 0, if this function is not implemented.                   |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | D3                                                                                                                                                                                                                                                                                                                                                                                         | Not Used                      |     |          |    | Set to 0                                                                |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | D2                                                                                                                                                                                                                                                                                                                                                                                         | Not Used                      |     |          |    | Set to 0                                                                |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | D1                                                                                                                                                                                                                                                                                                                                                                                         | Not Used                      |     |          |    | Set to 0                                                                |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | D0                                                                                                                                                                                                                                                                                                                                                                                         | Not Used                      |     |          |    | Set to 0                                                                |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| X = void                  |                                                                                                                                                                                                                                                                                                                                                                                            |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Restriction               | It is necessary to wait 300ms after the last write access to registers on the User area before the Bit D0 value can be read.                                                                                                                                                                                                                                                               |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.                                                                                                                                                                                                         |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                                                                                                                                                                                                          |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Register Availability     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                               |     |          |    |                                                                         |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes               | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                     | Availability                  |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                   | Yes                           |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                    | Yes                           |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                  | Yes                           |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                   | Yes                           |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Sleep In                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Default                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00<sub>HEX</sub></td></tr><tr><td>S/W Reset</td><td>00<sub>HEX</sub></td></tr><tr><td>H/W Reset</td><td>00<sub>HEX</sub></td></tr></table>                                                                                                                                                          |                               |     |          |    |                                                                         |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00 <sub>HEX</sub> | S/W Reset                               | 00 <sub>HEX</sub> | H/W Reset                                 | 00 <sub>HEX</sub> |                                          |     |          |     |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                     | Default Value                 |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | Power On Sequence                                                                                                                                                                                                                                                                                                                                                                          | 00 <sub>HEX</sub>             |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                  | 00 <sub>HEX</sub>             |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| H/W Reset                 | 00 <sub>HEX</sub>                                                                                                                                                                                                                                                                                                                                                                          |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
| Flow Chart                | <div><div>RDDSDR (0Fh)</div><div>Host</div><div>Driver</div><div>1st Parameter: Dummy Read<br/>2nd Parameter: Send D [7:0] display self-diagnostic status</div></div>                                                                                                                                                                                                                      |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |
|                           | <div><div>Legend</div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div>                                                                                                                                                                                                                                         |                               |     |          |    |                                                                         |    |    |    |    |    |    |     |        |               |                                          |                   |                                         |                   |                                           |                   |                                          |     |          |     |



## Sleep In (10h)

| 10h                                       | SLPIN (Sleep In)                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|---------------|-----------------------------------------|---------------|-------------------------------------------|---------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                    | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑   | XX       | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 10h |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Description                               | <p>This command causes the ILI9806H to enter the minimum power consumption mode.</p> <p>In this mode, the DC/DC converter, Internal oscillator, and panel scanning are all stopped.</p> <div><div>OUT</div><div>Blank</div><div>STOP</div></div> <p>The MPU interface and memory are still working, and the memory keeps its contents.</p> <p>X = Void</p>                                                                                             |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Restriction                               | <p>This command has no effect when the module is already in the Sleep In mode. To exit the Sleep In mode, only the Sleep Out Command (11h) is workable. It is necessary to wait 5msec before sending the next command; this is to allow time for the supply voltages and clock circuits to become stable. It is necessary to wait 120msec after sending the Sleep Out command (when in the Sleep In Mode) before the Sleep In command can be sent.</p> |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                             |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes           | Normal Mode On, Idle Mode On, Sleep Out | Yes           | Partial Mode On, Idle Mode Off, Sleep Out | Yes           | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Sleep In Mode</td></tr><tr><td>S/W Reset</td><td>Sleep In Mode</td></tr><tr><td>H/W Reset</td><td>Sleep In Mode</td></tr></table>                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Sleep In Mode | S/W Reset                               | Sleep In Mode | H/W Reset                                 | Sleep In Mode |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Power On Sequence                         | Sleep In Mode                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| S/W Reset                                 | Sleep In Mode                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| H/W Reset                                 | Sleep In Mode                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Flow Chart                                | <div><div><div>SPLIN (10h)</div><div>Display whole blank screen<br/>(Automatic No effect to DISP ON/OFF commands)</div><div>Drain charge from LCD panel</div></div><div><div>Stop DC/DC Converter</div><div>Stop Internal Oscillator</div><div>Sleep In Mode</div></div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |

## Sleep Out (11h)

| 11h                                       | SLPOUT (Sleep Out)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|---------------|-----------------------------------------|---------------|-------------------------------------------|---------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1   | ↑   | XX       | 0  | 0  | 0  | 1  | 0  | 0  | 0  | 1  | 11h |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Description                               | <p>This command turns off the sleep mode.</p> <p>In this mode, the DC/DC converter is enabled, the Internal oscillator is started, and the panel scanning is started.</p> <div><div>OUT</div><div>STOP</div><div>Blank</div><div>Memory Contents<br/>(DISPON 29h is set)</div></div> <p>X = Void</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Restriction                               | <p>This command has no effect when the module is already in the Sleep Out mode. To exit the Sleep Out Mode, Sleep In command (10h), S/W reset command (01h), and H/W reset are workable. It is necessary to wait 5msec before sending the next command; this is to allow time for the supply voltages and clock circuits to become stable.</p> <p>The ILI9806H loads all factory default values of the display supplier to the registers during this 5msec. There cannot be any abnormal visual effect on the display image if factory defaults and register values are the same when this load is done and when the ILI9806H is already in the Sleep Out mode.</p> <p>The ILI9806H performs self-diagnostic functions during this 5msec. It is necessary to wait 120msec after sending the Sleep In command (when in the Sleep Out mode) before the Sleep Out command can be sent.</p> |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes           | Normal Mode On, Idle Mode On, Sleep Out | Yes           | Partial Mode On, Idle Mode Off, Sleep Out | Yes           | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>Sleep In Mode</td></tr><tr><td>S/W Reset</td><td>Sleep In Mode</td></tr><tr><td>H/W Reset</td><td>Sleep In Mode</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Sleep In Mode | S/W Reset                               | Sleep In Mode | H/W Reset                                 | Sleep In Mode |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Power On Sequence                         | Sleep In Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| S/W Reset                                 | Sleep In Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| H/W Reset                                 | Sleep In Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Flow Chart                                | <div><div><div>SPLOUT (11h)</div><div>Start Internal Oscillator</div><div>Start up DC-DC Converter</div><div>Charge Offset voltage for LCD Panel</div></div><div><div>Display whole blank screen for 2 frames (Automatic No effect to DISP ON/OFF Commands)</div><div>Display Memory contents in accordance with the current command table settings</div><div>Sleep Out Mode</div></div><div><div>Legend</div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |

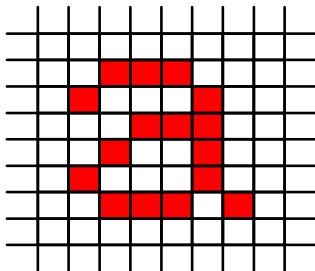
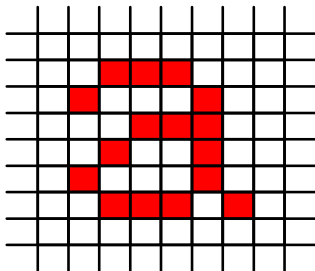
## Partial Mode On (12h)

| 12h                                       | PTLON (Partial Mode On)                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|---------------------|-----------------------------------------|---------------------|-------------------------------------------|---------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 12h |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Description                               | This command turns on the Partial Mode. The Partial Mode window is described in the Partial Area command (30H).<br>To leave the Partial Mode, the Normal Display Mode On command (13H) should be written.                                                                                                                                                                                  |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Restriction                               | This command has no effect when the Partial Display Mode is already active.                                                                                                                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                 | Normal Mode On, Idle Mode On, Sleep Out | Yes                 | Partial Mode On, Idle Mode Off, Sleep Out | Yes                 | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Normal Display Mode</td></tr><tr><td>S/W Reset</td><td>Normal Display Mode</td></tr><tr><td>H/W Reset</td><td>Normal Display Mode</td></tr></table>                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Normal Display Mode | S/W Reset                               | Normal Display Mode | H/W Reset                                 | Normal Display Mode |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Power On Sequence                         | Normal Display Mode                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| S/W Reset                                 | Normal Display Mode                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| H/W Reset                                 | Normal Display Mode                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |
| Flow Chart                                | See Partial Area (30h)                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                     |                                         |                     |                                           |                     |                                          |     |          |     |

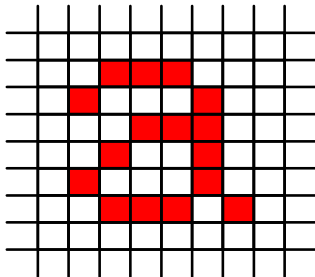
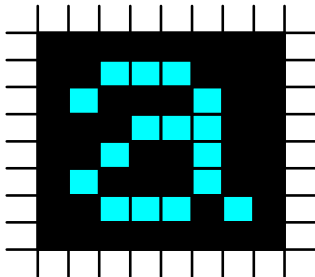
## Normal Display Mode On (13h)

| 13h                                       | NORON (Normal Display Mode On)                                                                                                                                                                                                                                                                                                                                                             |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|------------------------|-----------------------------------------|------------------------|-------------------------------------------|------------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 1  | 0  | 0  | 1  | 1  | 13h |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Description                               | This command returns the display to the Normal Display Mode. Normal Display Mode On means Partial Mode Off and Scroll mode off.<br><br>X = Void                                                                                                                                                                                                                                            |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Restriction                               | This command has no effect when the Normal Display Mode is active.                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                    | Normal Mode On, Idle Mode On, Sleep Out | Yes                    | Partial Mode On, Idle Mode Off, Sleep Out | Yes                    | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Normal Display Mode On</td></tr><tr><td>S/W Reset</td><td>Normal Display Mode On</td></tr><tr><td>H/W Reset</td><td>Normal Display Mode On</td></tr></table>                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Normal Display Mode On | S/W Reset                               | Normal Display Mode On | H/W Reset                                 | Normal Display Mode On |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Power On Sequence                         | Normal Display Mode On                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| S/W Reset                                 | Normal Display Mode On                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| H/W Reset                                 | Normal Display Mode On                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |
| Flow Chart                                | See Partial Area Descriptions for details of when to use this command.                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                        |                                         |                        |                                           |                        |                                          |     |          |     |

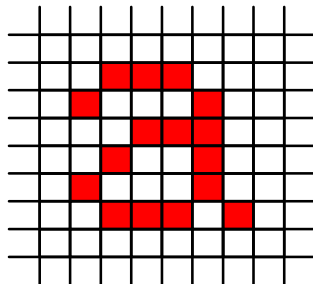
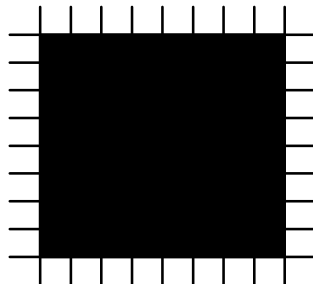
## Display Inversion Off (20h)

| 20h                                       | INVOFF (Display Inversion Off)                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----------------------|-----------------------------------------|-----------------------|-------------------------------------------|-----------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 0  | 20h |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Description                               | <p>This command is used to recover from the Display Inversion On mode.</p> <p>This command makes no change of the content of Frame Memory.</p> <p>This command does not change any other status.</p> <div><div><p>Memory</p></div><div><p>Display Panel</p></div></div> <p>X = Void</p> |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Restriction                               | This command has no effect when the module is already in the Display Inversion Off mode.                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                 |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                   | Normal Mode On, Idle Mode On, Sleep Out | Yes                   | Partial Mode On, Idle Mode Off, Sleep Out | Yes                   | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Display Inversion Off</td></tr><tr><td>S/W Reset</td><td>Display Inversion Off</td></tr><tr><td>H/W Reset</td><td>Display Inversion Off</td></tr></table>                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Display Inversion Off | S/W Reset                               | Display Inversion Off | H/W Reset                                 | Display Inversion Off |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Power On Sequence                         | Display Inversion Off                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| S/W Reset                                 | Display Inversion Off                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| H/W Reset                                 | Display Inversion Off                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Flow Chart                                | <div><div><p>Display Inversion On Mode</p><p>↓</p><p>INVOFF(20h)</p><p>↓</p><p>Display Inversion Off Mode</p></div><div><p>Legend</p><ul style="list-style-type: none"><li>Command</li><li>Parameter</li><li>Display</li><li>Action</li><li>Mode</li><li>Sequential transfer</li></ul></div></div>                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |

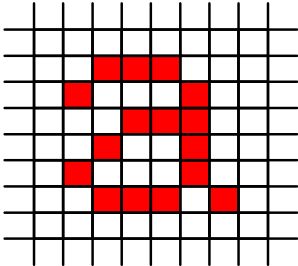
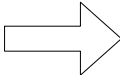
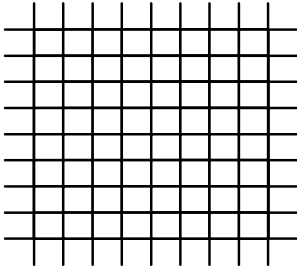
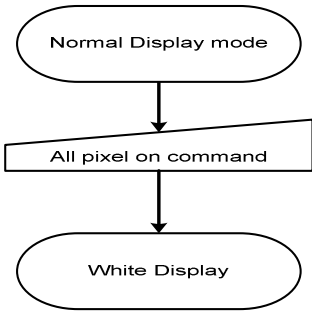
## Display Inversion On (21h)

| 21h                                       | INVON (Display Inversion ON)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----------------------|-----------------------------------------|-----------------------|-------------------------------------------|-----------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | RDX                                                                               | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                                                                                 | ↑   | XX       | 0  | 0  | 1  | 0  | 0  | 0  | 0  | 1  | 21h |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Description                               | <p>This command is used to enter the Display Inversion On mode.</p> <p>This command makes no change of the content of the Frame Memory. Every bit is inverted from the Frame Memory to the display.</p> <p>This command does not change any other status.</p> <p>To exit the Display Inversion On mode, the Display Inversion Off command (20h) should be written.</p> <div><div>Memory</div><div></div><div>→</div><div><div>Display Panel</div><div></div></div><p>X = Void</p></div> |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
|                                           | Restriction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | This command has no effect when the ILI9806H is already in the Inversion On mode. |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                 |                                                                                   |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                   | Normal Mode On, Idle Mode On, Sleep Out | Yes                   | Partial Mode On, Idle Mode Off, Sleep Out | Yes                   | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Display Inversion Off</td></tr><tr><td>S/W Reset</td><td>Display Inversion Off</td></tr><tr><td>H/W Reset</td><td>Display Inversion Off</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                   |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Display Inversion Off | S/W Reset                               | Display Inversion Off | H/W Reset                                 | Display Inversion Off |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Power On Sequence                         | Display Inversion Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| S/W Reset                                 | Display Inversion Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| H/W Reset                                 | Display Inversion Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |
| Flow Chart                                | <div><div><div>Display Inversion Off Mode</div><div>↓</div><div>INVON(21h)</div><div>↓</div><div>Display Inversion On Mode</div></div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                                                                                                                                                                                                                                                                                  |                                                                                   |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                       |                                         |                       |                                           |                       |                                          |     |          |     |

## All Pixel Off (22h)

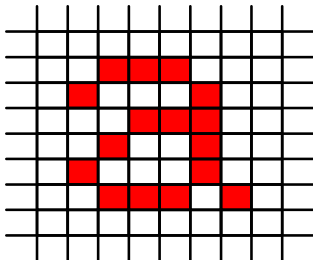
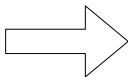
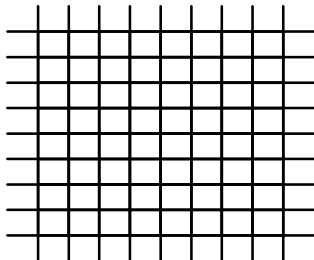
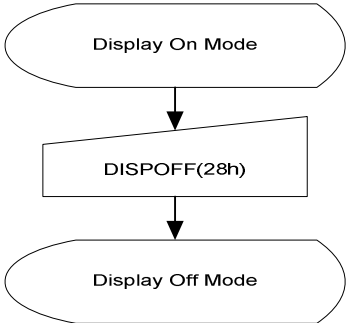
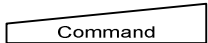
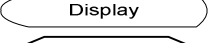
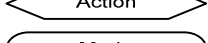
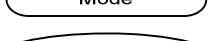
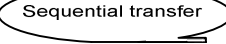
| 22h                                       | ALLPOFF (All pixels off)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | ↑   | XX       | 0  | 0  | 1  | 0  | 0  | 0  | 1  | 0  | 22h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command turns the display panel black in the Sleep Out mode and the status of the Display On/Off register can be ON or OFF. This command makes no change to the contents of the Frame Memory. This command does not change any other status.</p> <div><div><p>Memory</p></div><div><p>Display Panel</p></div></div> <p>To exit this mode, All Pixels On, Normal Display Mode On, or Partial Mode On commands can be used. The display panel shows the content of the Frame Memory after Normal Display Mode On and Partial Mode On commands.</p> |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | This command has no effect when the ILI9806H is already in the Display Inversion On mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                  |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>OFF</td></tr><tr><td>S/W Reset</td><td>OFF</td></tr><tr><td>H/W Reset</td><td>OFF</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | OFF | S/W Reset                               | OFF | H/W Reset                                 | OFF |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><p>Normal Display mode</p><p>↓</p><p>All pixel off command</p><p>↓</p><p>Black Display</p></div><div><p>Legend</p><ul style="list-style-type: none"><li>Command</li><li>Parameter</li><li>Display</li><li>Action</li><li>Mode</li><li>Sequential transfer</li></ul></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## All Pixel On (23h)

| 23h                                       | ALLPON (All pixels on)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1   | ↑   | XX       | 0  | 0  | 1  | 0  | 0  | 0  | 1  | 1  | 23h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command turns the display panel white in the Sleep Out mode and the status of the Display On/Off register can be ON or OFF. This command makes no change of contents of the Frame Memory. This command does not change any other status.</p> <div><div><p>Memory</p></div><div></div><div><p>Display Panel</p></div></div> <p>To exit this mode, All Pixels Off, Normal Display Mode On or Partial Mode On commands can be used. The display shows the content of the Frame Memory after Normal Display Mode On and Partial Mode On commands.</p> |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | This command has no effect when the ILI9806H is already in the Inversion on mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>OFF</td></tr><tr><td>S/W Reset</td><td>OFF</td></tr><tr><td>H/W Reset</td><td>OFF</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | OFF | S/W Reset                               | OFF | H/W Reset                                 | OFF |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | OFF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><pre>graph TD; A([Normal Display mode]) --&gt; B[/All pixel on command/]; B --&gt; C([White Display]);</pre></div><div><p>Legend</p><ul style="list-style-type: none"><li> Command</li><li> Parameter</li><li> Display</li><li> Action</li><li> Mode</li><li> Sequential transfer</li></ul></div></div>                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |



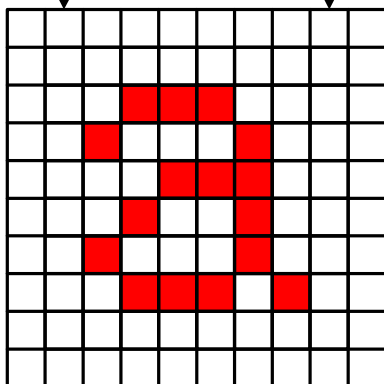
## Display Off (28h)

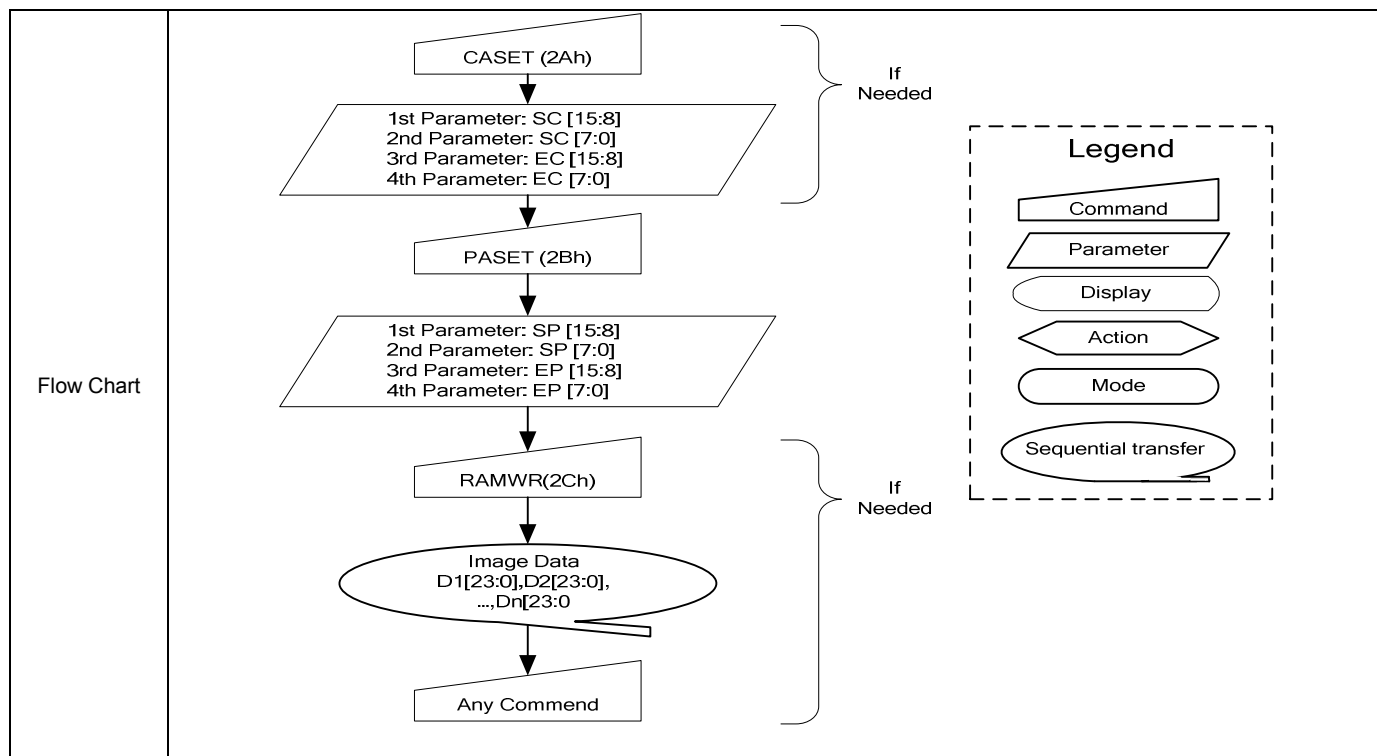
| 28h                                       | DISOFF (Display Off)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-------------|-----------------------------------------|-------------|-------------------------------------------|-------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | ↑   | XX       | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 0  | 28h |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Description                               | <p>This command is used to enter the Display Off mode. In this mode, the output from the Frame Memory is disabled and a blank page inserted.</p> <p>This command makes no change of contents of the Frame Memory and does not change any other status.</p> <p>There will be no abnormal visible effect on the display.</p> <div><div><p>Memory</p></div><div></div><div><p>Display Panel</p></div></div> <p>X = Void</p>                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Restriction                               | This command has no effect when the module is already in the Display Off mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes         | Normal Mode On, Idle Mode On, Sleep Out | Yes         | Partial Mode On, Idle Mode Off, Sleep Out | Yes         | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>Display Off</td></tr><tr><td>S/W Reset</td><td>Display Off</td></tr><tr><td>H/W Reset</td><td>Display Off</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Display Off | S/W Reset                               | Display Off | H/W Reset                                 | Display Off |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Power On Sequence                         | Display Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| S/W Reset                                 | Display Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| H/W Reset                                 | Display Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Flow Chart                                | <div><div><pre>graph TD; A([Display On Mode]) --&gt; B[/DISPOFF(28h)/]; B --&gt; C([Display Off Mode]);</pre></div><div><p>Legend</p><ul style="list-style-type: none"><li> Command</li><li> Parameter</li><li> Display</li><li> Action</li><li> Mode</li><li> Sequential transfer</li></ul></div></div> |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |

## Display ON (29h)

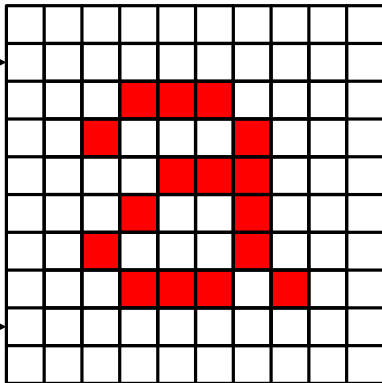
| 29h                                       | DISON (Display ON)                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-------------|-----------------------------------------|-------------|-------------------------------------------|-------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 1  | 0  | 1  | 0  | 0  | 1  | 29h |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Description                               | <p>This command is used to recover from the Display Off mode. Output from the Frame Memory is enabled.</p> <p>This command makes no change to the contents of the Frame Memory.</p> <p>This command does not change any other status.</p> <div><div><p>Memory</p></div><div></div><div><p>Display Panel</p></div></div> <p>X = Void</p>                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Restriction                               | This command has no effect when the ILI9806H is already in the Display On mode.                                                                                                                                                                                                                                                                                                            |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes         | Normal Mode On, Idle Mode On, Sleep Out | Yes         | Partial Mode On, Idle Mode Off, Sleep Out | Yes         | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Display Off</td></tr><tr><td>S/W Reset</td><td>Display Off</td></tr><tr><td>H/W Reset</td><td>Display Off</td></tr></table>                                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Display Off | S/W Reset                               | Display Off | H/W Reset                                 | Display Off |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Power On Sequence                         | Display Off                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| S/W Reset                                 | Display Off                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| H/W Reset                                 | Display Off                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |
| Flow Chart                                | <div><div></div><div><p>Legend</p><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                                                                                                                                            |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |             |                                          |     |          |     |

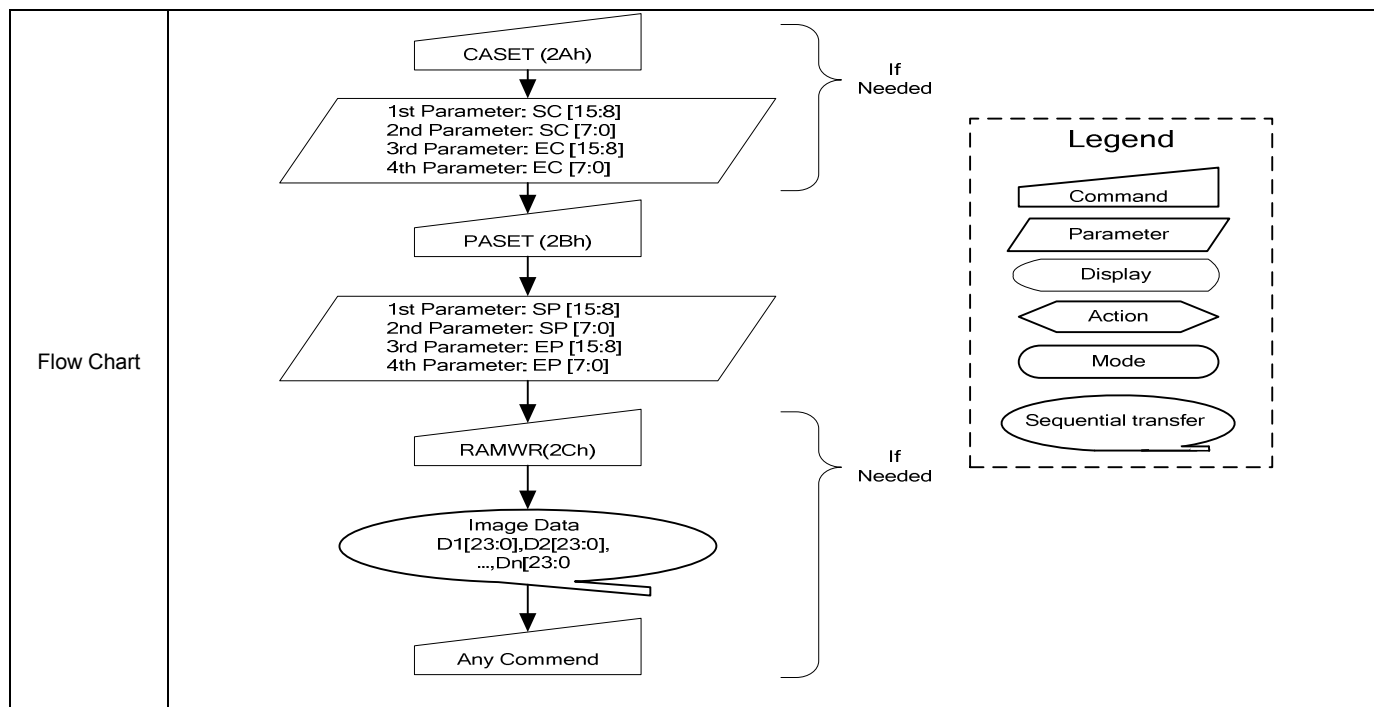
## Column Address Set (2Ah)

| 2Ah                                       | CASET (Column Address Set)                                                                                                                                                                                                                                                                                                                                                                                                                    |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|----------|-----------|----|----|----|----|----|----|----|-----|-----------|--------------|------------------------------------------|-----------|-----------------------------------------|-----------------|-------------------------------------------|-----------|------------------------------------------|-----------------|-----------|-----------|-----|-----------------|-----------|-----------|-----|-----------------|-----------|-----------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                           | RDX       | WRX       | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1         | ↑         | XX       | 0         | 0  | 1  | 0  | 1  | 0  | 1  | 0  | 2Ah |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1         | ↑         | XX       | SC [15:8] |    |    |    |    |    |    |    | XX  |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1         | ↑         | XX       | SC [7:0]  |    |    |    |    |    |    |    | XX  |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 3 <sup>rd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1         | ↑         | XX       | EC [15:8] |    |    |    |    |    |    |    | XX  |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 4 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1         | ↑         | XX       | EC [7:0]  |    |    |    |    |    |    |    | XX  |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Description                               | <p>This command is used to define the area of the frame memory the MPU can access. This command makes no change on the other status of the driver. When the RAMWR command is applied, the values of SC [15:0] and EC [15:0] are referred. Each value represents one column line in the Frame Memory.</p> <div><div>SC[15:0]</div><div>EC[15:0]</div></div> |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Restriction                               | <p>SC [15:0] must always be equal to or less than EC [15:0]. For example (480 (RGB) x 864 Resolution):</p> <p>When SC [15:0] or EC [15:0] is greater than 01DFh (when MADCTL's D5 = 0) or 035Fh (when MADCTL's D5 = 1), data out of range will be ignored.</p> <p><b>NOTE1 : The SC[15:0] and SC[15:0] – EC[15:0] + 1 must can be divisible by 2</b></p>                                                                                      |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                    |           |           |          |           |    |    |    |    |    |    |    |     | Status    | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes       | Normal Mode On, Idle Mode On, Sleep Out | Yes             | Partial Mode On, Idle Mode Off, Sleep Out | Yes       | Partial Mode On, Idle Mode On, Sleep Out | Yes             | Sleep In  | Yes       |     |                 |           |           |     |                 |           |           |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Default                                   | <table><tr><th>RSO [2:0]</th><th>Resolution</th><th>SC [15:0]</th><th>EC [15:0]</th></tr><tr><td>000</td><td>480 (RGB) x 864</td><td>0 x 0000h</td><td>0 x 01DFh</td></tr><tr><td>001</td><td>480 (RGB) x 854</td><td>0 x 0000h</td><td>0 x 01DFh</td></tr><tr><td>010</td><td>480 (RGB) x 800</td><td>0 x 0000h</td><td>0 x 01DFh</td></tr><tr><td>011</td><td>480 (RGB) x 640</td><td>0 x 0000h</td><td>0 x 01DFh</td></tr></table>         |           |           |          |           |    |    |    |    |    |    |    |     | RSO [2:0] | Resolution   | SC [15:0]                                | EC [15:0] | 000                                     | 480 (RGB) x 864 | 0 x 0000h                                 | 0 x 01DFh | 001                                      | 480 (RGB) x 854 | 0 x 0000h | 0 x 01DFh | 010 | 480 (RGB) x 800 | 0 x 0000h | 0 x 01DFh | 011 | 480 (RGB) x 640 | 0 x 0000h | 0 x 01DFh |
| RSO [2:0]                                 | Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                    | SC [15:0] | EC [15:0] |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 000                                       | 480 (RGB) x 864                                                                                                                                                                                                                                                                                                                                                                                                                               | 0 x 0000h | 0 x 01DFh |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 001                                       | 480 (RGB) x 854                                                                                                                                                                                                                                                                                                                                                                                                                               | 0 x 0000h | 0 x 01DFh |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 010                                       | 480 (RGB) x 800                                                                                                                                                                                                                                                                                                                                                                                                                               | 0 x 0000h | 0 x 01DFh |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 011                                       | 480 (RGB) x 640                                                                                                                                                                                                                                                                                                                                                                                                                               | 0 x 0000h | 0 x 01DFh |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |



## Page Address Set (2Bh)

| 2Bh                                       | PASET (Page Address Set)                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|----------|-----------|----|----|----|----|----|----|----|-----|-----------|--------------|------------------------------------------|-----------|-----------------------------------------|-----------------|-------------------------------------------|-----------|------------------------------------------|-----------------|-----------|-----------|-----|-----------------|-----------|-----------|-----|-----------------|-----------|-----------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | RDX       | WRX       | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1         | ↑         | XX       | 0         | 0  | 1  | 0  | 1  | 0  | 1  | 1  | 2Bh |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1         | ↑         | XX       | SP [15:8] |    |    |    |    |    |    |    | XX  |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1         | ↑         | XX       | SP [7:0]  |    |    |    |    |    |    |    | XX  |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 3 <sup>rd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1         | ↑         | XX       | EP [15:8] |    |    |    |    |    |    |    | XX  |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 4 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1         | ↑         | XX       | EP [7:0]  |    |    |    |    |    |    |    | XX  |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Description                               | This command is used to define the area of the frame memory the MPU can access. This command makes no change on the other status of the driver. The values of SP [15:0] and EP [15:0] are referred when RAMWR command is applied. Each value represents one Page line in the Frame Memory.                                                                                                                                                                          |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
|                                           | <div><div>SP[15:0] →</div><div></div><div>EP[15:0] →</div></div> <p>X = void</p>                                                                                                                                                                                                                                                                                                 |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Restriction                               | SP [15:0] must always be equal to or less than EP [15:0]. For example (480 (RGB) x 864 Resolution):<br>When SP [15:0] or EP [15:0] is greater than 035Fh (when MADCTL's D5 = 0) or 01DFh (when MADCTL's D5 = 1), data out of range will be ignored.<br><br><b>NOTE : The SP[15:0] and SP[15:0] - EP[15:0] + 1 must can be divisible by 2</b>                                                                                                                        |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table>                                            |           |           |          |           |    |    |    |    |    |    |    |     | Status    | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes       | Normal Mode On, Idle Mode On, Sleep Out | Yes             | Partial Mode On, Idle Mode Off, Sleep Out | Yes       | Partial Mode On, Idle Mode On, Sleep Out | Yes             | Sleep In  | Yes       |     |                 |           |           |     |                 |           |           |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |           |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| Default                                   | <table><thead><tr><th>RSO [2:0]</th><th>Resolution</th><th>SP [15:0]</th><th>EP [15:0]</th></tr></thead><tbody><tr><td>000</td><td>480 (RGB) x 864</td><td>0 x 0000h</td><td>0 x 035Fh</td></tr><tr><td>001</td><td>480 (RGB) x 854</td><td>0 x 0000h</td><td>0 x 0355h</td></tr><tr><td>010</td><td>480 (RGB) x 800</td><td>0 x 0000h</td><td>0 x 031Fh</td></tr><tr><td>011</td><td>480 (RGB) x 640</td><td>0 x 0000h</td><td>0 x 027Fh</td></tr></tbody></table> |           |           |          |           |    |    |    |    |    |    |    |     | RSO [2:0] | Resolution   | SP [15:0]                                | EP [15:0] | 000                                     | 480 (RGB) x 864 | 0 x 0000h                                 | 0 x 035Fh | 001                                      | 480 (RGB) x 854 | 0 x 0000h | 0 x 0355h | 010 | 480 (RGB) x 800 | 0 x 0000h | 0 x 031Fh | 011 | 480 (RGB) x 640 | 0 x 0000h | 0 x 027Fh |
| RSO [2:0]                                 | Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                                          | SP [15:0] | EP [15:0] |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 000                                       | 480 (RGB) x 864                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0 x 0000h | 0 x 035Fh |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 001                                       | 480 (RGB) x 854                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0 x 0000h | 0 x 0355h |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 010                                       | 480 (RGB) x 800                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0 x 0000h | 0 x 031Fh |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |
| 011                                       | 480 (RGB) x 640                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0 x 0000h | 0 x 027Fh |          |           |    |    |    |    |    |    |    |     |           |              |                                          |           |                                         |                 |                                           |           |                                          |                 |           |           |     |                 |           |           |     |                 |           |           |



## Memory Write (2Ch)

| 2Ch                                       | RAMWR (Memory Write)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|------------------------------------|-----------------------------------------|------------------------------------|-------------------------------------------|------------------------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | RDX | WRX | D [23:8]  | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1   | ↑   | XX        | 0  | 0  | 1  | 0  | 1  | 1  | 0  | 0  | 2Ch |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1   | ↑   | D1 [23:0] |    |    |    |    |    |    |    |    | XX  |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| :                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1   | ↑   | Dx [23:0] |    |    |    |    |    |    |    |    | XX  |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| N <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1   | ↑   | Dn [23:0] |    |    |    |    |    |    |    |    | XX  |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Description                               | <p>This command transfers data from the MPU to the Frame Memory. This command makes no change to the other status of the driver. When this command is accepted, the column register and the page register are reset to the Start Column (SC) and the Start Page (SP) positions. The Start Column and Start Page positions are different in accordance with the MADCTL setting. Then D [23:0] is stored in the Frame Memory, and the column register and the page register are incremented at the same time. Sending any other commands can stop the frame Write.</p> <p>X = void.</p> |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Restriction                               | <p>There is no restriction on the length of parameters.</p> <p><b>NOTE1 :</b> <i>command 2C + 3C must write even line data that can wire to memory.</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table>                                                                                                                                                              |     |     |           |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                | Normal Mode On, Idle Mode On, Sleep Out | Yes                                | Partial Mode On, Idle Mode Off, Sleep Out | Yes                                | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>Contents of memory is set randomly</td></tr><tr><td>S/W Reset</td><td>Contents of memory is set randomly</td></tr><tr><td>H/W Reset</td><td>Contents of memory is set randomly</td></tr></tbody></table>                                                                                                                                                                                                                                                                 |     |     |           |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Contents of memory is set randomly | S/W Reset                               | Contents of memory is set randomly | H/W Reset                                 | Contents of memory is set randomly |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Power On Sequence                         | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| S/W Reset                                 | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| H/W Reset                                 | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RAMWR(2Ch)</div><div>Image Data<br/>D1[23:0],D2[23:0],<br/>...,Dn[23:0]</div><div>Any Command</div></div><div><div>Legend</div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                                                                                                                                                                                                                                      |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |

## Memory Read (2Eh)

| 2Eh                                       | RAMRD (Memory Read)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|------------------------------------|-----------------------------------------|------------------------------------|-------------------------------------------|------------------------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8]  | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX        | 0  | 0  | 1  | 0  | 1  | 1  | 1  | 0  | 2Eh |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX        | X  | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | D1 [23:0] |    |    |    |    |    |    |    |    | XX  |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| :                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | Dx [23:0] |    |    |    |    |    |    |    |    | XX  |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| (N+1) <sup>th</sup> Parameter             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | Dn [23:0] |    |    |    |    |    |    |    |    | XX  |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Description                               | <p>The command transfers image data from the Frame Memory to the MPU. This command makes no change to the other status of the driver. When this command is accepted, the column register and the page register are reset to the Start Column (SC) and the Start Page (SP) positions.</p> <p>The Start Column and Start Page positions are different in accordance with the MADCTL setting.</p> <p>Then D [23:0] is read back from the Frame Memory, and the column register and the page register are incremented at the same time. Sending any other command can stop the frame read.</p> <p>X = void</p> |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Restriction                               | <p>There is no restriction on the length of parameters.</p> <p><b>NOTE: Read memory data is real memory data after memory compression (not image data)</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table>                                                                                                                                                                                   |     |     |           |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                | Normal Mode On, Idle Mode On, Sleep Out | Yes                                | Partial Mode On, Idle Mode Off, Sleep Out | Yes                                | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>Contents of memory is set randomly</td></tr><tr><td>S/W Reset</td><td>Contents of memory is set randomly</td></tr><tr><td>H/W Reset</td><td>Contents of memory is set randomly</td></tr></tbody></table>                                                                                                                                                                                                                                                                                      |     |     |           |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Contents of memory is set randomly | S/W Reset                               | Contents of memory is set randomly | H/W Reset                                 | Contents of memory is set randomly |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Power On Sequence                         | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| S/W Reset                                 | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| H/W Reset                                 | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RAMRD(2Eh)</div><div>Dummy</div><div>Image Data<br/>D1[23:0],D2[23:0],<br/>...,Dn[23:0]</div><div>Any Command</div></div><div><div>Legend</div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                                                                                                                                                                                                                                           |     |     |           |    |    |    |    |    |    |    |    |     |        |               |                                          |                                    |                                         |                                    |                                           |                                    |                                          |     |          |     |

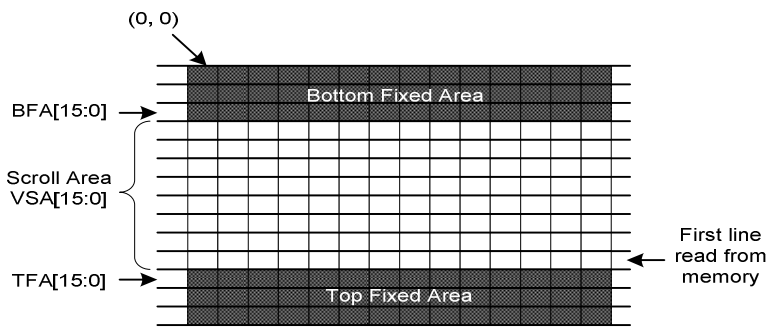


## Partial Area (30h)

| 30h                       | PLTAR (Partial Area)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |           |    |    |    |    |    |    |    |     |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|
|                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |
| Command                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1   | ↑   | XX       | 0         | 0  | 1  | 1  | 0  | 0  | 0  | 0  | 30h |
| 1 <sup>st</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1   | ↑   | XX       | SR [15:8] |    |    |    |    |    |    |    | XX  |
| 2 <sup>nd</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1   | ↑   | XX       | SR [7:0]  |    |    |    |    |    |    |    | XX  |
| 3 <sup>rd</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1   | ↑   | XX       | ER [15:8] |    |    |    |    |    |    |    | XX  |
| 4 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1   | ↑   | XX       | ER [7:0]  |    |    |    |    |    |    |    | XX  |
| Description               | <p>This command defines the module's partial display area. There are two parameters associated with this command. The first defines the Start Row (SR) and the second the End Row (ER), as illustrated in the following figure. SR and ER refer to the Frame Memory line pointer.</p> <p>If End Row &gt; Start Row when MADCTL D4 = 0.</p> <div><div><div>Start Row<br/>SR[15:0] →</div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div></div> |     |     |          |           |    |    |    |    |    |    |    |     |

| Register Availability                     | <table border="1"> <thead> <tr> <th>Status</th><th>Availability</th></tr> </thead> <tbody> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr> <td>Sleep In</td><td>Yes</td></tr> </tbody> </table> | Status | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <p>1. To Enter the Partial Mode</p> <p>2. To Leave the Partial Mode</p> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li>Command (trapezoid)</li> <li>Parameter (parallelogram)</li> <li>Display (rounded rectangle)</li> <li>Action (pentagon)</li> <li>Mode (oval)</li> <li>Sequential transfer (oval with arrow)</li> </ul>                                                                                                            |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

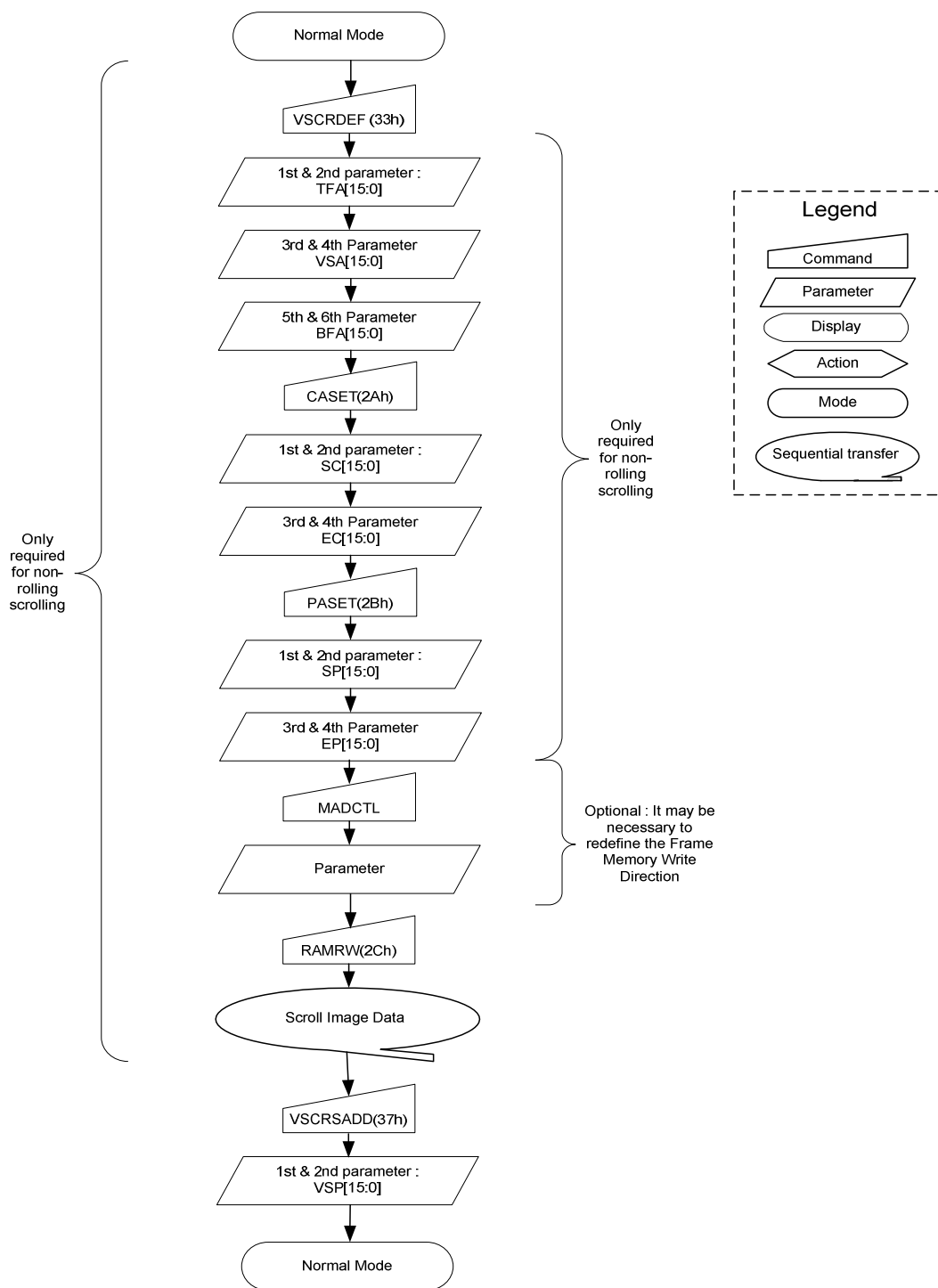
## Vertical Scrolling Definition (33h)

| 33h                       | VSCRDEF (Vertical Scrolling Definition)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |            |    |    |    |    |    |    |    |     |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|------------|----|----|----|----|----|----|----|-----|
|                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | RDX | WRX | D [23:8] | D7         | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |
| Command                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1   | ↑   | XX       | 0          | 0  | 1  | 1  | 0  | 0  | 1  | 1  | 33h |
| 1 <sup>st</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1   | ↑   | XX       | TFA [15:8] |    |    |    |    |    |    |    | XX  |
| 2 <sup>nd</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1   | ↑   | XX       | TFA [7:0]  |    |    |    |    |    |    |    | XX  |
| 3 <sup>rd</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1   | ↑   | XX       | VSA [15:8] |    |    |    |    |    |    |    | XX  |
| 4 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1   | ↑   | XX       | VSA [7:0]  |    |    |    |    |    |    |    | XX  |
| 5 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1   | ↑   | XX       | BFA [15:8] |    |    |    |    |    |    |    | XX  |
| 6 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1   | ↑   | XX       | BFA [7:0]  |    |    |    |    |    |    |    | XX  |
| Description               | This command defines the display vertical scrolling area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |            |    |    |    |    |    |    |    |     |
|                           | <p><b>Memory Access Control (36h) D4 = 0:</b></p> <p>The 1<sup>st</sup> &amp; 2<sup>nd</sup> parameters, TFA [15:0], describe the Top Fixed Area in number of lines from the top of the Frame Memory. The top of the Frame Memory and top of the display device are aligned.</p> <p>The 3<sup>rd</sup> &amp; 4<sup>th</sup> parameters, VSA [15:0], describe the height of the Vertical Scrolling Area in number of lines of the Frame Memory from the Vertical Scrolling Start Address. The first line of the Vertical Scrolling Area starts immediately after the bottom most line of the Top Fixed Area. The last line of the Vertical Scrolling Area ends immediately before the top most line of the Bottom Fixed Area.</p> <p>The 5<sup>th</sup> &amp; 6<sup>th</sup> parameters, BFA [15:0], describe the Bottom Fixed Area in number of lines from the bottom of the Frame Memory. The bottom of the Frame Memory and bottom of the display device are aligned.</p> <p>TFA, VSA, and BFA refer to the Frame Memory Line Pointer.</p> <div></div> |     |     |          |            |    |    |    |    |    |    |    |     |
| Description               | <p><b>Memory Access Control (36h) D4 = 1:</b></p> <p>The 1<sup>st</sup> &amp; 2<sup>nd</sup> parameters, TFA [15:0], describe the Top Fixed Area in number of lines from the bottom of the Frame Memory. The bottom of the Frame Memory and bottom of the display device are aligned.</p> <p>The 3<sup>rd</sup> &amp; 4<sup>th</sup> parameters, VSA [15:0], describe the height of the Vertical Scrolling Area in number of lines of the Frame Memory from the Vertical Scrolling Start Address. The first line of the Vertical Scrolling Area starts immediately after the top most line of the Top Fixed Area. The last line of the Vertical Scrolling Area ends immediately before the bottom most line of the Bottom Fixed Area.</p> <p>The 5<sup>th</sup> &amp; 6<sup>th</sup> parameters, BFA [15:0], describe the Bottom Fixed Area in number of lines from the top of the Frame Memory. The top of the Frame Memory and top of the display device are aligned.</p> <p>TFA, VSA and BFA refer to the Frame Memory Line Pointer.</p> <div></div>  |     |     |          |            |    |    |    |    |    |    |    |     |

| Restriction                               | <p>The sum of TFA, VSA and BFA must equal the number of the display device's horizontal lines; otherwise, the Scrolling mode is undefined. In the Vertical Scroll mode, Memory Access Control (36h) D5 should be set to 0 – this only affects the Frame Memory write.</p> <p><b>NOTE: The TFA[15:0] ,VSA[15:0], BFA[15:0], must can be divisible by 2</b></p>                                                                                                       |             |              |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|------------------------------------------|-------------|-----------------------------------------|-----------|-------------------------------------------|-----------|------------------------------------------|-----------|-----------|-----------|-----------------|-----------|-----------|-----------|-----------------|-----------|-----------|-----------|
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                          | Status      | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes         | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes       | Partial Mode On, Idle Mode On, Sleep Out | Yes       | Sleep In  | Yes       |                 |           |           |           |                 |           |           |           |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                        |             |              |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |              |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |              |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |              |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |              |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |             |              |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| Default                                   | <table><tr><th>Resolution</th><th>TFA [15..0]</th><th>VSA [15..0]</th><th>BFA [15..0]</th></tr><tr><td>480 (RGB) x 864</td><td>0 x 0000h</td><td>0 x 0360h</td><td>0 x 0000h</td></tr><tr><td>480 (RGB) x 854</td><td>0 x 0000h</td><td>0 x 0356h</td><td>0 x 0000h</td></tr><tr><td>480 (RGB) x 800</td><td>0 x 0000h</td><td>0 x 0320h</td><td>0 x 0000h</td></tr><tr><td>480 (RGB) x 640</td><td>0 x 0000h</td><td>0 x 0280h</td><td>0 x 0000h</td></tr></table> | Resolution  | TFA [15..0]  | VSA [15..0]                              | BFA [15..0] | 480 (RGB) x 864                         | 0 x 0000h | 0 x 0360h                                 | 0 x 0000h | 480 (RGB) x 854                          | 0 x 0000h | 0 x 0356h | 0 x 0000h | 480 (RGB) x 800 | 0 x 0000h | 0 x 0320h | 0 x 0000h | 480 (RGB) x 640 | 0 x 0000h | 0 x 0280h | 0 x 0000h |
| Resolution                                | TFA [15..0]                                                                                                                                                                                                                                                                                                                                                                                                                                                         | VSA [15..0] | BFA [15..0]  |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| 480 (RGB) x 864                           | 0 x 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 x 0360h   | 0 x 0000h    |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| 480 (RGB) x 854                           | 0 x 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 x 0356h   | 0 x 0000h    |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| 480 (RGB) x 800                           | 0 x 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 x 0320h   | 0 x 0000h    |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |
| 480 (RGB) x 640                           | 0 x 0000h                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0 x 0280h   | 0 x 0000h    |                                          |             |                                         |           |                                           |           |                                          |           |           |           |                 |           |           |           |                 |           |           |           |

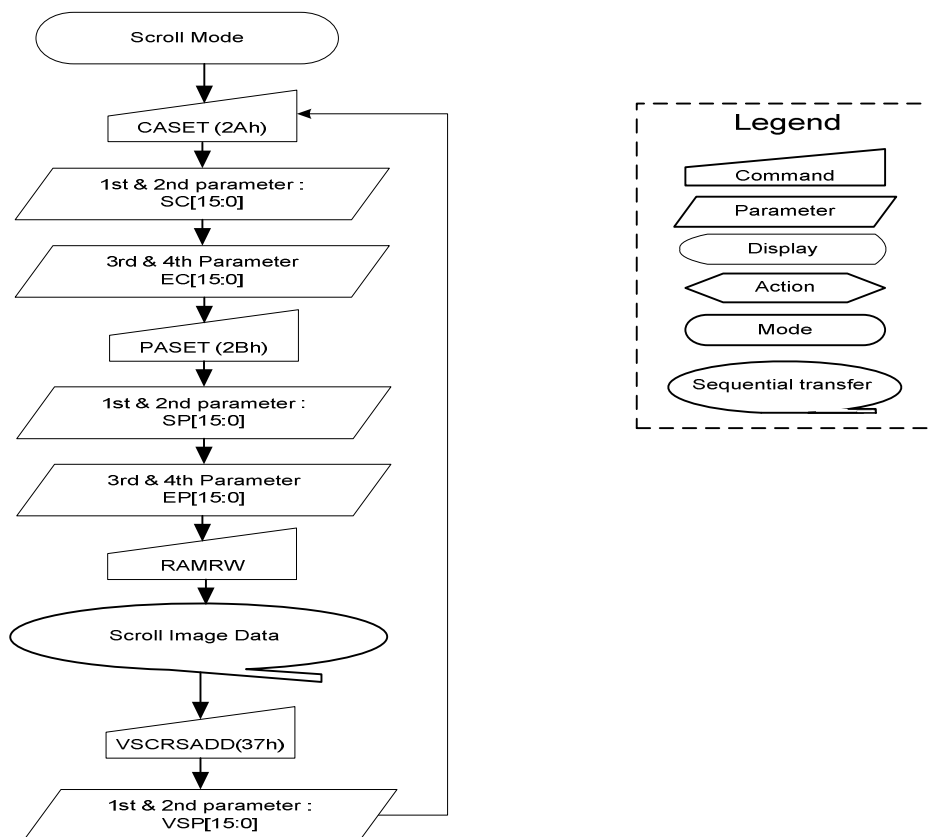
1. To enter the Vertical Scroll Mode:

Flow Chart

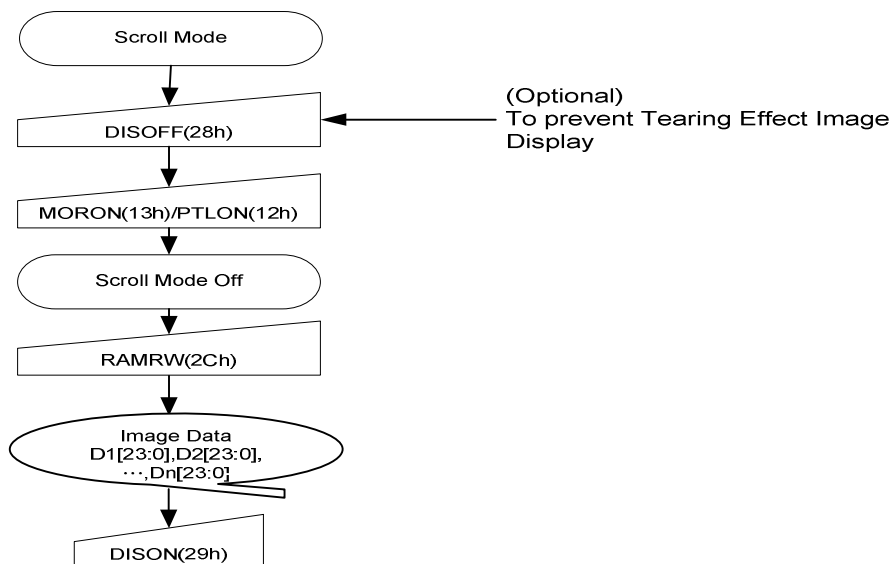


Since the value of the Vertical Scrolling Start Address is absolute with reference to the Frame Memory, it must not enter the fixed area; otherwise, an undesirable image may appear on the Display Panel.

2. Continuous Scroll :



3. To Leave Vertical Scroll Mode:

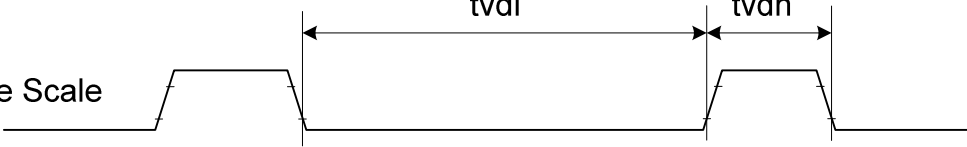


Note: To exit the Scroll Mode, both Normal Display Mode On (13h) and Partial Mode On (12h) commands can be used.

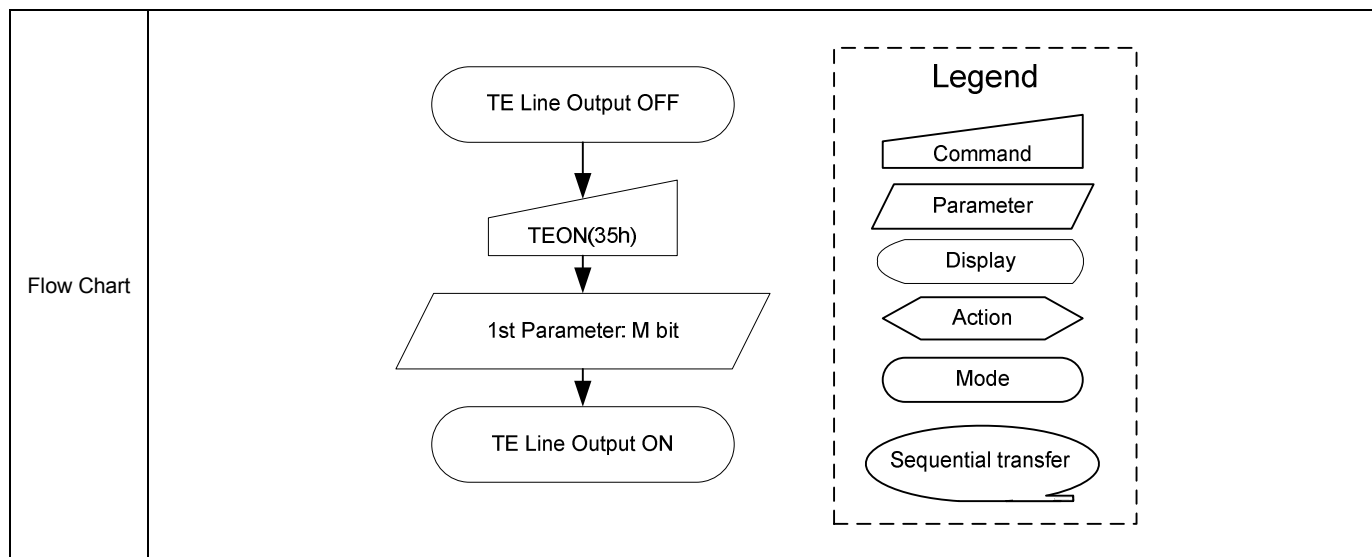
## Tearing Effect Line OFF (34h)

| 34h                                       | TEOFF (Tearing Effect Line OFF)                                                                                                                                                                                                                                                                                                                                                            |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 0  | 34h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command is used to turn off the Display module's Tearing Effect output signal (Active Low) on the TE signal line.                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | This command has no effect when the Tearing Effect output is already OFF.                                                                                                                                                                                                                                                                                                                  |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Off</td></tr><tr><td>S/W Reset</td><td>Off</td></tr><tr><td>H/W Reset</td><td>Off</td></tr></table>                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Off | S/W Reset                               | Off | H/W Reset                                 | Off |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | Off                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | Off                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | Off                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>TE Line Output ON</div><div>↓</div><div>TEOFF(34h)</div><div>↓</div><div>TE Line Output OFF</div></div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                                  |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Tearing Effect Line ON (35h)

| 35h                                       | TEON (Tearing Effect Line ON)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|-------------------|------------------------------------------|-----------|-----------------------------------------|-----------|-------------------------------------------|-----|------------------------------------------|-----|----------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | RDX                                                                                                                                                                                                                                                                                                                                                                                                                      | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑   | XX       | 0  | 0  | 1  | 1  | 0  | 1  | 0  | 1  | 35h |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Parameter                                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑   | XX       | X  | X  | X  | X  | X  | X  | X  | M  | XX  |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Description                               | <p>This command is used to turn ON the Tearing Effect output signal on the TE signal line. Changing the MADCTL bit B4 will not affect this output. The Tearing Effect Line On has one parameter, which describes the mode of the Tearing Effect Output Line.</p> <p>When <b>M = 0</b>: The Tearing Effect Output line consists of V-Blanking information only:</p> <div><p>Vertical Time Scale</p></div> <p>When <b>M = 1</b>: The Tearing Effect Output Line consists of both V-Blanking and H-Blanking information:</p> <div><p>Vertical Time Scale</p></div> <p>Note: During the Sleep In Mode with Tearing Effect Line On, Tearing Effect Output pin will be active Low.</p> <p>X = void</p> |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
|                                           | Restriction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | This command has no effect when the Tearing Effect output is already OFF.                                                                                                                                                                                                                                                                                                                                                |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
|                                           | Register Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table> |     |          |    |    |    |    |    |    |    |    |     |        | Status        | Availability      | Normal Mode On, Idle Mode Off, Sleep Out | Yes       | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>Off</td></tr><tr><td>S/W Reset</td><td>Off</td></tr><tr><td>H/W Reset</td><td>Off</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence | Off                                      | S/W Reset | Off                                     | H/W Reset | Off                                       |     |                                          |     |          |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| Power On Sequence                         | Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| S/W Reset                                 | Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |
| H/W Reset                                 | Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |          |    |    |    |    |    |    |    |    |     |        |               |                   |                                          |           |                                         |           |                                           |     |                                          |     |          |





## Memory Access Control (36h)

| 36h       | MADCTL (Memory Access Control) |     |     |          |    |    |    |    |     |    |    |    |     |
|-----------|--------------------------------|-----|-----|----------|----|----|----|----|-----|----|----|----|-----|
|           | DCX                            | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3  | D2 | D1 | D0 | HEX |
| Command   | 0                              | 1   | ↑   | XX       | 0  | 0  | 1  | 1  | 0   | 1  | 1  | 0  | 36h |
| Parameter | 1                              | 1   | ↑   | XX       | MY | MX | MV | ML | BGR | MH | SS | GS | XX  |

This command defines read/write scanning direction of the Frame Memory.

This command makes no change on the other status of the driver.

| Bit | Symbol | Name                     | Description                                                                               |
|-----|--------|--------------------------|-------------------------------------------------------------------------------------------|
| D7  | MY     | Row Address Order        | These 3 bits control the write/read direction from the MPU to memory                      |
| D6  | MX     | Column Address Order     |                                                                                           |
| D5  | MV     | Row/Column Exchange      |                                                                                           |
| D4  | ML     | Vertical Refresh Order   | LCD vertical refresh direction control                                                    |
| D3  | BGR    | RGB-BGR Order            | Color selector switch control<br>(0 = RGB color filter panel, 1 = BGR color filter panel) |
| D2  | MH     | Horizontal Refresh Order | LCD horizontal refreshing direction control                                               |
| D1  | SS     | Flip Horizontal(SS)      | Select the Source driver scan direction on the panel module                               |
| D0  | GS     | Flip Vertical (GS)       | Select the Gate driver scan direction on the panel module                                 |

Note : GS scan direction usage depends on the design of the Panel.

Top-Left (0,0) means the physical memory location

MY (Page Address Order)="0"

Top Left MCU data

Top Left Frame memory

SC → EC

SP ↓ EP

MY (Page Address Order)="1"

Top Left MCU data

Top Left Frame memory

SC → EC

SP ↓ EP

MX (Column Address Order)="0"

Top Left MCU data

Top Left Frame memory

SC → EC

SP ↓ EP

MX (Column Address Order)="1"

Top Left MCU data

Top Left Frame memory

EC ← SC

SP ↓ EP

MV (Vertical Refresh Order bit)="0"

Top Left MCU data

Top Left Frame memory

SC → EC

SP ↓ EP

MV (Vertical Refresh Order bit)="1"

Top Left MCU data

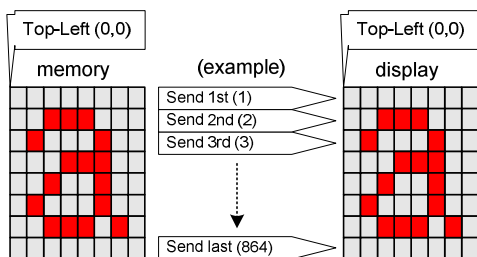
Top Left Frame memory

SP → EP

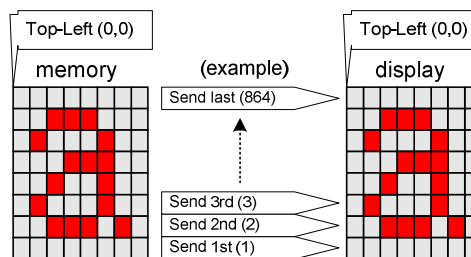
SC ↓ EC

Description

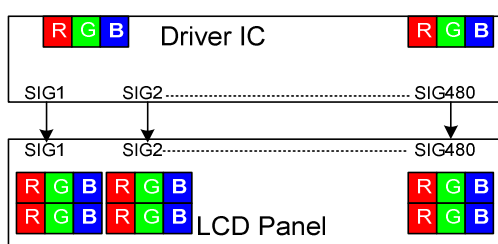
**ML (Vertical refresh order bit)="0"**



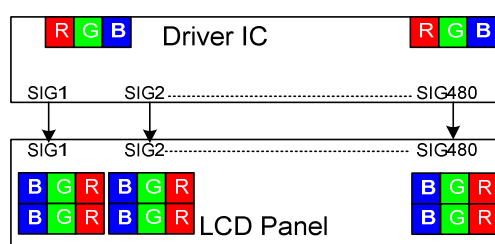
**ML (Vertical refresh order bit)="1"**



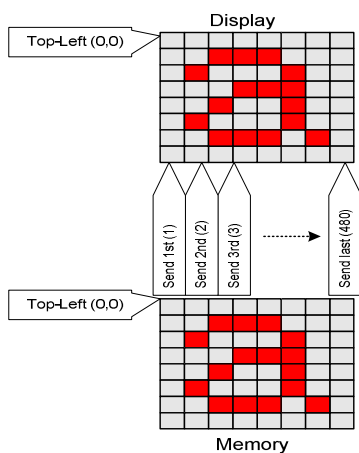
**BGR (RGB-BGR Order control bit)="0"**



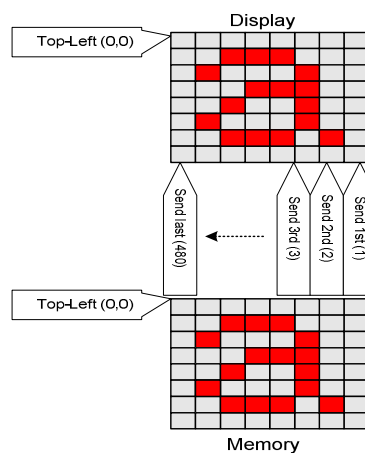
**BGR (RGB-BGR Order control bit)="1"**



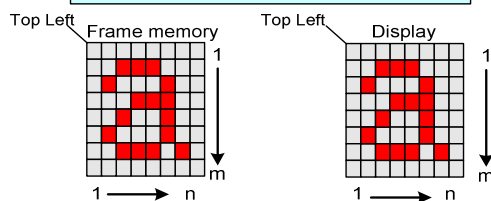
**MH (Horizontal refresh order control bit)="0"**



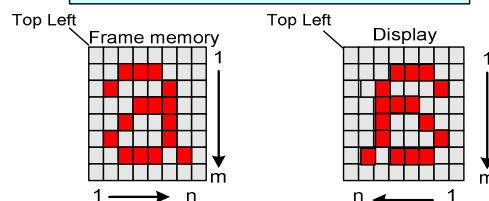
**MH (Horizontal refresh order control bit)="1"**



**SS (Source Scan sequence)="0"**



**SS (Source Scan sequence)="1"**



|                                           | <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>GS (Gate Scan sequence)="0"</p> </div> <div style="text-align: center;"> <p>GS (Gate Scan sequence)="1"</p> </div> </div>                                                                                                                                                                                                                           |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----------|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| Register Availability                     | <table border="1"> <thead> <tr> <th>Status</th><th>Availability</th></tr> </thead> <tbody> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr> <td>Sleep In</td><td>Yes</td></tr> </tbody> </table> | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| Default                                   | <table border="1"> <thead> <tr> <th>Status</th><th>Default Value</th></tr> </thead> <tbody> <tr> <td>Power On Sequence</td><td>00h</td></tr> <tr> <td>S/W Reset</td><td>No change</td></tr> <tr> <td>H/W Reset</td><td>00h</td></tr> </tbody> </table>                                                                                                                                                                                               | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | No change | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| S/W Reset                                 | No change                                                                                                                                                                                                                                                                                                                                                                                                                                            |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div style="display: flex; align-items: center; justify-content: center;"> <div style="text-align: center;"> </div> <div style="border: 1px dashed black; padding: 10px; margin-left: 20px;"> <p><b>Legend</b></p> <ul style="list-style-type: none"> <li> Command</li> <li> Parameter</li> <li> Display</li> <li> Action</li> <li> Mode</li> <li> Sequential transfer</li> </ul> </div> </div>                                                      |        |               |                                          |     |                                         |           |                                           |     |                                          |     |          |     |

## Vertical Scrolling Start Address (37h)

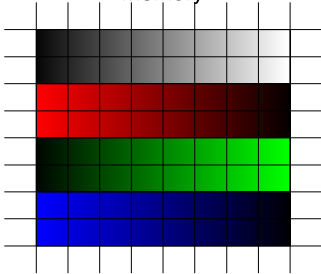
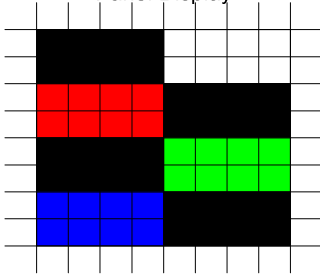
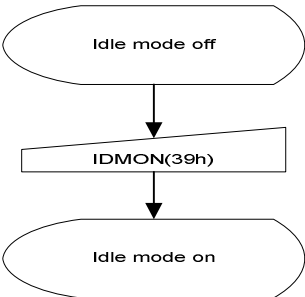
| 37h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | VSCRSADD (Vertical Scrolling Start Address)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|------------|----|----|----|----|----|----|----|-----|-----|-----|----|----|---|----|----|-----|-----|-----|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D [23:8] | D7         | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |     |     |    |    |   |    |    |     |     |     |
| Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1   | ↑   | XX       | 0          | 0  | 1  | 1  | 0  | 1  | 1  | 1  | 37h |     |     |    |    |   |    |    |     |     |     |
| 1 <sup>st</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1   | ↑   | XX       | VSP [15:8] |    |    |    |    |    |    |    | XX  |     |     |    |    |   |    |    |     |     |     |
| 2 <sup>nd</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1   | ↑   | XX       | VSP [7:0]  |    |    |    |    |    |    |    | XX  |     |     |    |    |   |    |    |     |     |     |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>This command is used together with the Vertical Scrolling Definition (33h). These two commands describe the scrolling area and the scrolling mode. The Vertical Scrolling Start Address command has one parameter which describes the address of the line in the Frame Memory that will be written as the first line after the last line of the Top Fixed Area on the display, as illustrated below.</p> <p>When MADCTL D4 = 0</p> <p>Example: When Top Fixed Area = Bottom Fixed Area = 00, Vertical Scrolling Area = 864 and VSP= 3</p> <div><div><p>Frame Memory</p><p>(0, 0) →</p><p>Line Pointer VSP[15:0] →</p><p>(0, 863) →</p></div><div><p>Pointer B4=0</p><table><tr><td>0</td></tr><tr><td>1</td></tr><tr><td>2</td></tr><tr><td>3</td></tr><tr><td>4</td></tr><tr><td>..</td></tr><tr><td>..</td></tr><tr><td>861</td></tr><tr><td>862</td></tr><tr><td>863</td></tr></table></div><div><p>Display</p></div></div> |     |     |          |            |    |    |    |    |    |    |    |     | 0   | 1   | 2  | 3  | 4 | .. | .. | 861 | 862 | 863 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| ..                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| ..                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 861                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 862                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 863                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| <p>When MADCTL D4=1</p> <p>Example: When Top Fixed Area = Bottom Fixed Area = 00, Vertical Scrolling Area = 864 and VSP= 3</p> <div><div><p>Frame Memory</p><p>(0, 0) →</p><p>Line Pointer VSP[15:0] →</p><p>(0, 863) →</p></div><div><p>Pointer B4=1</p><table><tr><td>863</td></tr><tr><td>862</td></tr><tr><td>861</td></tr><tr><td>..</td></tr><tr><td>..</td></tr><tr><td>4</td></tr><tr><td>3</td></tr><tr><td>2</td></tr><tr><td>1</td></tr><tr><td>0</td></tr></table></div><div><p>Display</p></div></div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    | 863 | 862 | 861 | .. | .. | 4 | 3  | 2  | 1   | 0   |     |
| 863                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 862                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 861                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| ..                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| ..                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| <p>Note: When the new Pointer position and Picture Data are sent, the result on the display will appear at the next Panel Scan to avoid tearing effect.</p> <p>VSP refers to the Frame Memory line Pointer.</p> <p>X = void</p>                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |
| Restriction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <p>Since the value of the Vertical Scrolling Start Address is absolute (with reference to the Frame Memory), it must not enter the fixed area (defined by Vertical Scrolling Definition (33h)). Otherwise, undesirable image will occur on the Panel.</p> <p><b>NOTE: The VSP[15:0] must can be divisible by 2</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |            |    |    |    |    |    |    |    |     |     |     |    |    |   |    |    |     |     |     |

| Register Availability                     | <table> <tr> <th>Status</th><th>Availability</th></tr> <tr> <td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr> <td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr> <td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr> <tr> <td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr> <tr> <td>Sleep In</td><td>Yes</td></tr> </table> | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                            |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table> <tr> <th>Status</th><th>Default Value</th></tr> <tr> <td>Power On Sequence</td><td>00h</td></tr> <tr> <td>S/W Reset</td><td>00h</td></tr> <tr> <td>H/W Reset</td><td>00h</td></tr> </table>                                                                                                                                                                                                     | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                           |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                                     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | See Vertical Scrolling Definition (33h) description.                                                                                                                                                                                                                                                                                                                                                    |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Idle Mode Off (38h)

| 38h                                       | IDMOFF (Idle Mode Off)                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|---------------|-----------------------------------------|---------------|-------------------------------------------|---------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 1  | 1  | 1  | 0  | 0  | 0  | 38h |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Description                               | This command causes the Display module to exit the Idle mode.<br>In the Idle Mode Off, the display panel can display a maximum of 16.7M colors.                                                                                                                                                                                                                                            |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Restriction                               | This command has no effect when the module is already in the Idle Mode Off.                                                                                                                                                                                                                                                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes           | Normal Mode On, Idle Mode On, Sleep Out | Yes           | Partial Mode On, Idle Mode Off, Sleep Out | Yes           | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Idle Mode Off</td></tr><tr><td>S/W Reset</td><td>Idle Mode Off</td></tr><tr><td>H/W Reset</td><td>Idle Mode Off</td></tr></table>                                                                                                                                                                   |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | Idle Mode Off | S/W Reset                               | Idle Mode Off | H/W Reset                                 | Idle Mode Off |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Power On Sequence                         | Idle Mode Off                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| S/W Reset                                 | Idle Mode Off                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| H/W Reset                                 | Idle Mode Off                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |
| Flow Chart                                | <div><div><div>Idle mode on</div><div>↓</div><div>IDMOFF(38h)</div><div>↓</div><div>Idle mode off</div></div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |               |                                         |               |                                           |               |                                          |     |          |     |

## Idle Mode On (39h)

| 39h                                       | IDMON (Idle Mode On)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|---------------------------------|---------------------------------|----|----|----|----|----|----|----|----|-----|-----------------------------------|---------------|------------------------------------------|---------------|-----------------------------------------|---------------------------------|-------------------------------------------|---------------------------------|------------------------------------------|----------|----------|----------|------|----------|----------|----------|-----|----------|----------|----------|---------|----------|----------|----------|-------|----------|----------|----------|------|----------|----------|----------|--------|----------|----------|----------|-------|----------|----------|----------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | RDX                             | WRX                             | D [23:8]                        | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1                               | ↑                               | XX                              | 0  | 0  | 1  | 1  | 1  | 0  | 0  | 1  | 39h |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Parameter                                 | No parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Description                               | <p>This command is used to enter the Idle Mode On. In the Idle Mode On, color expression is reduced. The first bits of R, G, and B in the Frame Memory will determine the display color, as shown in the table below.</p> <div><div><p>Memory</p></div><div>→</div><div><p>Panel Display</p></div></div> <table><tr><th colspan="4">Memory Contents vs. Display Color</th></tr><tr><th></th><th>R<sub>7</sub> - R<sub>0</sub></th><th>G<sub>7</sub> - G<sub>0</sub></th><th>B<sub>7</sub> - B<sub>0</sub></th></tr><tr><td>Black</td><td>0XXXXXXX</td><td>0XXXXXXX</td><td>0XXXXXXX</td></tr><tr><td>Blue</td><td>0XXXXXXX</td><td>0XXXXXXX</td><td>1XXXXXXX</td></tr><tr><td>Red</td><td>1XXXXXXX</td><td>0XXXXXXX</td><td>0XXXXXXX</td></tr><tr><td>Magenta</td><td>1XXXXXXX</td><td>0XXXXXXX</td><td>1XXXXXXX</td></tr><tr><td>Green</td><td>0XXXXXXX</td><td>1XXXXXXX</td><td>0XXXXXXX</td></tr><tr><td>Cyan</td><td>0XXXXXXX</td><td>1XXXXXXX</td><td>1XXXXXXX</td></tr><tr><td>Yellow</td><td>1XXXXXXX</td><td>1XXXXXXX</td><td>0XXXXXXX</td></tr><tr><td>White</td><td>1XXXXXXX</td><td>1XXXXXXX</td><td>1XXXXXXX</td></tr></table> <p>X = void</p> |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     | Memory Contents vs. Display Color |               |                                          |               |                                         | R <sub>7</sub> - R <sub>0</sub> | G <sub>7</sub> - G <sub>0</sub>           | B <sub>7</sub> - B <sub>0</sub> | Black                                    | 0XXXXXXX | 0XXXXXXX | 0XXXXXXX | Blue | 0XXXXXXX | 0XXXXXXX | 1XXXXXXX | Red | 1XXXXXXX | 0XXXXXXX | 0XXXXXXX | Magenta | 1XXXXXXX | 0XXXXXXX | 1XXXXXXX | Green | 0XXXXXXX | 1XXXXXXX | 0XXXXXXX | Cyan | 0XXXXXXX | 1XXXXXXX | 1XXXXXXX | Yellow | 1XXXXXXX | 1XXXXXXX | 0XXXXXXX | White | 1XXXXXXX | 1XXXXXXX | 1XXXXXXX |
|                                           | Memory Contents vs. Display Color                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | R <sub>7</sub> - R <sub>0</sub> | G <sub>7</sub> - G <sub>0</sub> | B <sub>7</sub> - B <sub>0</sub> |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Black                                     | 0XXXXXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0XXXXXXX                        | 0XXXXXXX                        |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Blue                                      | 0XXXXXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0XXXXXXX                        | 1XXXXXXX                        |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Red                                       | 1XXXXXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0XXXXXXX                        | 0XXXXXXX                        |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Magenta                                   | 1XXXXXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0XXXXXXX                        | 1XXXXXXX                        |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Green                                     | 0XXXXXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1XXXXXXX                        | 0XXXXXXX                        |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Cyan                                      | 0XXXXXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1XXXXXXX                        | 1XXXXXXX                        |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Yellow                                    | 1XXXXXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1XXXXXXX                        | 0XXXXXXX                        |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| White                                     | 1XXXXXXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1XXXXXXX                        | 1XXXXXXX                        |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Restriction                               | This command has no effect when the module is already in the Idle Mode On.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     | Status                            | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes           | Normal Mode On, Idle Mode On, Sleep Out | Yes                             | Partial Mode On, Idle Mode Off, Sleep Out | Yes                             | Partial Mode On, Idle Mode On, Sleep Out | Yes      | Sleep In | Yes      |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Idle Mode Off</td></tr><tr><td>S/W Reset</td><td>Idle Mode Off</td></tr><tr><td>H/W Reset</td><td>Idle Mode Off</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     | Status                            | Default Value | Power On Sequence                        | Idle Mode Off | S/W Reset                               | Idle Mode Off                   | H/W Reset                                 | Idle Mode Off                   |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Power On Sequence                         | Idle Mode Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| S/W Reset                                 | Idle Mode Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| H/W Reset                                 | Idle Mode Off                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |
| Flow Chart                                | <div><div><pre>graph TD; A([Idle mode off]) --&gt; B[/IDMON(39h)/]; B --&gt; C([Idle mode on]);</pre></div><div><p>Legend</p><ul style="list-style-type: none"><li>Command</li><li>Parameter</li><li>Display</li><li>Action</li><li>Mode</li><li>Sequential transfer</li></ul></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                 |                                 |                                 |    |    |    |    |    |    |    |    |     |                                   |               |                                          |               |                                         |                                 |                                           |                                 |                                          |          |          |          |      |          |          |          |     |          |          |          |         |          |          |          |       |          |          |          |      |          |          |          |        |          |          |          |       |          |          |          |



## Interface Pixel Format (3Ah)

| 3Ah                                       | COLMOD (Interface Pixel Format)                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|----------------------|----------------------|-----------|-----------|----|----------------------|----|-----------|----|--------------|-----|--------|---------------|-------------------|------------------------------------------|-----------|-----|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------------|--|-----------|------------------------------------------|--|----------------------|----------|---|-----|--------------|---|---|---|--------------|---|---|---|--------------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX          | WRX                  | D [23:8]             | D7        | D6        | D5 | D4                   | D3 | D2        | D1 | D0           | HEX |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1            | ↑                    | XX                   | 0         | 0         | 1  | 1                    | 1  | 0         | 1  | 0            | 3Ah |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Parameter                                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1            | ↑                    | XX                   | 0         | DPI [2:0] |    |                      | X  | DBI [2:0] |    |              | XX  |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Description                               | This command sets the pixel format. DPI [3:0] selects the pixel format of the RGB interface, and DBI [2:0] select the pixel format of the MPU interface.                                                                                                                                                                                                                                                                                                           |              |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
|                                           | <table><tr><th colspan="3">DPI [2:0]</th><th>RGB Interface Format</th></tr><tr><td>1</td><td>0</td><td>1</td><td>16-bit/pixel</td></tr><tr><td>1</td><td>1</td><td>0</td><td>18-bit/pixel</td></tr><tr><td>1</td><td>1</td><td>1</td><td>24-bit/pixel</td></tr></table>                                                                                                                                                                                            |              |                      |                      | DPI [2:0] |           |    | RGB Interface Format | 1  | 0         | 1  | 16-bit/pixel | 1   | 1      | 0             | 18-bit/pixel      | 1                                        | 1         | 1   | 24-bit/pixel                            | <table><tr><th colspan="3">DBI [2:0]</th><th>MPU Interface Format</th></tr><tr><td>1</td><td>0</td><td>1</td><td>16-bit/pixel</td></tr><tr><td>1</td><td>1</td><td>0</td><td>18-bit/pixel</td></tr><tr><td>1</td><td>1</td><td>1</td><td>24-bit/pixel</td></tr></table> |     |                                           |  | DBI [2:0] |                                          |  | MPU Interface Format | 1        | 0 | 1   | 16-bit/pixel | 1 | 1 | 0 | 18-bit/pixel | 1 | 1 | 1 | 24-bit/pixel |
|                                           | DPI [2:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              |                      | RGB Interface Format |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
|                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0            | 1                    | 16-bit/pixel         |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
|                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1            | 0                    | 18-bit/pixel         |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| 1                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1            | 24-bit/pixel         |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| DBI [2:0]                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              | MPU Interface Format |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| 1                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1            | 16-bit/pixel         |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| 1                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0            | 18-bit/pixel         |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| 1                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1            | 24-bit/pixel         |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| X = void                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Register Availability                     | <table><tr><th colspan="2">Status</th><th>Availability</th></tr><tr><td colspan="2">Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Partial M de On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Sleep In</td><td>Yes</td></tr></table> |              |                      |                      |           |           |    |                      |    |           |    |              |     | Status |               | Availability      | Normal Mode On, Idle Mode Off, Sleep Out |           | Yes | Normal Mode On, Idle Mode On, Sleep Out |                                                                                                                                                                                                                                                                         | Yes | Partial M de On, Idle Mode Off, Sleep Out |  | Yes       | Partial Mode On, Idle Mode On, Sleep Out |  | Yes                  | Sleep In |   | Yes |              |   |   |   |              |   |   |   |              |
| Status                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Availability |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Normal Mode On, Idle Mode Off, Sleep Out  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes          |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Normal Mode On, Idle Mode On, Sleep Out   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes          |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Partial M de On, Idle Mode Off, Sleep Out |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes          |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Partial Mode On, Idle Mode On, Sleep Out  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes          |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Sleep In                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes          |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>07h</td></tr><tr><td>S/W Reset</td><td>07h</td></tr><tr><td>H/W Reset</td><td>07h</td></tr></table>                                                                                                                                                                                                                                                                         |              |                      |                      |           |           |    |                      |    |           |    |              |     | Status | Default Value | Power On Sequence | 07h                                      | S/W Reset | 07h | H/W Reset                               | 07h                                                                                                                                                                                                                                                                     |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Power On Sequence                         | 07h                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| S/W Reset                                 | 07h                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| H/W Reset                                 | 07h                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |
| Flow Chart                                | <div>Example :</div> <div><div>18 bit/pixel Mode</div><div>COLMOD(3Ah)<br/>DBI: 111</div><div>24 bit/pixel Mode</div></div> <div><div>Legend</div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div>                                                                                                                                                                                     |              |                      |                      |           |           |    |                      |    |           |    |              |     |        |               |                   |                                          |           |     |                                         |                                                                                                                                                                                                                                                                         |     |                                           |  |           |                                          |  |                      |          |   |     |              |   |   |   |              |   |   |   |              |

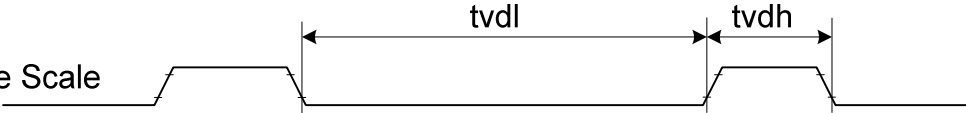
## Memory Write Continue (3Ch)

| 3Ch                                                                   | RAMWRC (Memory Write Continue)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|-----------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------|-----------|----|----|----|----|----|----|----|----|-----|-----------|----------------|------------------------------------------|--------------------------------------|-----------------------------------------|------------------------------------|-------------------------------------------|------------------------------------|------------------------------------------|-----------------------------------------------------|--------------------------|----------------|-------------------------------------------------|--------------------------|------------------------|
|                                                                       | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | RDX                      | WRX                    | D [23:8]  | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Command                                                               | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                        | ↑                      | XX        | 0  | 0  | 1  | 1  | 1  | 1  | 0  | 0  | 3Ch |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| 1 <sup>st</sup> Parameter                                             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                        | ↑                      | D1 [23:0] |    |    |    |    |    |    |    |    | XX  |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| :                                                                     | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                        | ↑                      | Dx [23:0] |    |    |    |    |    |    |    |    | XX  |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| N <sup>th</sup> Parameter                                             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                        | ↑                      | Dn [23:0] |    |    |    |    |    |    |    |    | XX  |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Description                                                           | This command is used to transfer data from the MPU to the frame memory if the frame memory wants to continue memory write after the “Memory Write (2Ch)” command. This command makes no change to the other status of the driver.                                                                                                                                                                                                                                                                                                                                     |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       | When this command is accepted, the column register and the page register will not reset to the Start Column/Start Page positions after it is done on the “Memory Write (2Ch)” command.                                                                                                                                                                                                                                                                                                                                                                                |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       | Then D [23:0] is stored in the frame memory and the column register and the page register are incremented, as the table below:                                                                                                                                                                                                                                                                                                                                                                                                                                        |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       | Column and Page Counter Control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       | <table><tr><th>Condition</th><th>Column counter</th><th>Page Counter</th></tr><tr><td>When RAMWR/RAMRD command is accepted</td><td>Return to “Start Column”</td><td>Return to “Start Page”</td></tr><tr><td>Complete Pixel Read/Write action</td><td>Increment by 1</td><td>No change</td></tr><tr><td>The Column counter value is large than “End Column”</td><td>Return to “Start Column”</td><td>Increment by 1</td></tr><tr><td>The Page counter value is large than “End Page”</td><td>Return to “Start Column”</td><td>Return to “Start Page”</td></tr></table> |                          |                        |           |    |    |    |    |    |    |    |    |     | Condition | Column counter | Page Counter                             | When RAMWR/RAMRD command is accepted | Return to “Start Column”                | Return to “Start Page”             | Complete Pixel Read/Write action          | Increment by 1                     | No change                                | The Column counter value is large than “End Column” | Return to “Start Column” | Increment by 1 | The Page counter value is large than “End Page” | Return to “Start Column” | Return to “Start Page” |
|                                                                       | Condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Column counter           | Page Counter           |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       | When RAMWR/RAMRD command is accepted                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Return to “Start Column” | Return to “Start Page” |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       | Complete Pixel Read/Write action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Increment by 1           | No change              |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       | The Column counter value is large than “End Column”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Return to “Start Column” | Increment by 1         |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       | The Page counter value is large than “End Page”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Return to “Start Column” | Return to “Start Page” |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Sending any other command can stop the Memory Write Continue command. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| X = void                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Restriction                                                           | There is no restriction on the length of parameters. No access to the frame memory in the Sleep In mode.<br><b>NOTE1 :</b> <i>command 2C + 3C must write even line data that can wire to memory.</i>                                                                                                                                                                                                                                                                                                                                                                  |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Register Availability                                                 | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                            |                          |                        |           |    |    |    |    |    |    |    |    |     | Status    | Availability   | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                  | Normal Mode On, Idle Mode On, Sleep Out | Yes                                | Partial Mode On, Idle Mode Off, Sleep Out | Yes                                | Partial Mode On, Idle Mode On, Sleep Out | Yes                                                 | Sleep In                 | Yes            |                                                 |                          |                        |
| Status                                                                | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Normal Mode On, Idle Mode Off, Sleep Out                              | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Normal Mode On, Idle Mode On, Sleep Out                               | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Partial Mode On, Idle Mode Off, Sleep Out                             | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Partial Mode On, Idle Mode On, Sleep Out                              | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Sleep In                                                              | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Default                                                               | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Contents of memory is set randomly</td></tr><tr><td>S/W Reset</td><td>Contents of memory is set randomly</td></tr><tr><td>H/W Reset</td><td>Contents of memory is set randomly</td></tr></table>                                                                                                                                                                                                                                                                               |                          |                        |           |    |    |    |    |    |    |    |    |     | Status    | Default Value  | Power On Sequence                        | Contents of memory is set randomly   | S/W Reset                               | Contents of memory is set randomly | H/W Reset                                 | Contents of memory is set randomly |                                          |                                                     |                          |                |                                                 |                          |                        |
| Status                                                                | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Power On Sequence                                                     | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| S/W Reset                                                             | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| H/W Reset                                                             | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Flow Chart                                                            | <div><div><div>RAMWRC(3Ch)</div><div>Image Data<br/>D1[23:0],D2[23:0],<br/>...,Dn[23:0]</div><div>Next Command</div></div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                                                                                                                                                                                                         |                          |                        |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |

## Memory Read Continue (3Eh)

| 3Eh                                                 | RAMRDC (Memory Read Continue)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----|-----------|----|----|----|----|----|----|----|----|-----|-----------|----------------|------------------------------------------|--------------------------------------|-----------------------------------------|------------------------------------|-------------------------------------------|------------------------------------|------------------------------------------|-----------------------------------------------------|--------------------------|----------------|-------------------------------------------------|--------------------------|------------------------|
|                                                     | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | RDX                    | WRX | D [23:8]  | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Command                                             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1                      | ↑   | XX        | 0  | 0  | 1  | 1  | 1  | 1  | 1  | 0  | 3Eh |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| 1 <sup>st</sup> Parameter                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑                      | 1   | XX        | X  | X  | X  | X  | X  | X  | X  | X  | XX  |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| 2 <sup>nd</sup> Parameter                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑                      | 1   | D1 [15:0] |    |    |    |    |    |    |    |    | XX  |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| :                                                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑                      | 1   | Dx [15:0] |    |    |    |    |    |    |    |    | XX  |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| N <sup>th</sup> Parameter                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑                      | 1   | Dn [15:0] |    |    |    |    |    |    |    |    | XX  |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Description                                         | <p>This command is used to transfer data from the Frame Memory to the MPU, if the MPU wants to continue memory read after “Memory Read (2Eh)” command. This command makes no change to the other status of the driver.</p> <p>When this command is accepted, the column register and the page register will not reset to the Start Column/Start Page positions since it is done on the “Memory Read (2Eh)” command.</p> <p>Then D [15:0] is read back from the frame memory, and the column register and the page register are incremented, as the table below: Column and Page Counter Control.</p> <table><tr><th>Condition</th><th>Column counter</th><th>Page Counter</th></tr><tr><td>When RAMWR/RAMRD command is accepted</td><td>Return to “Start Column”</td><td>Return to “Start Page”</td></tr><tr><td>Complete Pixel Read/Write action</td><td>Increment by 1</td><td>No change</td></tr><tr><td>The Column counter value is large than “End Column”</td><td>Return to “Start Column”</td><td>Increment by 1</td></tr><tr><td>The Page counter value is large than “End Page”</td><td>Return to “Start Column”</td><td>Return to “Start Page”</td></tr></table> <p>Sending any other command can stop the Memory Read Continue command.</p> <p>X = void.</p> |                        |     |           |    |    |    |    |    |    |    |    |     | Condition | Column counter | Page Counter                             | When RAMWR/RAMRD command is accepted | Return to “Start Column”                | Return to “Start Page”             | Complete Pixel Read/Write action          | Increment by 1                     | No change                                | The Column counter value is large than “End Column” | Return to “Start Column” | Increment by 1 | The Page counter value is large than “End Page” | Return to “Start Column” | Return to “Start Page” |
| Condition                                           | Column counter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Page Counter           |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| When RAMWR/RAMRD command is accepted                | Return to “Start Column”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Return to “Start Page” |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Complete Pixel Read/Write action                    | Increment by 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | No change              |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| The Column counter value is large than “End Column” | Return to “Start Column”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Increment by 1         |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| The Page counter value is large than “End Page”     | Return to “Start Column”                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Return to “Start Page” |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Restriction                                         | <p>There is no restriction on the length of parameters.</p> <p>No access to the frame memory in the Sleep In mode.</p> <p><b>NOTE : Read memory data is real memory data after memory compression (not image data )</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Register Availability                               | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |     |           |    |    |    |    |    |    |    |    |     | Status    | Availability   | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                  | Normal Mode On, Idle Mode On, Sleep Out | Yes                                | Partial Mode On, Idle Mode Off, Sleep Out | Yes                                | Partial Mode On, Idle Mode On, Sleep Out | Yes                                                 | Sleep In                 | Yes            |                                                 |                          |                        |
| Status                                              | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Normal Mode On, Idle Mode Off, Sleep Out            | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Normal Mode On, Idle Mode On, Sleep Out             | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Partial Mode On, Idle Mode Off, Sleep Out           | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Partial Mode On, Idle Mode On, Sleep Out            | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Sleep In                                            | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Default                                             | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>Contents of memory is set randomly</td></tr><tr><td>S/W Reset</td><td>Contents of memory is set randomly</td></tr><tr><td>H/W Reset</td><td>Contents of memory is set randomly</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |     |           |    |    |    |    |    |    |    |    |     | Status    | Default Value  | Power On Sequence                        | Contents of memory is set randomly   | S/W Reset                               | Contents of memory is set randomly | H/W Reset                                 | Contents of memory is set randomly |                                          |                                                     |                          |                |                                                 |                          |                        |
| Status                                              | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Power On Sequence                                   | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| S/W Reset                                           | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| H/W Reset                                           | Contents of memory is set randomly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |
| Flow Chart                                          | <div><div><div>RAMRDC(3Eh)</div><div>Dummy read</div><div>Image Data<br/>D1[23:0],D2[23:0],<br/>...,Dn[23:0]</div><div>Next Command</div></div><div><div>Legend</div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |     |           |    |    |    |    |    |    |    |    |     |           |                |                                          |                                      |                                         |                                    |                                           |                                    |                                          |                                                     |                          |                |                                                 |                          |                        |

## Write Tear Scan Line (44h)

| 44h                                       | TESLWR (Write Tear Scan Line)                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                      | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                        | 1   | ↑   | XX       | 0        | 1  | 0  | 0  | 0  | 1  | 0  | 0  | 44h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                        | 1   | ↑   | XX       | N [15:8] |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                        | 1   | ↑   | XX       | N [7:0]  |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command turns on the display Tearing Effect output signal on the TE signal line when the display reaches line N. Changing Memory Access Control (36h) D4 will not affect the TE signal. The Tearing Effect Line On has one parameter that describes the Tearing Effect Output Line mode. The Tearing Effect Output line consists of V-Blanking information only.                                                    |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|                                           | <div>Vertical Time Scale</div>                                                                                                                                                                                                                                                                                                         |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|                                           | Note that set Tear Scan Line with N = 0 is equivalent to Tearing Effect Line ON with M = 0.<br>The Tearing Effect Output line shall be active low when the ILI9806H is in the Sleep mode.                                                                                                                                                                                                                                |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | This command has no effect when the Tearing Effect output is already ON.                                                                                                                                                                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></tbody></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>TE Output ON or OFF</div><div>TESLWR (44h)</div><div>1st Parameter : N[15:8]</div><div>2nd Parameter : N[7:0]</div><div>TE Line Output ON</div></div><div><div>Legend</div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Scan Line (45h)

| 45h                                       | TESLRD (Read Tear Scan Line)                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                      | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                        | 1   | ↑   | XX       | 0        | 1  | 0  | 0  | 0  | 1  | 0  | 1  | 45h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑   | 1   | XX       | N [15:8] |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 3 <sup>rd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑   | 1   | XX       | N [7:0]  |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | The display reads the current scan line N, used to update the display device. The total number of scan lines on a display device is defined as VS + VBP + VACT + VFP. The first scan line is defined as the first line of V-Sync and is denoted as Line 0. When in the Sleep Mode, the value returned by the Read Scan Line command is undefined.                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></tbody></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>TESLRD(45h)</div><div>Dummy Read</div><div>2nd Parameter : N [15:8]</div><div>3rd Parameter : N [7:0]</div></div><div>Host<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                            |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Write Display Brightness Value (51h)

| 51h                                       | WRDISBV (Write Display Brightness)                                                                                                                                                                                                                                                                                                                                                         |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0         | 1  | 0  | 1  | 0  | 0  | 0  | 1  | 51h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | DBV [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command is used to adjust the brightness value of the display.<br><br><b>DBV [7:0]</b> : 8 bit, for display brightness of manual brightness setting and the CABC in the ILI9806H. PWM output signal and LEDPWM pin will control the LED driver IC in order to control the display brightness.                                                                                         |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |           |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></table>                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>WRDISBV(51h)</div><div>↓</div><div>DBV [7:0]</div><div>↓</div><div>New Display Brightness Value Loaded</div></div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                       |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

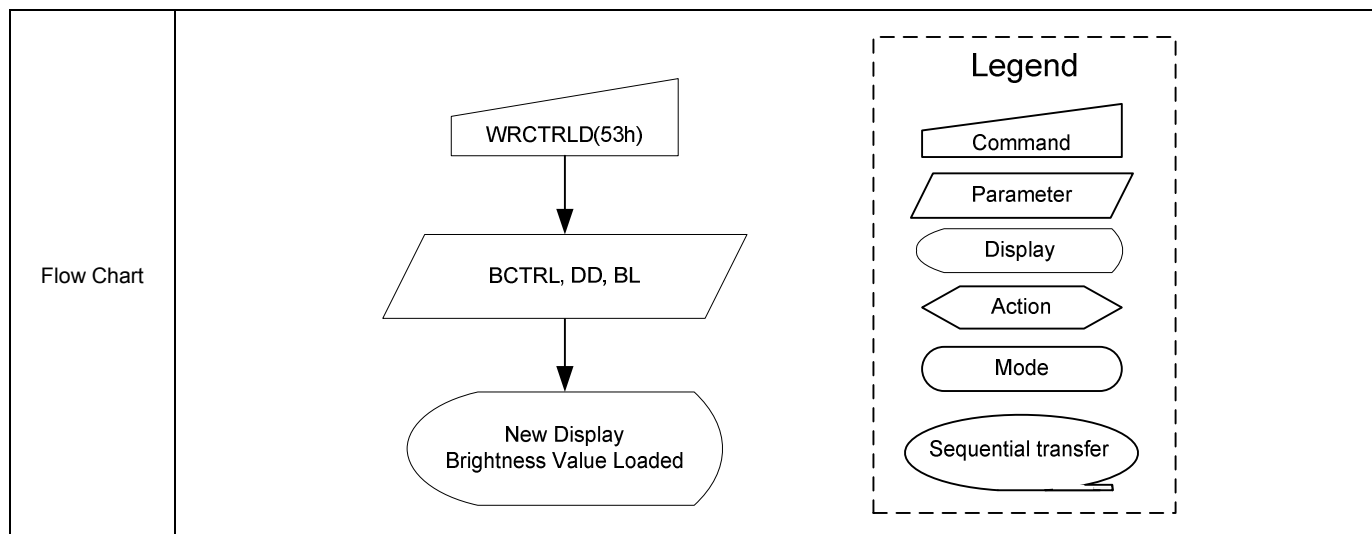
## Read Display Brightness Value (52h)

| 52h                                       | RDISBV (Read Display Brightness Value)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1   | ↑   | XX       | 0         | 1  | 0  | 1  | 0  | 0  | 1  | 0  | 52h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | XX       | X         | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ↑   | 1   | XX       | DBV [7:0] |    |    |    |    |    |    | XX |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command is used to return the brightness value of the display.</p> <p>DBV [7:0] is reset when display is in the Sleep In mode.</p> <p>DBV [7:0] is 0 when the bit BCTRL of “Write CTRL Display (53h)” command is 0.</p> <p>DBV [7:0] is the manual set brightness specified by the Write CTRL Display (53h) command when BCTRL bit is 1.</p> <p>When the bit BCTRL of the Write CTRL Display (53h) command is 1 and C1/C0 bit of the Write Content Adaptive Brightness Control (55h) command are 0, DBV [7:0] output is the brightness value specified by the Write Display Brightness (51h) command.</p> |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                                                                                                                                                                                                                                                   |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table>                                                                                                                                                                                          |     |     |          |           |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|                                           | <div><div><div>RDISBV(52h)</div><div>Host</div><div>Driver</div><div>1st Parameter: Dummy Read<br/>2nd Parameter: Display Brightness Value Read</div></div><div><div>Legend</div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Write CTRL Display Value (53h)

| 53h                                                                                                                                                      | WRCTRLD (Write Control Display)                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----|----------|----|----|-------|----|----|----|----|----|-----|-------------|---------------|------------------------------------------|------------------------------------------------|-----------------------------------------|---------------------------------------------------|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                                                                                                                                          | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX                                               | WRX | D [23:8] | D7 | D6 | D5    | D4 | D3 | D2 | D1 | D0 | HEX |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Command                                                                                                                                                  | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1                                                 | ↑   | XX       | 0  | 1  | 0     | 1  | 0  | 0  | 1  | 1  | 53h |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                                                                                                                                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1                                                 | ↑   | XX       | X  | X  | BCTRL | X  | DD | BL | X  | X  | XX  |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Description                                                                                                                                              | This command is used to control the display brightness.                                                                                                                                                                                                                                                                                                                                    |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | BCTRL: Brightness Control Block On/Off. This bit is always used to switch brightness for display.                                                                                                                                                                                                                                                                                          |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | <table><tr><th>BCTRL</th><th>Description</th></tr><tr><td>0</td><td>Brightness Control Block Off (DBV [7:0] = 00h)</td></tr><tr><td>1</td><td>Brightness Control Block On (DBV [7:0] is active)</td></tr></table>                                                                                                                                                                          |                                                   |     |          |    |    |       |    |    |    |    |    |     | BCTRL       | Description   | 0                                        | Brightness Control Block Off (DBV [7:0] = 00h) | 1                                       | Brightness Control Block On (DBV [7:0] is active) |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | BCTRL                                                                                                                                                                                                                                                                                                                                                                                      | Description                                       |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | 0                                                                                                                                                                                                                                                                                                                                                                                          | Brightness Control Block Off (DBV [7:0] = 00h)    |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | 1                                                                                                                                                                                                                                                                                                                                                                                          | Brightness Control Block On (DBV [7:0] is active) |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | DD: Display Dimming Control. This function is only for manual brightness setting.                                                                                                                                                                                                                                                                                                          |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | <table><tr><th>DD</th><th>Description</th></tr><tr><td>0</td><td>Display Dimming Off</td></tr><tr><td>1</td><td>Display Dimming On</td></tr></table>                                                                                                                                                                                                                                       |                                                   |     |          |    |    |       |    |    |    |    |    |     | DD          | Description   | 0                                        | Display Dimming Off                            | 1                                       | Display Dimming On                                |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | DD                                                                                                                                                                                                                                                                                                                                                                                         | Description                                       |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | 0                                                                                                                                                                                                                                                                                                                                                                                          | Display Dimming Off                               |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| 1                                                                                                                                                        | Display Dimming On                                                                                                                                                                                                                                                                                                                                                                         |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| BL: Backlight Control On/Off                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| <table><tr><th>BL</th><th>Description</th></tr><tr><td>0</td><td>Backlight Control Off</td></tr><tr><td>1</td><td>Backlight Control On</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    | BL  | Description | 0             | Backlight Control Off                    | 1                                              | Backlight Control On                    |                                                   |                                           |     |                                          |     |          |     |
| BL                                                                                                                                                       | Description                                                                                                                                                                                                                                                                                                                                                                                |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| 0                                                                                                                                                        | Backlight Control Off                                                                                                                                                                                                                                                                                                                                                                      |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| 1                                                                                                                                                        | Backlight Control On                                                                                                                                                                                                                                                                                                                                                                       |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Dimming function is adapted to the brightness registers for display when the bit BCTRL is changed at DD = 1, e.g. BCTRL: 0->1 or 1->0.                   |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| When the BL bit changes from ON to OFF, backlight is turned off without gradual dimming, even if Display Dimming On (DD = 1) are selected.               |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| X = void                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Restriction                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Register Availability                                                                                                                                    | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                                                   |     |          |    |    |       |    |    |    |    |    |     | Status      | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                            | Normal Mode On, Idle Mode On, Sleep Out | Yes                                               | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                                                                                                                                   | Availability                                                                                                                                                                                                                                                                                                                                                                               |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Sleep In                                                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Default                                                                                                                                                  | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></table>                                                                                                                                                                                                 |                                                   |     |          |    |    |       |    |    |    |    |    |     | Status      | Default Value | Power On Sequence                        | 00h                                            | S/W Reset                               | 00h                                               | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                                                                                                                                   | Default Value                                                                                                                                                                                                                                                                                                                                                                              |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Power On Sequence                                                                                                                                        | 00h                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| S/W Reset                                                                                                                                                | 00h                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| H/W Reset                                                                                                                                                | 00h                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |





## Read CTRL Display Value (54h)

| 54h                                                                                                                                                      | RDCTRLD (Read Control Display Value)                                                                                                                                                                                                                                                                                                                                                       |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----|----------|----|----|-------|----|----|----|----|----|-----|-------------|---------------|------------------------------------------|------------------------------------------------|-----------------------------------------|---------------------------------------------------|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                                                                                                                                          | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX                                               | WRX | D [23:8] | D7 | D6 | D5    | D4 | D3 | D2 | D1 | D0 | HEX |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Command                                                                                                                                                  | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1                                                 | ↑   | XX       | 0  | 1  | 0     | 1  | 0  | 1  | 0  | 0  | 54h |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                                                                                                                                | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                                                 | 1   | XX       | X  | X  | X     | X  | X  | X  | X  | X  | XX  |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                                                                                                                                | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                                                 | 1   | XX       | X  | X  | BCTRL | X  | DD | BL | X  | X  | XX  |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Description                                                                                                                                              | This command is used to control the display brightness.                                                                                                                                                                                                                                                                                                                                    |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | <b>BCTRL</b> : Brightness Control Block On/Off. This bit is always used to switch brightness for display.                                                                                                                                                                                                                                                                                  |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | <table><tr><th>BCTRL</th><th>Description</th></tr><tr><td>0</td><td>Brightness Control Block Off (DBV [7:0] = 00h)</td></tr><tr><td>1</td><td>Brightness Control Block On (DBV [7:0] is active)</td></tr></table>                                                                                                                                                                          |                                                   |     |          |    |    |       |    |    |    |    |    |     | BCTRL       | Description   | 0                                        | Brightness Control Block Off (DBV [7:0] = 00h) | 1                                       | Brightness Control Block On (DBV [7:0] is active) |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | BCTRL                                                                                                                                                                                                                                                                                                                                                                                      | Description                                       |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | 0                                                                                                                                                                                                                                                                                                                                                                                          | Brightness Control Block Off (DBV [7:0] = 00h)    |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | 1                                                                                                                                                                                                                                                                                                                                                                                          | Brightness Control Block On (DBV [7:0] is active) |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | <b>DD</b> : Display Dimming Control. This function is only for manual brightness setting.                                                                                                                                                                                                                                                                                                  |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | <table><tr><th>DD</th><th>Description</th></tr><tr><td>0</td><td>Display Dimming Off</td></tr><tr><td>1</td><td>Display Dimming On</td></tr></table>                                                                                                                                                                                                                                       |                                                   |     |          |    |    |       |    |    |    |    |    |     | DD          | Description   | 0                                        | Display Dimming Off                            | 1                                       | Display Dimming On                                |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | DD                                                                                                                                                                                                                                                                                                                                                                                         | Description                                       |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
|                                                                                                                                                          | 0                                                                                                                                                                                                                                                                                                                                                                                          | Display Dimming Off                               |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| 1                                                                                                                                                        | Display Dimming On                                                                                                                                                                                                                                                                                                                                                                         |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| <b>BL</b> : Backlight Control On/Off                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| <table><tr><th>BL</th><th>Description</th></tr><tr><td>0</td><td>Backlight Control Off</td></tr><tr><td>1</td><td>Backlight Control On</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    | BL  | Description | 0             | Backlight Control Off                    | 1                                              | Backlight Control On                    |                                                   |                                           |     |                                          |     |          |     |
| BL                                                                                                                                                       | Description                                                                                                                                                                                                                                                                                                                                                                                |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| 0                                                                                                                                                        | Backlight Control Off                                                                                                                                                                                                                                                                                                                                                                      |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| 1                                                                                                                                                        | Backlight Control On                                                                                                                                                                                                                                                                                                                                                                       |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| X = Void                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Restriction                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                            |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Register Availability                                                                                                                                    | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                                                   |     |          |    |    |       |    |    |    |    |    |     | Status      | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                            | Normal Mode On, Idle Mode On, Sleep Out | Yes                                               | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                                                                                                                                   | Availability                                                                                                                                                                                                                                                                                                                                                                               |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Sleep In                                                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Default                                                                                                                                                  | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></table>                                                                                                                                                                                                 |                                                   |     |          |    |    |       |    |    |    |    |    |     | Status      | Default Value | Power On Sequence                        | 00h                                            | S/W Reset                               | 00h                                               | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                                                                                                                                   | Default Value                                                                                                                                                                                                                                                                                                                                                                              |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Power On Sequence                                                                                                                                        | 00h                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| S/W Reset                                                                                                                                                | 00h                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| H/W Reset                                                                                                                                                | 00h                                                                                                                                                                                                                                                                                                                                                                                        |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |
| Flow Chart                                                                                                                                               | <div><div><div>RDCTRLD(54h)</div><div>↓</div><div>1st Parameter: Dummy Read<br/>2nd Parameter: Control Display Value Read</div></div><div>Host<br/>-----<br/>Driver</div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                              |                                                   |     |          |    |    |       |    |    |    |    |    |     |             |               |                                          |                                                |                                         |                                                   |                                           |     |                                          |     |          |     |

## Write Content Adaptive Brightness Control Value (55h)

| 55h                                       | WRCABC (Write Content Adaptive Brightness Control)                                                                                                                                                                                                                                                                                                                                         |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|---------------------------|-------------|----|----|----|---------|----|----|----|-----|---------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|----------|----------|-----|---|---|---------------------------|---|---|---|---|--------------------|---|---|---|---|-------------------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8]                  | D7          | D6 | D5 | D4 | D3      | D2 | D1 | D0 | HEX |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX                        | 0           | 1  | 0  | 1  | 0       | 1  | 0  | 1  | 55h |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX                        | 0           | 0  | 0  | 0  | C [3:0] |    |    |    | XX  |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Description                               | This command is used to set parameters for image content based on the adaptive brightness control functionality.                                                                                                                                                                                                                                                                           |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
|                                           | There are 4 different modes for content adaptive image functionality, which are defined in the table below.                                                                                                                                                                                                                                                                                |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
|                                           | <table><tr><th colspan="4">C [3:0]</th><th>Description</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>CABC Off</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>User Interface Image mode</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>Still Picture mode</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>Moving Image mode</td></tr></table>       |     |     |                           |             |    |    |    |         |    |    |    |     | C [3:0] |               |                                          |     | Description                             | 0   | 0                                         | 0   | 0                                        | CABC Off | 0        | 0   | 0 | 1 | User Interface Image mode | 0 | 0 | 1 | 0 | Still Picture mode | 0 | 0 | 1 | 1 | Moving Image mode |
|                                           | C [3:0]                                                                                                                                                                                                                                                                                                                                                                                    |     |     |                           | Description |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
|                                           | 0                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 0   | 0                         | CABC Off    |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| 0                                         | 0                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 1   | User Interface Image mode |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| 0                                         | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | 0   | Still Picture mode        |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| 0                                         | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | 1   | Moving Image mode         |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| X = Void                                  |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |                           |             |    |    |    |         |    |    |    |     | Status  | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes      | Sleep In | Yes |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></table>                                                                                                                                                                                                 |     |     |                           |             |    |    |    |         |    |    |    |     | Status  | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |
| Flow Chart                                | <div><div><div>WRCABC(55h)</div><div>↓</div><div>1st Parameter: C [3:0]</div><div>↓</div><div>New Adaptive Image Mode</div></div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                       |     |     |                           |             |    |    |    |         |    |    |    |     |         |               |                                          |     |                                         |     |                                           |     |                                          |          |          |     |   |   |                           |   |   |   |   |                    |   |   |   |   |                   |

## Read Content Adaptive Brightness Control Value (56h)

| 56h                                       | RDCABC (Read Content Adaptive Brightness Control)                                                                                                                                                                                                                                                                                                                                          |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-------------------|---------------------------|----|----|----|---------|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8]          | D7                        | D6 | D5 | D4 | D3      | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX                | 0                         | 1  | 0  | 1  | 0       | 1  | 1  | 0  | 56h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX                | X                         | X  | X  | X  | X       | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX                | 0                         | 0  | 0  | 0  | C [3:0] |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command is used to read the settings for image content based on the adaptive brightness control functionality. There are 4 different modes for content adaptive image functionality, which are defined in the table below.                                                                                                                                                            |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|                                           | C [3:0]                                                                                                                                                                                                                                                                                                                                                                                    |     |     |                   | Description               |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|                                           | 0                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 0   | 0                 | CABC Off                  |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|                                           | 0                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 0   | 1                 | User Interface Image mode |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|                                           | 0                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 1   | 0                 | Still Picture mode        |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 0                                         | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | 1   | Moving Image mode |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|                                           | X = Void                                                                                                                                                                                                                                                                                                                                                                                   |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                            |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |                   |                           |    |    |    |         |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></table>                                                                                                                                                                                                 |     |     |                   |                           |    |    |    |         |    |    |    |     | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDCABC(56h)</div><div>↓</div><div>1st Parameter: Dummy Read<br/>2nd Parameter: CABC Value Read</div></div><div>Host<br/>-----<br/>Driver</div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                          |     |     |                   |                           |    |    |    |         |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Write CABC Minimum Brightness (5Eh)

| 5Eh                                       | WRCABCMB (Write CABC Minimum Brightness)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | ↑   | XX       | 0         | 1  | 0  | 1  | 1  | 1  | 1  | 0  | 5Eh |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1   | ↑   | XX       | CMB [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command is used to set the minimum brightness value of the display for the CABC function.</p> <p><b>CMB [7:0]:</b> CABC minimum brightness control. This parameter is used to set a limit to the amount of brightness reduction allowed.</p> <p>When the CABC is active, it cannot reduce the display brightness to less than the CABC minimum brightness setting. Image processing function works normally, even if the brightness cannot be changed.</p> <p>This function does not affect the manual brightness setting. Manual brightness setting does not have a limit on allowable brightness reduction; display brightness can be set less than the CABC minimum brightness. Smooth transition and dimming function work normally.</p> <p>When the display brightness is turned off (BCTRL = 0 of Write CTRL Display (53h)), the CABC minimum brightness setting is ignored. The principle relationship is such that 00h value means the lowest brightness for the CABC, and FFh value means the highest brightness for the CABC.</p> |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |           |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>WRCABCMB(5Eh)</div><div>↓</div><div>1st Parameter:<br/>CMB[7:0]</div><div>↓</div><div>New Display Luminance<br/>Value Loaded</div></div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read CABC Minimum Brightness (5Fh)

| 5Fh                                       | RDCABCMB (Read CABC Minimum Brightness)                                                                                                                                                                                                                                                                                                                                                    |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0         | 1  | 0  | 1  | 1  | 1  | 1  | 1  | 5Fh |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X         | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | CMB [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command reads the minimum brightness value of the CABC function.</p> <p>The principle relationship is such that 00h value means the lowest brightness, and FFh value means the highest brightness.</p> <p>CMB [7:0] is the CABC minimum brightness specified by the Write CABC minimum brightness (5Eh) command.</p>                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                                |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |           |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></table>                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDCABCMB(5Fh)</div><div>↓</div><div>1st Parameter: Dummy Read<br/>2nd Parameter: CABC minimum Brightness Read</div></div><div>Host<br/>-----<br/>Driver</div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                           |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Automatic Brightness Control Self-diagnostic Result (68h)

| 68h                                       | RDABCSDR (Read automatic brightness control self-diagnostic result)                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|---------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                     | RDX | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1   | ↑   | XX       | 0       | 1  | 1  | 0  | 1  | 0  | 0  | 0  | 68h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑   | 1   | XX       | X       | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                       | ↑   | 1   | XX       | D [7:6] |    | 0  | 0  | 0  | 0  | 0  | 0  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command indicates the status of the display self-diagnostic results for automatic brightness control after the Sleep Out command, as described in the table below:</p> <p>Bit D7 – Register Loading Detection, see the section “Register loading Detection”.</p> <p>Bit D6 – Functionality Detection, see the section “Functionality Detection”.</p> <p>Bits D5, D4, D3, D2, D1 and D0 are for future use and are set to 0.</p> |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                              |     |     |          |         |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td></tr></table>                                                                                                                                                                                                                                              |     |     |          |         |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | 00h | S/W Reset                               | 00h | H/W Reset                                 | 00h |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>Read RDABCSDR(68h)</div><div>↓</div><div>1st Parameter: Dummy Read<br/>Send 2nd Parameter</div></div><div><div>Host</div><div>Driver</div></div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                                     |     |     |          |         |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Black/White Low Bits (70h)

| 70h                                       | RDBWLB (Read Black/White Low Bits)                                                                                                                                                                                                                                                                                                                                                         |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------|----|-----------|----|----------|----|----------|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7        | D6 | D5        | D4 | D3       | D2 | D1       | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0         | 1  | 1         | 1  | 0        | 0  | 0        | 0  | 70h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X         | X  | X         | X  | X        | X  | X        | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Bkx [1:0] |    | Bky [1:0] |    | Wx [1:0] |    | Wy [1:0] |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command reads the lowest bits of black and white color characteristics.</p> <p>Black: Bkx and Bky</p> <p>White: Wx and Wy</p> <p>X = void</p>                                                                                                                                                                                                                                      |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                            |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |           |    |           |    |          |    |          |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |           |    |           |    |          |    |          |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDBWLB(70h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                            |     |     |          |           |    |           |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |



## Read Bkx (71h)

| 71h                                       | RDBkx (Read Bkx)                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0         | 1  | 1  | 1  | 0  | 0  | 0  | 1  | 71h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X         | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Bkx [9:2] |    |    |    |    |    |    | 00 |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command reads the Bkx bits (Bkx [9:2]) of black color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                    |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |           |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDBkx(71h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                             |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Bky (72h)

| 72h                                       | RDBky (Read Bky)                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0         | 1  | 1  | 1  | 0  | 0  | 1  | 0  | 72h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X         | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Bky [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command reads the Bky bits (Bky [9:2]) of black color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                    |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |           |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDBky(72h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                             |     |     |          |           |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Wx (73h)

| 73h                                       | RDWx (Read Wx)                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 0  | 0  | 1  | 1  | 73h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Wx [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command reads the Wx bits (Wx [9:2]) of white color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDWx(73h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Wy (74h)

| 74h                                       | RDWy (Read Wy)                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 0  | 1  | 0  | 0  | 74h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Wy [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command returns the Wy bits (Wy [9:2]) of white color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                    |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDWy(74h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Red/Green Low Bits (75h)

| 75h                                       | RDRGLB (Read Red / Green Low Bits)                                                                                                                                                                                                                                                                                                                                                         |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----------|----|----------|----|----------|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5       | D4 | D3       | D2 | D1       | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1        | 1  | 0        | 1  | 0        | 1  | 75h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X        | X  | X        | X  | X        | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Rx [1:0] |    | Ry [1:0] |    | Gx [1:0] |    | Gy [1:0] |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command reads the lowest bits of red and green color characteristics.</p> <p>Red: Rx and Ry</p> <p>Green: Gx and Gy</p> <p>X = void</p>                                                                                                                                                                                                                                            |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                            |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |          |    |          |    |          |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |          |    |          |    |          |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDRGLB(75h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                            |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Rx (76h)

| 76h                                       | RDRx (Read Rx)                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 0  | 1  | 1  | 0  | 76h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Rx [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command reads the Rx bits (Rx [9:2]) of red color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDRx(76h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Ry (77h)

| 77h                                       | RDRy (Read Ry)                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 0  | 1  | 1  | 1  | 77h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Ry [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command reads the Ry bits (Ry [9:2]) of red color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDRy(77h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Gx (78h)

| 78h                                       | RDGx (Read Gx)                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 1  | 0  | 0  | 0  | 78h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Gx [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command reads the Gx bits (Gx [9:2]) of green color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDGx(78h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |



## Read Gy (79h)

| 79h                                       | RDGy (Read Gy)                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 1  | 0  | 0  | 1  | 79h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Gy [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command reads the Gy bits (Gy [9:2]) of green color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDGy(79h)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Blue/A Color Low Bits (7Ah)

| 7Ah                                       | RDBALB (Read Blue / A Color Low Bits)                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----------|----|----------|----|----------|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5       | D4 | D3       | D2 | D1       | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1        | 1  | 1        | 0  | 1        | 0  | 7Ah |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X        | X  | X        | X  | X        | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Bx [1:0] |    | By [1:0] |    | Ax [1:0] |    | Ay [1:0] |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command reads the lowest bits of blue and A color color characteristics.</p> <p>Blue: Bx and By</p> <p>A color: Ax and Ay</p> <p>X = void</p>                                                                                                                                                                                                                                      |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                            |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |          |    |          |    |          |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |          |    |          |    |          |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDBALB(7Ah)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                           |     |     |          |          |    |          |    |          |    |          |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Bx (7Bh)

| 7Bh                                       | RDBx (Read Bx)                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 1  | 0  | 1  | 1  | 7Bh |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Bx [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command reads the Bx bits (Bx [9:2]) of blue color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                       |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDBx(7Bh)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read By (7Ch)

| 7Ch                                       | RDBy (Read By)                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 1  | 1  | 0  | 0  | 7Ch |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | By [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command reads the By bits (By [9:2]) of blue color characteristics.<br>X = void                                                                                                                                                                                                                                                                                                       |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | The ILI9806H sends the 2 <sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.<br><br>Only the 2 <sup>nd</sup> parameter is sent on the DSI; the 1 <sup>st</sup> parameter is not sent.                                                                                                |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDBy(7Ch)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Ax (7Dh)

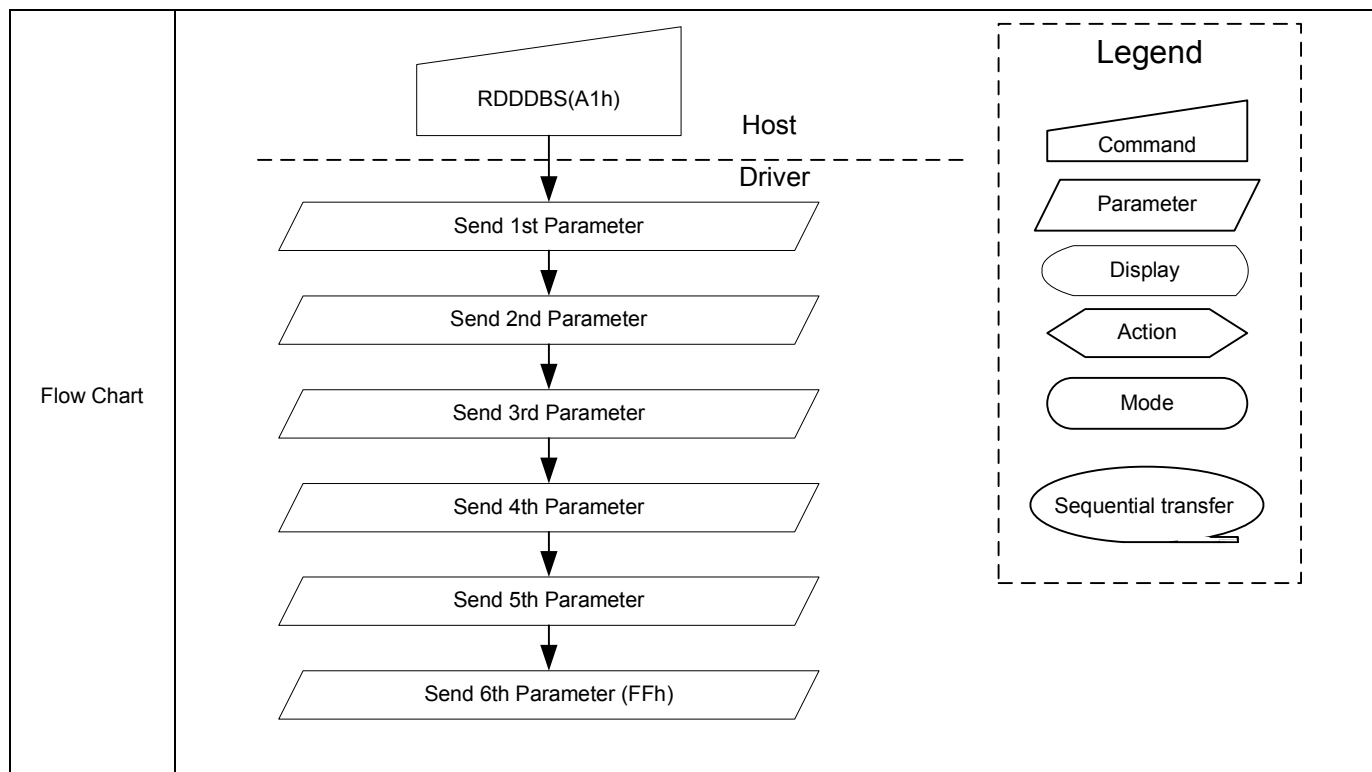
| 7Dh                                       | RDAx (Read Ax)                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 1  | 1  | 0  | 1  | 7Dh |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Ax [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command returns the Ax bits (Ax [9:2]) of A color characteristics.</p> <p>Ax [9:2] are set to 0 if they are not used.</p> <p>X = void</p>                                                                                                                                                                                                                                          |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                            |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDAx(7Dh)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read Ay (7Eh)

| 7Eh                                       | RDy (Read Ay)                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                      | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                        | 1   | ↑   | XX       | 0        | 1  | 1  | 1  | 1  | 1  | 1  | 0  | 7Eh |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                        | ↑   | 1   | XX       | Ay [9:2] |    |    |    |    |    |    |    | 00  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <p>This command reads the Ay bits (Ay [9:2]) of A color characteristics.</p> <p>Ay [9:2] are set to 0 if they are not used.</p> <p>X = void</p>                                                                                                                                                                                                                                                                          |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                                                          |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></tbody></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power On Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power On Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDAy(7Eh)</div><div>↓</div><div>Send 1st Parameter</div><div>↓</div><div>Send 2nd Parameter</div></div><div>Host<br/>-----<br/>Driver</div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                                            |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read DDB Start (A1h)

| A1h                                                                                                                                                                                        | RDDDBS (Read DDB Start)                                                                                                                                                                                                                                                                                                                                                                                             |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------|-------------|-------------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----------|-------------------------------------------|------------|------------------------------------------|-------------------|----------|-----|-----|-----|-----------|-----|-----|-----|-----|-----------|-----|-----|-----|-----|
|                                                                                                                                                                                            | DCX                                                                                                                                                                                                                                                                                                                                                                                                                 | RDX        | WRX        | D [23:8]    | D7          | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Command                                                                                                                                                                                    | 0                                                                                                                                                                                                                                                                                                                                                                                                                   | 1          | ↑          | XX          | 1           | 0  | 1  | 0  | 0  | 0  | 0  | 1  | A1h |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| 1 <sup>st</sup> Parameter                                                                                                                                                                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                   | ↑          | 1          | XX          | X           | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| 2 <sup>nd</sup> Parameter                                                                                                                                                                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                   | ↑          | 1          | XX          | SID [7:0]   |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| 3 <sup>rd</sup> Parameter                                                                                                                                                                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                   | ↑          | 1          | XX          | SID [15:8]  |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| 4 <sup>th</sup> Parameter                                                                                                                                                                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                   | ↑          | 1          | XX          | MRID [7:0]  |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| 5 <sup>th</sup> Parameter                                                                                                                                                                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                   | ↑          | 1          | XX          | MRID [15:8] |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| 6 <sup>th</sup> Parameter                                                                                                                                                                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                   | ↑          | 1          | XX          | 1           | 1  | 1  | 1  | 1  | 1  | 1  | 1  | FF  |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Description                                                                                                                                                                                | This command reads the supplier identification and display module mode/revision information.                                                                                                                                                                                                                                                                                                                        |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|                                                                                                                                                                                            | Note: This information is not the same as which “Read ID1 (DAh)”, “Read ID2 (DBh)” and “Read ID3 (DCh)” commands return.                                                                                                                                                                                                                                                                                            |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|                                                                                                                                                                                            | Parameter 2: SID [7:0] LCD module’s manufacturer ID.                                                                                                                                                                                                                                                                                                                                                                |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|                                                                                                                                                                                            | Parameter 3: SID [15:8] LCD module/driver version ID.                                                                                                                                                                                                                                                                                                                                                               |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|                                                                                                                                                                                            | Parameter 4: MRID [7:0] LCD module/driver ID.                                                                                                                                                                                                                                                                                                                                                                       |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|                                                                                                                                                                                            | Parameter 5: MRID [15:8] IC version code.                                                                                                                                                                                                                                                                                                                                                                           |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|                                                                                                                                                                                            | Parameter 6: FFh - Exit code – there is no more data in the Descriptor Block                                                                                                                                                                                                                                                                                                                                        |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|                                                                                                                                                                                            | This read sequence can be interrupted by any command and it can be continued by the Read DDB Continue (A8h) command.                                                                                                                                                                                                                                                                                                |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| For example, RDDDBS => 1 <sup>st</sup> parameter has been sent => 2 <sup>nd</sup> parameter has been sent => interrupt => RDDDBC => 3 <sup>rd</sup> parameter of the RDDDBS has been sent. |                                                                                                                                                                                                                                                                                                                                                                                                                     |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Restriction                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                     |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Register Availability                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                     |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|                                                                                                                                                                                            | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                          |            |            |             |             |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes        | Partial Mode On, Idle Mode On, Sleep Out | Yes               | Sleep In | Yes |     |     |           |     |     |     |     |           |     |     |     |     |
| Status                                                                                                                                                                                     | Availability                                                                                                                                                                                                                                                                                                                                                                                                        |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                    | Yes                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Sleep In                                                                                                                                                                                   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                 |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Default                                                                                                                                                                                    | <table><tr><th rowspan="2">Status</th><th colspan="4">Default Value</th></tr><tr><th>SID [7:0]</th><th>SID [15:8]</th><th>MRID [7:0]</th><th>MRID [15:8]</th></tr><tr><td>Power On Sequence</td><td>00h</td><td>00h</td><td>00h</td><td>00h</td></tr><tr><td>S/W Reset</td><td>00h</td><td>00h</td><td>00h</td><td>00h</td></tr><tr><td>H/W Reset</td><td>00h</td><td>00h</td><td>00h</td><td>00h</td></tr></table> |            |            |             |             |    |    |    |    |    |    |    |     | Status | Default Value |                                          |     |                                         | SID [7:0] | SID [15:8]                                | MRID [7:0] | MRID [15:8]                              | Power On Sequence | 00h      | 00h | 00h | 00h | S/W Reset | 00h | 00h | 00h | 00h | H/W Reset | 00h | 00h | 00h | 00h |
| Status                                                                                                                                                                                     | Default Value                                                                                                                                                                                                                                                                                                                                                                                                       |            |            |             |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
|                                                                                                                                                                                            | SID [7:0]                                                                                                                                                                                                                                                                                                                                                                                                           | SID [15:8] | MRID [7:0] | MRID [15:8] |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| Power On Sequence                                                                                                                                                                          | 00h                                                                                                                                                                                                                                                                                                                                                                                                                 | 00h        | 00h        | 00h         |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| S/W Reset                                                                                                                                                                                  | 00h                                                                                                                                                                                                                                                                                                                                                                                                                 | 00h        | 00h        | 00h         |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |
| H/W Reset                                                                                                                                                                                  | 00h                                                                                                                                                                                                                                                                                                                                                                                                                 | 00h        | 00h        | 00h         |             |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |           |                                           |            |                                          |                   |          |     |     |     |           |     |     |     |     |           |     |     |     |     |





## Read DDB Continue (A8h)

| A8h                                       | RDDDBC (Read DDB Continue)                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7       | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 1        | 0  | 1  | 0  | 1  | 0  | 0  | 0  | A8h |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | X        | X  | X  | X  | X  | X  | X  | X  | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | D1 [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| :                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Dx [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| N <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑   | 1   | XX       | Dn [7:0] |    |    |    |    |    |    |    | XX  |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | This command is used to read the supplier’s identification and revision information from the point where RDDDBS (A1h) was interrupted by another command.                                                                                                                                                                                                                                  |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | -                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |          |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power ON Sequence</td><td>XXh</td></tr><tr><td>S/W Reset</td><td>XXh</td></tr><tr><td>H/W Reset</td><td>XXh</td></tr></table>                                                                                                                                                                                                 |     |     |          |          |    |    |    |    |    |    |    |     | Status | Default Value | Power ON Sequence                        | XXh | S/W Reset                               | XXh | H/W Reset                                 | XXh |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Power ON Sequence                         | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| S/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| H/W Reset                                 | XXh                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div><div>RDDDBC(A8h)</div><div>↓</div><div>RDDDBS Data<br/>D1[7:0], D2[7:0],...Dn[7:0]</div></div><div>Host<br/>Driver</div></div><div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div></div>                                                                           |     |     |          |          |    |    |    |    |    |    |    |     |        |               |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Read ID1 (DAh)

| DBh                                       | RDID1 (Read ID1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------------------------------|------------------------------------------|-------------------|-----------------------------------------|-----------|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX                                  | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                                    | ↑   | XX       | 1         | 1  | 0  | 1  | 1  | 0  | 1  | 0  | DAh |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ↑                                    | 1   | XX       | X         | X  | X  | X  | X  | X  | X  | X  | XX  |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ↑                                    | 1   | XX       | ID1 [7:0] |    |    |    |    |    |    |    | XX  |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Description                               | <p>This read byte is used to track the LCD module/driver version. It is defined by the display supplier (with User's agreement) and changes each time a revision is made to the display, material or construction specifications.</p> <p>The 1<sup>st</sup> parameter is a dummy data.</p> <p>The 2<sup>nd</sup> parameter is the LCD module/driver's version ID. The ID parameter range is from 80h to FFh.</p> <p>The ID2 is programmed by the OTP function.</p> <p>X = Void</p> |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                                                                                                                    |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                         |                                      |     |          |           |    |    |    |    |    |    |    |     | Status | Availability                          | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value<br/>(Before OTP program)</th><th>Default Value<br/>(After OTP program)</th></tr><tr><td>Power On Sequence</td><td>00h</td><td>OTP value</td></tr><tr><td>H/W Reset</td><td>00h</td><td>OTP value</td></tr></table>                                                                                                                                                                                                                     |                                      |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value<br>(Before OTP program) | Default Value<br>(After OTP program)     | Power On Sequence | 00h                                     | OTP value | H/W Reset                                 | 00h | OTP value                                |     |          |     |
| Status                                    | Default Value<br>(Before OTP program)                                                                                                                                                                                                                                                                                                                                                                                                                                              | Default Value<br>(After OTP program) |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OTP value                            |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OTP value                            |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDID1(DAh)</div><div>↓</div><div>1st Parameter: Dummy Read</div><div>↓</div><div>2nd Parameter: Send ID1[7:0]</div></div><div><div>Host</div><div>Driver</div></div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                                                            |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |

## Read ID2 (DBh)

| DBh                                       | RDID2 (Read ID2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------------------------------|------------------------------------------|-------------------|-----------------------------------------|-----------|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX                                  | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                                    | ↑   | XX       | 1         | 1  | 0  | 1  | 1  | 0  | 1  | 1  | DBh |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ↑                                    | 1   | XX       | X         | X  | X  | X  | X  | X  | X  | X  | XX  |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ↑                                    | 1   | XX       | ID2 [7:0] |    |    |    |    |    |    |    | XX  |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Description                               | <p>This read byte is used to track the LCD module/driver version. It is defined by the display supplier (with User's agreement) and changes each time a revision is made to the display, material or construction specifications.</p> <p>The 1<sup>st</sup> parameter is a dummy data.</p> <p>The 2<sup>nd</sup> parameter is the LCD module/driver's version ID. The ID parameter range is from 80h to FFh.</p> <p>The ID2 is programmed by the OTP function.</p> <p>X = Void</p> |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                                                                                                                    |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table>                                                           |                                      |     |          |           |    |    |    |    |    |    |    |     | Status | Availability                          | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Default                                   | <table><thead><tr><th>Status</th><th>Default Value<br/>(Before OTP program)</th><th>Default Value<br/>(After OTP program)</th></tr></thead><tbody><tr><td>Power On Sequence</td><td>80h</td><td>OTP value</td></tr><tr><td>H/W Reset</td><td>80h</td><td>OTP value</td></tr></tbody></table>                                                                                                                                                                                       |                                      |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value<br>(Before OTP program) | Default Value<br>(After OTP program)     | Power On Sequence | 80h                                     | OTP value | H/W Reset                                 | 80h | OTP value                                |     |          |     |
| Status                                    | Default Value<br>(Before OTP program)                                                                                                                                                                                                                                                                                                                                                                                                                                              | Default Value<br>(After OTP program) |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 80h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OTP value                            |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 80h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | OTP value                            |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDID2(DBh)</div><div>↓</div><div>1st Parameter: Dummy Read</div><div>↓</div><div>2nd Parameter: Send ID2 [7:0]</div></div><div>Host<br/>Driver</div></div> <div><div>Legend</div><div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                                                                            |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |

## Read ID3 (DCh)

| DCh                                       | RDID3 (Read ID3)                                                                                                                                                                                                                                                                                                                                                                           |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----|----------|-----------|----|----|----|----|----|----|----|-----|--------|---------------------------------------|------------------------------------------|-------------------|-----------------------------------------|-----------|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX                                  | WRX | D [23:8] | D7        | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1                                    | ↑   | XX       | 1         | 1  | 0  | 1  | 1  | 1  | 0  | 0  | DCh |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                                    | 1   | XX       | X         | X  | X  | X  | X  | X  | X  | X  | XX  |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑                                    | 1   | XX       | ID3 [7:0] |    |    |    |    |    |    | XX |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Description                               | <p>This read byte identifies the LCD module/driver. It is specified by users.</p> <p>The 1<sup>st</sup> parameter is a dummy data.</p> <p>The 2<sup>nd</sup> parameter is the LCD module/driver's ID.</p> <p>The ID3 is programmed by the OTP function.</p> <p>X = Void</p>                                                                                                                |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Restriction                               | <p>The ILI9806H sends the 2<sup>nd</sup> parameter value to the data lines if the MPU wants to read more than one parameter (= more than 2 RDX cycle) on the parallel MPU interface.</p> <p>Only the 2<sup>nd</sup> parameter is sent on the DSI; the 1<sup>st</sup> parameter is not sent.</p>                                                                                            |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                                      |     |          |           |    |    |    |    |    |    |    |     | Status | Availability                          | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value<br/>(Before OTP program)</th><th>Default Value<br/>(After OTP program)</th></tr><tr><td>Power On Sequence</td><td>00h</td><td>OTP value</td></tr><tr><td>H/W Reset</td><td>00h</td><td>OTP value</td></tr></table>                                                                                                                             |                                      |     |          |           |    |    |    |    |    |    |    |     | Status | Default Value<br>(Before OTP program) | Default Value<br>(After OTP program)     | Power On Sequence | 00h                                     | OTP value | H/W Reset                                 | 00h | OTP value                                |     |          |     |
| Status                                    | Default Value<br>(Before OTP program)                                                                                                                                                                                                                                                                                                                                                      | Default Value<br>(After OTP program) |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Power On Sequence                         | 00h                                                                                                                                                                                                                                                                                                                                                                                        | OTP value                            |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| H/W Reset                                 | 00h                                                                                                                                                                                                                                                                                                                                                                                        | OTP value                            |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |
| Flow Chart                                | <div><div><div>RDID3(DCh)</div><div>Host<br/>Driver</div><div>1st Parameter: Dummy Read</div><div>2nd Parameter: Send ID3 [7:0]</div></div><div><div>Legend</div><div>Command</div><div>Parameter</div><div>Display</div><div>Action</div><div>Mode</div><div>Sequential transfer</div></div></div>                                                                                        |                                      |     |          |           |    |    |    |    |    |    |    |     |        |                                       |                                          |                   |                                         |           |                                           |     |                                          |     |          |     |

### 5.3. Extend Command (EXTC) Description

#### Interface Mode Control (B0h)

| B0h                                       | IFMODE (Interface Mode Control)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|----------|----|----|----|----|------|------|-----|-----|-----|--------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|------|------------------------------------------|-------------------|----------|------|------|------|-----------|------|------|------|------|-----------|------|------|------|------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | RDX  | WRX  | D [23:8] | D7 | D6 | D5 | D4 | D3   | D2   | D1  | D0  | HEX |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1    | ↑    | XX       | 1  | 0  | 1  | 1  | 0    | 0    | 0   | 0   | B0h |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1    | ↑    | XX       | 0  | 0  | 0  | 0  | VSPL | HSPL | DPL | EPL | 00  |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Description                               | <p>Sets the operation status of the RGB interface. The setting becomes effective as soon as the command is received.</p> <p><b>EPL</b>: Enable polarity (0 = Low enable, 1 = High enable)</p> <p><b>DPL</b>: PCLK polarity set (0 = data fetched at the rising time, 1 = data fetched at the falling time)</p> <p><b>HSPL</b>: HS polarity (0 = Low level sync clock, 1 = High level sync clock)</p> <p><b>VSPL</b>: VS polarity (0 = Low level sync clock, 1 = High level sync clock)</p> <p>Other settings are prohibited</p> |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                      |      |      |          |    |    |    |    |      |      |     |     |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes  | Partial Mode On, Idle Mode On, Sleep Out | Yes               | Sleep In | Yes  |      |      |           |      |      |      |      |           |      |      |      |      |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Default                                   | <table><tr><th rowspan="2">Status</th><th colspan="4">Default Value</th></tr><tr><th>EPL</th><th>DPL</th><th>HSPL</th><th>VSPL</th></tr><tr><td>Power ON Sequence</td><td>1'b0</td><td>1'b0</td><td>1'b0</td><td>1'b0</td></tr><tr><td>S/W Reset</td><td>1'b0</td><td>1'b0</td><td>1'b0</td><td>1'b0</td></tr><tr><td>H/W Reset</td><td>1'b0</td><td>1'b0</td><td>1'b0</td><td>1'b0</td></tr></table>                                                                                                                           |      |      |          |    |    |    |    |      |      |     |     |     | Status | Default Value |                                          |     |                                         | EPL | DPL                                       | HSPL | VSPL                                     | Power ON Sequence | 1'b0     | 1'b0 | 1'b0 | 1'b0 | S/W Reset | 1'b0 | 1'b0 | 1'b0 | 1'b0 | H/W Reset | 1'b0 | 1'b0 | 1'b0 | 1'b0 |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |      |      |          |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
|                                           | EPL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | DPL  | HSPL | VSPL     |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| Power ON Sequence                         | 1'b0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1'b0 | 1'b0 | 1'b0     |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| S/W Reset                                 | 1'b0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1'b0 | 1'b0 | 1'b0     |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |
| H/W Reset                                 | 1'b0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1'b0 | 1'b0 | 1'b0     |    |    |    |    |      |      |     |     |     |        |               |                                          |     |                                         |     |                                           |      |                                          |                   |          |      |      |      |           |      |      |      |      |           |      |      |      |      |

## Frame Rate Control 1 (In Normal Mode/Full Colors) (B1h)

| B1h                                                                                              | FRMCTR1 (Frame Rate Control In Normal Mode)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|------------|----|--------------------|-----------------|----|----|-----------|----|-----|------------|--|--|--|--|--|---------|-----------------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|----|-------|---|---|---|---|---|---|----|-------|---|---|---|---|---|---|----|-------|-------|--|--|--|--|--|--|--------------------|
|                                                                                                  | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | RDX | WRX | D [23:8] | D7         | D6 | D5                 | D4              | D3 | D2 | D1        | D0 | HEX |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Command                                                                                          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 1          | 0  | 1                  | 1               | 0  | 0  | 0         | 1  | B1h |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 1 <sup>st</sup> parameter                                                                        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 0          | 0  | 0                  | 0               | 0  | 0  | DIVA[1:0] |    | 00  |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 2 <sup>nd</sup> parameter                                                                        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | RTNA [7:0] |    |                    |                 |    |    |           |    | 57  |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 3 <sup>rd</sup> parameter                                                                        | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 0          | 0  | FRSA [5:0]         |                 |    |    |           |    | 03  |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Description                                                                                      | Sets the division ratio for internal clocks of the Normal Display Mode On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | $\text{Frame Rate} = \frac{\text{Fosc}}{(\text{DIVA} \times (\text{FRSA} + 1)) \times \text{RTNA} \times (\text{Display Line} + \text{VBP} + \text{VFP})}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | Fosc: Internal oscillator frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | DIVA: Division Ratio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | FRSA: Frame rate setting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | RTNA: Clocks per line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | Display Line: Total driving line number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | VBP: Back porch line number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | VFP: Front porch line number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | Note: If “VBP+VFP” < 60 or = 60, The “VBP+VFP” data of the frame rate calculation formula = 60.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | If “VBP+VFP” > 60 , The “VBP+VFP” data of the frame rate calculation formula = “VBP+VFP” real data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | <table><tr><th colspan="6">FRSA [5:0]</th><th>Decimal</th><th>Frame rate (Hz)</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>2</td><td>80.19</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>3</td><td>60.14</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>4</td><td>48.11</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>5</td><td>40.09</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>6</td><td>34.36</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>7</td><td>30.07</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>8</td><td>26.73</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>9</td><td>24.05</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>10</td><td>21.87</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>11</td><td>20.04</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>12</td><td>18.50</td></tr><tr><td colspan="7">Other</td><td>Setting prohibited</td></tr></table> |     |     |          |            |    |                    |                 |    |    |           |    |     | FRSA [5:0] |  |  |  |  |  | Decimal | Frame rate (Hz) | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 80.19 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 60.14 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 48.11 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 40.09 | 0 | 0 | 0 | 1 | 1 | 0 | 6 | 34.36 | 0 | 0 | 0 | 1 | 1 | 1 | 7 | 30.07 | 0 | 0 | 1 | 0 | 0 | 0 | 8 | 26.73 | 0 | 0 | 1 | 0 | 0 | 1 | 9 | 24.05 | 0 | 0 | 1 | 0 | 1 | 0 | 10 | 21.87 | 0 | 0 | 1 | 0 | 1 | 1 | 11 | 20.04 | 0 | 0 | 1 | 1 | 0 | 0 | 12 | 18.50 | Other |  |  |  |  |  |  | Setting prohibited |
|                                                                                                  | FRSA [5:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |            |    | Decimal            | Frame rate (Hz) |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 0   | 0        | 1          | 0  | 2                  | 80.19           |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                  | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 0   | 0        | 1          | 1  | 3                  | 60.14           |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 1   | 0        | 0          | 4  | 48.11              |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 1   | 0        | 1          | 5  | 40.09              |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 1   | 1        | 0          | 6  | 34.36              |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 1   | 1        | 1          | 7  | 30.07              |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 0   | 0        | 0          | 8  | 26.73              |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 0   | 0        | 1          | 9  | 24.05              |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 0   | 1        | 0          | 10 | 21.87              |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 0   | 1        | 1          | 11 | 20.04              |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 1   | 0        | 0          | 12 | 18.50              |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Other                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    | Setting prohibited |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Frame rate calculation example:                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Fosc = 18MHz, DIVA = 1, FRSA = 3, RTNA = 87 clock, Display Line = 800lines, VBP = VFP = 30lines. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Following the formula, the frame rate = 60.14Hz.                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |           |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |

|                                           | <div>DIVA [1:0]: division ratio for internal clocks for the Normal Display Mode On.</div> <table><tr><th colspan="2">DIVA [1:0]</th><th>Division Ratio</th></tr><tr><td>0</td><td>0</td><td>fosc</td></tr><tr><td>0</td><td>1</td><td>fosc/2</td></tr><tr><td>1</td><td>0</td><td>fosc/4</td></tr><tr><td>1</td><td>1</td><td>fosc/8</td></tr></table> <div>RTNA [7:0]: RTNA [7:0] is used to set 1H (line) period for the Normal Display Mode On.</div> <table><tr><th>RTNA [7:0]</th><th>Clock per Line</th></tr><tr><td>8'h3C</td><td>60</td></tr><tr><td>8'h3D</td><td>61</td></tr><tr><td>:</td><td>:</td></tr><tr><td>8'h57</td><td>87</td></tr><tr><td>8'h58</td><td>88</td></tr><tr><td>:</td><td>:</td></tr><tr><td>8'hFE</td><td>254</td></tr><tr><td>8'hFF</td><td>255</td></tr><tr><td>Other</td><td>Inhibit</td></tr></table> | DIVA [1:0]     |               | Division Ratio                           | 0   | 0                                       | fosc       | 0                                         | 1                 | fosc/2                                   | 1     | 0         | fosc/4    | 1     | 1     | fosc/8    | RTNA [7:0] | Clock per Line | 8'h3C | 60        | 8'h3D | 61 | : | : | 8'h57 | 87 | 8'h58 | 88 | : | : | 8'hFE | 254 | 8'hFF | 255 | Other | Inhibit |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|------------------------------------------|-----|-----------------------------------------|------------|-------------------------------------------|-------------------|------------------------------------------|-------|-----------|-----------|-------|-------|-----------|------------|----------------|-------|-----------|-------|----|---|---|-------|----|-------|----|---|---|-------|-----|-------|-----|-------|---------|
| DIVA [1:0]                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Division Ratio |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 0                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | fosc           |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 0                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | fosc/2         |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 1                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | fosc/4         |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 1                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | fosc/8         |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| RTNA [7:0]                                | Clock per Line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'h3C                                     | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'h3D                                     | 61                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| :                                         | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'h57                                     | 87                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'h58                                     | 88                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| :                                         | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'hFE                                     | 254                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'hFF                                     | 255                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Other                                     | Inhibit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Status         | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes        | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes   | Sleep In  | Yes       |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Default                                   | <table><tr><th rowspan="2">Status</th><th colspan="3">Default Value</th></tr><tr><th>DIVA [1:0]</th><th>RTNA [7:0]</th><th>FRSA [5:0]</th></tr><tr><td>Power ON Sequence</td><td>2'b00</td><td>8'h57</td><td>6'b010100</td></tr><tr><td>S/W Reset</td><td>2'b00</td><td>8'h57</td><td>6'b010100</td></tr><tr><td>H/W Reset</td><td>2'b00</td><td>8'h57</td><td>6'b010100</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Status         | Default Value |                                          |     | DIVA [1:0]                              | RTNA [7:0] | FRSA [5:0]                                | Power ON Sequence | 2'b00                                    | 8'h57 | 6'b010100 | S/W Reset | 2'b00 | 8'h57 | 6'b010100 | H/W Reset  | 2'b00          | 8'h57 | 6'b010100 |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
|                                           | DIVA [1:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | RTNA [7:0]     | FRSA [5:0]    |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Power ON Sequence                         | 2'b00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8'h57          | 6'b010100     |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| S/W Reset                                 | 2'b00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8'h57          | 6'b010100     |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| H/W Reset                                 | 2'b00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8'h57          | 6'b010100     |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |

**Frame Rate Control 2 (In Idle Mode/8 colors) (B2h)**

| B2h                                                                                               | FRMCTR2 (Frame Rate Control In Idle Mode)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|------------|----|--------------------|-----------------|----|----|------------|----|-----|------------|--|--|--|--|--|---------|-----------------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|---|-------|---|---|---|---|---|---|----|-------|---|---|---|---|---|---|----|-------|---|---|---|---|---|---|----|-------|-------|--|--|--|--|--|--|--------------------|
|                                                                                                   | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | RDX | WRX | D [23:8] | D7         | D6 | D5                 | D4              | D3 | D2 | D1         | D0 | HEX |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Command                                                                                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 1          | 0  | 1                  | 1               | 0  | 0  | 1          | 0  | B2h |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 1 <sup>st</sup> parameter                                                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 0          | 0  | 0                  | 0               | 0  | 0  | DIVB [1:0] |    | 00  |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 2 <sup>nd</sup> parameter                                                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | RTNB [7:0] |    |                    |                 |    |    |            |    | 57  |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 3 <sup>rd</sup> parameter                                                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 0          | 0  | FRSB [5:0]         |                 |    |    |            |    | 03  |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Description                                                                                       | Sets the division ratio for internal clocks of the Idle Mode On                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | <div>Frame Rate=<div>Fosc</div><div>(DIVBx(FRSB+1)) x RTNB x (Display Line+VBP+VFP)</div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | Fosc: Internal oscillator frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | DIVB: Division Ratio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | FRSB: Frame rate setting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | RTNB: Clocks per line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | Display Line: Total driving line number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | VBP: Back porch line number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | VFP: Front porch line number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | Note: If “VBP+VFP” < 60 or = 60, The “VBP+VFP” data of the frame rate calculation formula = 60.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | If “VBP+VFP” > 60 , The “VBP+VFP” data of the frame rate calculation formula = “VBP+VFP” real data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | <table><tr><th colspan="6">FRSB [5:0]</th><th>Decimal</th><th>Frame rate (Hz)</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>2</td><td>80.19</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>3</td><td>60.14</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>4</td><td>48.11</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>5</td><td>40.09</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>6</td><td>34.36</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td>7</td><td>30.07</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td>8</td><td>26.73</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>9</td><td>24.05</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td>10</td><td>21.87</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td>11</td><td>20.04</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td>12</td><td>18.50</td></tr><tr><td colspan="7">Other</td><td>Setting prohibited</td></tr></table> |     |     |          |            |    |                    |                 |    |    |            |    |     | FRSB [5:0] |  |  |  |  |  | Decimal | Frame rate (Hz) | 0 | 0 | 0 | 0 | 1 | 0 | 2 | 80.19 | 0 | 0 | 0 | 0 | 1 | 1 | 3 | 60.14 | 0 | 0 | 0 | 1 | 0 | 0 | 4 | 48.11 | 0 | 0 | 0 | 1 | 0 | 1 | 5 | 40.09 | 0 | 0 | 0 | 1 | 1 | 0 | 6 | 34.36 | 0 | 0 | 0 | 1 | 1 | 1 | 7 | 30.07 | 0 | 0 | 1 | 0 | 0 | 0 | 8 | 26.73 | 0 | 0 | 1 | 0 | 0 | 1 | 9 | 24.05 | 0 | 0 | 1 | 0 | 1 | 0 | 10 | 21.87 | 0 | 0 | 1 | 0 | 1 | 1 | 11 | 20.04 | 0 | 0 | 1 | 1 | 0 | 0 | 12 | 18.50 | Other |  |  |  |  |  |  | Setting prohibited |
|                                                                                                   | FRSB [5:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |            |    | Decimal            | Frame rate (Hz) |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
|                                                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 0   | 0        | 1          | 0  | 2                  | 80.19           |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 0   | 1        | 1          | 3  | 60.14              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 1   | 0        | 0          | 4  | 48.11              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 1   | 0        | 1          | 5  | 40.09              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 1   | 1        | 0          | 6  | 34.36              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 0   | 1   | 1        | 1          | 7  | 30.07              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 0   | 0        | 0          | 8  | 26.73              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 0   | 0        | 1          | 9  | 24.05              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 0   | 1        | 0          | 10 | 21.87              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 0   | 1        | 1          | 11 | 20.04              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | 1   | 0        | 0          | 12 | 18.50              |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Other                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    | Setting prohibited |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Frame rate calculation example:                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Fosc = 18MHz, DIVB = 1, FRSB = 20, RTNB = 87 clock, Display Line = 800lines, VBP = VFP = 30lines. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |
| Following the formula, the frame rate = 60.14Hz.                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |            |    |                    |                 |    |    |            |    |     |            |  |  |  |  |  |         |                 |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |   |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |   |   |   |   |   |   |    |       |       |  |  |  |  |  |  |                    |





**Frame Rate control 3 (In Partial Mode/Full Colors) (B3h)**

| B3h                                                                                               | FRMCTR3 (Frame Rate Control In Partial Mode)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|---------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|------------|----|------------|--------------------|-----------------|----|-----------|----|-----|------------|--|--|--|--|--|--|---------|-----------------|---|---|---|---|---|---|--|---|-------|---|---|---|---|---|---|--|---|-------|---|---|---|---|---|---|--|---|-------|---|---|---|---|---|---|--|---|-------|---|---|---|---|---|---|--|---|-------|---|---|---|---|---|---|--|---|-------|---|---|---|---|---|---|--|---|-------|---|---|---|---|---|---|--|---|-------|---|---|---|---|---|---|--|----|-------|---|---|---|---|---|---|--|----|-------|---|---|---|---|---|---|--|----|-------|-------|--|--|--|--|--|--|--|--------------------|--|
|                                                                                                   | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | RDX | WRX | D [23:8] | D7         | D6 | D5         | D4                 | D3              | D2 | D1        | D0 | HEX |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| Command                                                                                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | ↑   | XX       | 1          | 0  | 1          | 1                  | 0               | 0  | 1         | 1  | B3h |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 1 <sup>st</sup> parameter                                                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | ↑   | XX       | 0          | 0  | 0          | 0                  | 0               | 0  | DIVC[1:0] |    | 00  |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 2 <sup>nd</sup> parameter                                                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | ↑   | XX       | RTNC [7:0] |    |            |                    |                 |    |           |    | 57  |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 3 <sup>rd</sup> parameter                                                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | ↑   | XX       | 0          | 0  | FRSC [5:0] |                    |                 |    |           |    | 03  |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| Description                                                                                       | Sets the division ratio for internal clocks of Partial Mode On.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | <div>Frame Rate=<math display="block">\frac{\text{Fosc}}{(\text{DIVC} \times (\text{FRSC} + 1)) \times \text{RTNC} \times (\text{Display Line} + \text{VBP} + \text{VFP})}</math></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | Fosc: Internal oscillator frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | DIVC: Division Ratio                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | FRSC: Frame rate setting                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | RTNC: Clocks per line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | Display Line: Total driving line number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | VBP: Back porch line number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | VFP: Front porch line number                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | Note: If “VBP+VFP” < 60 or = 60, The “VBP+VFP” data of the frame rate calculation formula = 60.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | If “VBP+VFP” > 60 , The “VBP+VFP” data of the frame rate calculation formula = “VBP+VFP” real data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | <table><tr><th colspan="7">FRSC [5:0]</th><th>Decimal</th><th>Frame rate (Hz)</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td></td><td>2</td><td>80.19</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td></td><td>3</td><td>60.14</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td></td><td>4</td><td>48.11</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td></td><td>5</td><td>40.09</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td></td><td>6</td><td>34.36</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>1</td><td></td><td>7</td><td>30.07</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td><td></td><td>8</td><td>26.73</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td></td><td>9</td><td>24.05</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>0</td><td></td><td>10</td><td>21.87</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>1</td><td></td><td>11</td><td>20.04</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>0</td><td>0</td><td></td><td>12</td><td>18.50</td></tr><tr><td colspan="8">Other</td><td colspan="2">Setting prohibited</td></tr></table> |     |     |          |            |    |            |                    |                 |    |           |    |     | FRSC [5:0] |  |  |  |  |  |  | Decimal | Frame rate (Hz) | 0 | 0 | 0 | 0 | 1 | 0 |  | 2 | 80.19 | 0 | 0 | 0 | 0 | 1 | 1 |  | 3 | 60.14 | 0 | 0 | 0 | 1 | 0 | 0 |  | 4 | 48.11 | 0 | 0 | 0 | 1 | 0 | 1 |  | 5 | 40.09 | 0 | 0 | 0 | 1 | 1 | 0 |  | 6 | 34.36 | 0 | 0 | 0 | 1 | 1 | 1 |  | 7 | 30.07 | 0 | 0 | 1 | 0 | 0 | 0 |  | 8 | 26.73 | 0 | 0 | 1 | 0 | 0 | 1 |  | 9 | 24.05 | 0 | 0 | 1 | 0 | 1 | 0 |  | 10 | 21.87 | 0 | 0 | 1 | 0 | 1 | 1 |  | 11 | 20.04 | 0 | 0 | 1 | 1 | 0 | 0 |  | 12 | 18.50 | Other |  |  |  |  |  |  |  | Setting prohibited |  |
|                                                                                                   | FRSC [5:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |            |    |            | Decimal            | Frame rate (Hz) |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0   | 0   | 0        | 1          | 0  |            | 2                  | 80.19           |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
|                                                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0   | 0   | 0        | 1          | 1  |            | 3                  | 60.14           |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0   | 1   | 0        | 0          |    | 4          | 48.11              |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0   | 1   | 0        | 1          |    | 5          | 40.09              |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0   | 1   | 1        | 0          |    | 6          | 34.36              |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0   | 1   | 1        | 1          |    | 7          | 30.07              |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | 0   | 0        | 0          |    | 8          | 26.73              |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | 0   | 0        | 1          |    | 9          | 24.05              |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | 0   | 1        | 0          |    | 10         | 21.87              |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | 0   | 1        | 1          |    | 11         | 20.04              |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| 0                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1   | 1   | 0        | 0          |    | 12         | 18.50              |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| Other                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |            |    |            | Setting prohibited |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| Frame rate calculation example:                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| Fosc = 18MHz, DIVC = 1, FRSC = 20, RTNC = 87 clock, Display Line = 800lines, VBP = VFP = 30lines. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |
| Following the formula, the frame rate = 60.14Hz.                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |            |    |            |                    |                 |    |           |    |     |            |  |  |  |  |  |  |         |                 |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |   |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |   |   |   |   |   |   |  |    |       |       |  |  |  |  |  |  |  |                    |  |

|                                           | <div>DIVC [1:0]: division ratio for internal clocks for the Partial Mode On</div> <table><tr><th colspan="2">DIVC [1:0]</th><th>Division Ratio</th></tr><tr><td>0</td><td>0</td><td>fosc</td></tr><tr><td>0</td><td>1</td><td>fosc/2</td></tr><tr><td>1</td><td>0</td><td>fosc/4</td></tr><tr><td>1</td><td>1</td><td>fosc/8</td></tr></table> <div>RTNC [7:0]: RTNC [7:0] is used to set 1H (line) period for the Partial Mode On.</div> <table><tr><th>RTNC [7:0]</th><th>Clock per Line</th></tr><tr><td>8'h3C</td><td>60</td></tr><tr><td>8'h3D</td><td>61</td></tr><tr><td>:</td><td>:</td></tr><tr><td>8'h57</td><td>87</td></tr><tr><td>8'h58</td><td>88</td></tr><tr><td>:</td><td>:</td></tr><tr><td>8'hFE</td><td>254</td></tr><tr><td>8'hFF</td><td>255</td></tr><tr><td>Other</td><td>Inhibit</td></tr></table> | DIVC [1:0]     |               | Division Ratio                           | 0   | 0                                       | fosc       | 0                                         | 1                 | fosc/2                                   | 1     | 0         | fosc/4    | 1     | 1     | fosc/8    | RTNC [7:0] | Clock per Line | 8'h3C | 60        | 8'h3D | 61 | : | : | 8'h57 | 87 | 8'h58 | 88 | : | : | 8'hFE | 254 | 8'hFF | 255 | Other | Inhibit |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|------------------------------------------|-----|-----------------------------------------|------------|-------------------------------------------|-------------------|------------------------------------------|-------|-----------|-----------|-------|-------|-----------|------------|----------------|-------|-----------|-------|----|---|---|-------|----|-------|----|---|---|-------|-----|-------|-----|-------|---------|
| DIVC [1:0]                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Division Ratio |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 0                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | fosc           |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 0                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | fosc/2         |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 1                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | fosc/4         |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 1                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | fosc/8         |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| RTNC [7:0]                                | Clock per Line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'h3C                                     | 60                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'h3D                                     | 61                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| :                                         | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'h57                                     | 87                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'h58                                     | 88                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| :                                         | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'hFE                                     | 254                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| 8'hFF                                     | 255                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Other                                     | Inhibit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                  | Status         | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes        | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes   | Sleep In  | Yes       |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Default                                   | <table><tr><th rowspan="2">Status</th><th colspan="3">Default Value</th></tr><tr><th>DIVC [1:0]</th><th>RTNC [7:0]</th><th>FRSC [5:0]</th></tr><tr><td>Power ON Sequence</td><td>2'b00</td><td>8'h57</td><td>6'b010100</td></tr><tr><td>S/W Reset</td><td>2'b00</td><td>8'h57</td><td>6'b010100</td></tr><tr><td>H/W Reset</td><td>2'b00</td><td>8'h57</td><td>6'b010100</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                  | Status         | Default Value |                                          |     | DIVC [1:0]                              | RTNC [7:0] | FRSC [5:0]                                | Power ON Sequence | 2'b00                                    | 8'h57 | 6'b010100 | S/W Reset | 2'b00 | 8'h57 | 6'b010100 | H/W Reset  | 2'b00          | 8'h57 | 6'b010100 |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                |               |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
|                                           | DIVC [1:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | RTNC [7:0]     | FRSC [5:0]    |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| Power ON Sequence                         | 2'b00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8'h57          | 6'b010100     |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| S/W Reset                                 | 2'b00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8'h57          | 6'b010100     |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |
| H/W Reset                                 | 2'b00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8'h57          | 6'b010100     |                                          |     |                                         |            |                                           |                   |                                          |       |           |           |       |       |           |            |                |       |           |       |    |   |   |       |    |       |    |   |   |       |     |       |     |       |         |

## Display Inversion Control (B4h)

| _B4h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                | INVTR (Display Inversion Control) |     |                 |                  |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----|-----------------|------------------|----|----|----|-----------|----|----|----|--------|-------------------|---|---|---|-----------|---|--------|---|---|------------------|---|---|---|--------|-----------------|---|---|---|---|-----------------|--------|---|---|---|-----------------|---|---|--------|---|-----------------|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|--------|---|---|---|---|---|---|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                            | RDX                               | WRX | D [23:8]        | D7               | D6 | D5 | D4 | D3        | D2 | D1 | D0 | HEX    |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                                 | ↑   | XX              | 1                | 0  | 1  | 1  | 0         | 1  | 0  | 0  | B4h    |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 1 <sup>st</sup> parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                                 | ↑   | XX              | 0                | 0  | 0  | 0  | NLA [3:0] |    |    |    | 00     |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 2 <sup>nd</sup> parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                                 | ↑   | XX              | 0                | 0  | 0  | 0  | NLB [3:0] |    |    |    | 00     |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 3 <sup>rd</sup> parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                                 | ↑   | XX              | 0                | 0  | 0  | 0  | NLC [3:0] |    |    |    | 00     |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Set Display inversion mode                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                   |     |                 |                  |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | NLA [3:0]: Inversion setting in full colors normal mode (Normal Mode On)                                                                                                                                                                                                                                                                                                                                                                                       |                                   |     |                 |                  |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | NLB [3:0]: Inversion setting in Idle mode (Idle Mode On)                                                                                                                                                                                                                                                                                                                                                                                                       |                                   |     |                 |                  |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | NLC [3:0]: Inversion setting in full colors partial mode (Partial Mode On/Idle Mode Off)                                                                                                                                                                                                                                                                                                                                                                       |                                   |     |                 |                  |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <table><tr><th colspan="4">NLA/NLB/NLC [3:0]</th><th>Inversion</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>Column inversion</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>1 dot inversion</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>2 dot inversion</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>3 dot inversion</td></tr><tr><td>0</td><td>1</td><td>0</td><td>0</td><td>4 dot inversion</td></tr></table> |                                   |     |                 |                  |    |    |    |           |    |    |    |        | NLA/NLB/NLC [3:0] |   |   |   | Inversion | 0 | 0      | 0 | 0 | Column inversion | 0 | 0 | 0 | 1      | 1 dot inversion | 0 | 0 | 1 | 0 | 2 dot inversion | 0      | 0 | 1 | 1 | 3 dot inversion | 0 | 1 | 0      | 0 | 4 dot inversion |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | NLA/NLB/NLC [3:0]                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                   |     |                 | Inversion        |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                                 | 0   | 0               | Column inversion |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                                 | 0   | 1               | 1 dot inversion  |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                                 | 1   | 0               | 2 dot inversion  |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                                 | 1   | 1               | 3 dot inversion  |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                                 | 0   | 4 dot inversion |                  |    |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| <p style="text-align: center;">Column Inversion</p> <div><div><p>1st frame</p><table><tr><td>1 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr><tr><td>2 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr><tr><td>3 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr><tr><td>4 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr></table></div><div><p>2nd frame</p><table><tr><td>1 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr><tr><td>2 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr><tr><td>3 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr><tr><td>4 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr></table></div></div> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |     |                 |                  |    |    |    |           |    |    |    | 1 line | +                 | - | + | - | +         | - | 2 line | + | - | +                | - | + | - | 3 line | +               | - | + | - | + | -               | 4 line | + | - | + | -               | + | - | 1 line | - | +               | - | + | - | + | 2 line | - | + | - | + | - | + | 3 line | - | + | - | + | - | + | 4 line | - | + | - | + | - | + |
| 1 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 2 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 3 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 4 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 1 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 2 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 3 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 4 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| <p style="text-align: center;">1-Dot Inversion</p> <div><div><p>1st frame</p><table><tr><td>1 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr><tr><td>2 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr><tr><td>3 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr><tr><td>4 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr></table></div><div><p>2nd frame</p><table><tr><td>1 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr><tr><td>2 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr><tr><td>3 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr><tr><td>4 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr></table></div></div>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |     |                 |                  |    |    |    |           |    |    |    | 1 line | +                 | - | + | - | +         | - | 2 line | - | + | -                | + | - | + | 3 line | +               | - | + | - | + | -               | 4 line | - | + | - | +               | - | + | 1 line | - | +               | - | + | - | + | 2 line | + | - | + | - | + | - | 3 line | - | + | - | + | - | + | 4 line | + | - | + | - | + | - |
| 1 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 2 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 3 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 4 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 1 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 2 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 3 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 4 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| <p style="text-align: center;">2-Dot Inversion</p> <div><div><p>1st frame</p><table><tr><td>1 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr><tr><td>2 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr><tr><td>3 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr><tr><td>4 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr></table></div><div><p>2nd frame</p><table><tr><td>1 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr><tr><td>2 line</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td></tr><tr><td>3 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr><tr><td>4 line</td><td>+</td><td>-</td><td>+</td><td>-</td><td>+</td><td>-</td></tr></table></div></div>  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                   |     |                 |                  |    |    |    |           |    |    |    | 1 line | +                 | - | + | - | +         | - | 2 line | + | - | +                | - | + | - | 3 line | -               | + | - | + | - | +               | 4 line | - | + | - | +               | - | + | 1 line | - | +               | - | + | - | + | 2 line | - | + | - | + | - | + | 3 line | + | - | + | - | + | - | 4 line | + | - | + | - | + | - |
| 1 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 2 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 3 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 4 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 1 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 2 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                 | -   | +               | -                | +  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 3 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |
| 4 line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | +                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                                 | +   | -               | +                | -  |    |    |           |    |    |    |        |                   |   |   |   |           |   |        |   |   |                  |   |   |   |        |                 |   |   |   |   |                 |        |   |   |   |                 |   |   |        |   |                 |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |        |   |   |   |   |   |   |

|                                           | <div><div>3-Dot Inversion</div><div><div><div>1st frame</div><div><div>1 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>2 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>3 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>4 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>5 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>6 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div></div><div>→</div><div><div>2nd frame</div><div><div>1 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>2 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>3 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>4 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>5 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>6 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div></div></div></div></div></div> |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|-----------|-------------------------------------------|-----------|------------------------------------------|-----|----------|-----|
|                                           | <div><div>4-Dot Inversion</div><div><div><div>1st frame</div><div><div>1 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>2 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>3 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>4 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>5 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>6 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div></div><div>→</div><div><div>2nd frame</div><div><div>1 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>2 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>3 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>4 line</div><div><div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div></div></div><div>5 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div><div>6 line</div><div><div><div>+</div><div>-</div><div>+</div><div>-</div><div>+</div><div>-</div></div></div></div></div></div></div></div> |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes       | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Default                                   | <table><tr><th rowspan="2">Status</th><th>Default Value</th></tr><tr><th>NLA/NLB/NLC [3:0]</th></tr><tr><td>Power ON Sequence</td><td>4'b0000</td></tr><tr><td>S/W Reset</td><td>4'b0000</td></tr><tr><td>H/W Reset</td><td>4'b0000</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Status | Default Value | NLA/NLB/NLC [3:0]                        | Power ON Sequence | 4'b0000                                 | S/W Reset | 4'b0000                                   | H/W Reset | 4'b0000                                  |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                                           | NLA/NLB/NLC [3:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Power ON Sequence                         | 4'b0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| S/W Reset                                 | 4'b0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| H/W Reset                                 | 4'b0000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |

## Blanking Porch Control (B5h)

| B5h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                  |     | BLKPRH (Blanking Porch) |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----|-------------------------|-----------|----|----|----|----|----|-----------|----|-----------|----------------------------------|----------------------------------|------------------------------------------|--------------------|-----------------------------------------|--------------------|-------------------------------------------|------------|------------------------------------------|------------|-----------------------|-----|---|---|----------|------------|----------|------------|----------|-----|--|--|--|--|----------|-----|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | RDX                              | WRX | D [23:8]                | D7        | D6 | D5 | D4 | D3 | D2 | D1        | D0 | HEX       |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                | ↑   | XX                      | 1         | 0  | 1  | 1  | 0  | 1  | 0         | 1  | B5h       |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 1 <sup>st</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                | ↑   | XX                      | VFP [7:0] |    |    |    |    |    |           |    | 14        |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 2 <sup>nd</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                | ↑   | XX                      | VBP [7:0] |    |    |    |    |    |           |    | 14        |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 3 <sup>rd</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                | ↑   | XX                      | HBP [7:0] |    |    |    |    |    |           |    | 04        |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 4 <sup>th</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                | ↑   | XX                      | 0         | 0  | 0  | 0  | 0  | 0  | HBP [9:8] |    | 00        |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>VFP [7:0]/VBP [7:0]:</b> The VFP [7:0] and VBP [7:0] bits specify the line number of vertical front and back porch period respectively.                                                                                                                                                                                                                                                                                                                                                                                                                  |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <table><tr><th>VFP [7:0]<br/>VBP [7:0]</th><th>Number of HS of front/back porch</th></tr><tr><td>00000000</td><td>Setting prohibited</td></tr><tr><td>00000001</td><td>Setting prohibited</td></tr><tr><td>00000010</td><td>2</td></tr><tr><td>00000011</td><td>3</td></tr><tr><td>:</td><td>:</td></tr><tr><td>:</td><td>:</td></tr><tr><td>01111101</td><td>125</td></tr><tr><td>01111110</td><td>126</td></tr><tr><td>01111111</td><td>127</td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td>11111111</td><td>255</td></tr></table> |                                  |     |                         |           |    |    |    |    |    |           |    |           | VFP [7:0]<br>VBP [7:0]           | Number of HS of front/back porch | 00000000                                 | Setting prohibited | 00000001                                | Setting prohibited | 00000010                                  | 2          | 00000011                                 | 3          | :                     | :   | : | : | 01111101 | 125        | 01111110 | 126        | 01111111 | 127 |  |  |  |  | 11111111 | 255 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | VFP [7:0]<br>VBP [7:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Number of HS of front/back porch |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 00000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Setting prohibited               |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 00000001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Setting prohibited               |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 00000010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2                                |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 00000011                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 3                                |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | :                                |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | :                                |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 01111101                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 125                              |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 01111110                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 126                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 01111111                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 127                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 11111111                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 255                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| <b>HBP [9:0]:</b> The HBP [9:0] bits specify the line number of horizontal back porch period.                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| <table><tr><th>HBP [9:0]</th><th>Number of PCLK of the back porch</th></tr><tr><td>0000000000</td><td>Setting prohibited</td></tr><tr><td>0000000001</td><td>Setting prohibited</td></tr><tr><td>0000000010</td><td>2</td></tr><tr><td>0000000011</td><td>3</td></tr><tr><td>0000000100</td><td>4 (HBP [9:0] default)</td></tr><tr><td>:</td><td>:</td></tr><tr><td>:</td><td>:</td></tr><tr><td>1111111110</td><td>1022</td></tr><tr><td>1111111111</td><td>1023</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                  |     |                         |           |    |    |    |    |    |           |    | HBP [9:0] | Number of PCLK of the back porch | 0000000000                       | Setting prohibited                       | 0000000001         | Setting prohibited                      | 0000000010         | 2                                         | 0000000011 | 3                                        | 0000000100 | 4 (HBP [9:0] default) | :   | : | : | :        | 1111111110 | 1022     | 1111111111 | 1023     |     |  |  |  |  |          |     |
| HBP [9:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Number of PCLK of the back porch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 0000000000                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Setting prohibited                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 0000000001                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Setting prohibited                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 0000000010                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 0000000011                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 0000000100                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 4 (HBP [9:0] default)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 1111111110                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| 1111111111                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1023                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| <b>Note:</b> <i>VBP[6:0]=(VLW+VBP) line number, HBP[9:0]=(HLW+HBP) line number.</i>                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Restriction                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Register Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                  |                                  |     |                         |           |    |    |    |    |    |           |    |           | Status                           | Availability                     | Normal Mode On, Idle Mode Off, Sleep Out | Yes                | Normal Mode On, Idle Mode On, Sleep Out | Yes                | Partial Mode On, Idle Mode Off, Sleep Out | Yes        | Partial Mode On, Idle Mode On, Sleep Out | Yes        | Sleep In              | Yes |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                            | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                             | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                           | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                            | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |
| Sleep In                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |     |                         |           |    |    |    |    |    |           |    |           |                                  |                                  |                                          |                    |                                         |                    |                                           |            |                                          |            |                       |     |   |   |          |            |          |            |          |     |  |  |  |  |          |     |

| Default |  | Status            | Default Value |           |           |           |
|---------|--|-------------------|---------------|-----------|-----------|-----------|
|         |  |                   | VFP [7:0]     | VBP [7:0] | HBP [7:0] | HBP [9:8] |
|         |  | Power ON Sequence | 8'h14         | 8'h14     | 8'h04     | 2'b00     |
|         |  | S/W Reset         | 8'h14         | 8'h14     | 8'h04     | 2'b00     |
|         |  | H/W Reset         | 8'h14         | 8'h14     | 8'h04     | 2'b00     |

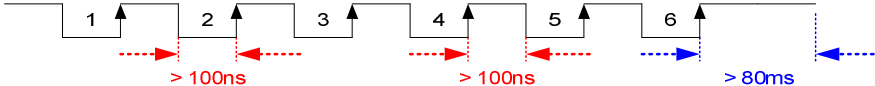
## Display Function Control (B6h)

| B6h                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | DISCTRL (Display Function Control) |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----|----------|-----------|---------|----|----|----|----|----------|----|---------|--------------------------|-----------------------------------|-----------------------|------------------------------------------|---------------|------------------|-----------------------------------------|----|---------------|-------------------------------------------|---------|-----|------------------------------------------|--|-----|----------|--|-----|
|                                                                                                                                                                                                                                             | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX                                | WRX | D [23:8] | D7        | D6      | D5 | D4 | D3 | D2 | D1       | D0 | HEX     |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Command                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                                  | ↑   | XX       | 1         | 0       | 1  | 1  | 0  | 1  | 1        | 0  | B6h     |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| 1 <sup>st</sup> parameter                                                                                                                                                                                                                   | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                                  | ↑   | XX       | SYNC mode | BP GRAM | RM | DM | 0  | 0  | PT [1:0] |    | 02      |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Description                                                                                                                                                                                                                                 | <b>SYNC mode:</b> Select the operation mode of the RGB interface                                                                                                                                                                                                                                                                                                                                                                                                   |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|                                                                                                                                                                                                                                             | <table><tr><th>SYNC mode</th><th>RGB interface selection</th></tr><tr><td>0</td><td>DE mode</td></tr><tr><td>1</td><td>SYNC mode</td></tr></table>                                                                                                                                                                                                                                                                                                                 |                                    |     |          |           |         |    |    |    |    |          |    |         | SYNC mode                | RGB interface selection           | 0                     | DE mode                                  | 1             | SYNC mode        |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|                                                                                                                                                                                                                                             | SYNC mode                                                                                                                                                                                                                                                                                                                                                                                                                                                          | RGB interface selection            |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|                                                                                                                                                                                                                                             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | DE mode                            |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|                                                                                                                                                                                                                                             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SYNC mode                          |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|                                                                                                                                                                                                                                             | <b>BPGRAM:</b> Select the RGB interface operation of the bypass GRAM mode.                                                                                                                                                                                                                                                                                                                                                                                         |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|                                                                                                                                                                                                                                             | <table><tr><th>BPGRAM</th><th>Bypass GRAM selection</th></tr><tr><td>0</td><td>Non bypass GRAM mode</td></tr><tr><td>1</td><td>Bypass GRAM mode</td></tr></table>                                                                                                                                                                                                                                                                                                  |                                    |     |          |           |         |    |    |    |    |          |    |         | BPGRAM                   | Bypass GRAM selection             | 0                     | Non bypass GRAM mode                     | 1             | Bypass GRAM mode |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|                                                                                                                                                                                                                                             | BPGRAM                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Bypass GRAM selection              |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|                                                                                                                                                                                                                                             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Non bypass GRAM mode               |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
|                                                                                                                                                                                                                                             | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Bypass GRAM mode                   |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| <b>RM:</b> Select the interface to access the GRAM. When RM = 0, the driver will write display data to the GRAM via the system interface, and the driver will write display data to the GRAM via RGB interface when RM = 1.                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| <table><tr><th>RM</th><th>Interface for RAM access</th></tr><tr><td>0</td><td>System interface</td></tr><tr><td>1</td><td>RGB interface</td></tr></table>                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |     |          |           |         |    |    |    |    |          |    | RM      | Interface for RAM access | 0                                 | System interface      | 1                                        | RGB interface |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| RM                                                                                                                                                                                                                                          | Interface for RAM access                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| 0                                                                                                                                                                                                                                           | System interface                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| 1                                                                                                                                                                                                                                           | RGB interface                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| <b>DM:</b> Select the display operation mode.                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| <table><tr><th>DM</th><th>Interface for RAM access</th></tr><tr><td>0</td><td>Internal system clock</td></tr><tr><td>1</td><td>RGB interface</td></tr></table>                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |     |          |           |         |    |    |    |    |          |    | DM      | Interface for RAM access | 0                                 | Internal system clock | 1                                        | RGB interface |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| DM                                                                                                                                                                                                                                          | Interface for RAM access                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| 0                                                                                                                                                                                                                                           | Internal system clock                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| 1                                                                                                                                                                                                                                           | RGB interface                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| <b>PT [1:0]:</b> Determine source/VCOM output in a non-display area in the partial display mode.                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| <table><tr><th colspan="2">PT[1:0]</th><th>Source output on non-display area</th></tr><tr><td>1</td><td>0</td><td>V255</td></tr><tr><td>1</td><td>1</td><td>V0</td></tr><tr><td colspan="2">Other setting</td><td>Inhibit</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |     |          |           |         |    |    |    |    |          |    | PT[1:0] |                          | Source output on non-display area | 1                     | 0                                        | V255          | 1                | 1                                       | V0 | Other setting |                                           | Inhibit |     |                                          |  |     |          |  |     |
| PT[1:0]                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Source output on non-display area  |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| 1                                                                                                                                                                                                                                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | V255                               |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| 1                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | V0                                 |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Other setting                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Inhibit                            |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Restriction                                                                                                                                                                                                                                 | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                  |                                    |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Register Availability                                                                                                                                                                                                                       | <table><tr><th colspan="2">Status</th><th>Availability</th></tr><tr><td colspan="2">Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Sleep In</td><td>Yes</td></tr></table> |                                    |     |          |           |         |    |    |    |    |          |    |         | Status                   |                                   | Availability          | Normal Mode On, Idle Mode Off, Sleep Out |               | Yes              | Normal Mode On, Idle Mode On, Sleep Out |    | Yes           | Partial Mode On, Idle Mode Off, Sleep Out |         | Yes | Partial Mode On, Idle Mode On, Sleep Out |  | Yes | Sleep In |  | Yes |
| Status                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Availability                       |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                                |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                                |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                                |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                                |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |
| Sleep In                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                                |     |          |           |         |    |    |    |    |          |    |         |                          |                                   |                       |                                          |               |                  |                                         |    |               |                                           |         |     |                                          |  |     |          |  |     |



|         |                   |               |        |      |      |           |
|---------|-------------------|---------------|--------|------|------|-----------|
| Default |                   |               |        |      |      |           |
|         | Status            | Default Value |        |      |      |           |
|         |                   | PT [1:0]      | BPGRAM | RM   | DM   | SYNC Mode |
|         | Power ON Sequence | 2'b10         | 1'b0   | 1'b0 | 1'b0 | 1'b0      |
|         | S/W Reset         | 2'b10         | 1'b0   | 1'b0 | 1'b0 | 1'b0      |
|         | H/W Reset         | 2'b10         | 1'b0   | 1'b0 | 1'b0 | 1'b0      |

## Entry Mode Set (B7h)

| B7h                                       | ETMOD (Entry Mode Set)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|----------|----|----|----|-----|------|----|----|-----|-----|--------|---------------------|--------------|------------------------------------------|------|-----------------------------------------|-----|-------------------------------------------|------|------------------------------------------|------|-----------|------|------|------|-----------|------|------|------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | RDX                                                                                                                                                                                                                                                                                                                                                                                        | WRX  | D [23:8] | D7 | D6 | D5 | D4  | D3   | D2 | D1 | D0  | HEX |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑    | XX       | 1  | 0  | 1  | 1   | 0    | 1  | 1  | 1   | B7h |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1                                                                                                                                                                                                                                                                                                                                                                                          | ↑    | XX       | 0  | 0  | 0  | PDR | DSTB | 1  | 1  | LVD | 10  |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| Description                               | <p><b>DSTB:</b> The ILI9806H driver enters the Deep Standby Mode when DSTB is set to high (= 1). In the Deep Standby mode, both internal logic power and SRAM power are turned off, and the display data stored in the Frame Memory and the instructions are not saved. Rewrite Frame Memory content and instructions after exiting the Deep Standby Mode.</p> <p>The ILI9806H provides two ways to exit the Deep Standby Mode:</p> <p>(1) Exit the Deep Standby Mode by pulling down the CSX to low (= 0) 6 times.</p> <p>(2) Input a RESX pulse with effective low level duration to start up the inner logic regulator and make a transition to the initial state.</p> <div><p>CSX</p></div> <div><p>WRX</p><p>"High"</p></div> <div><p>RDX</p><p>"High"</p></div> <div><p>DCX</p><p>"Low" or "High"</p></div> <div><p>DB[23:0]</p><p>"Low" or "High"</p></div> |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|                                           | <p><b>LVD:</b> Low voltage detection control.</p> <table><tr><th>LVD</th><th>Low voltage control</th></tr><tr><td>0</td><td>Enable</td></tr><tr><td>1</td><td>Disable</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     | LVD    | Low voltage control | 0            | Enable                                   | 1    | Disable                                 |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|                                           | LVD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Low voltage control                                                                                                                                                                                                                                                                                                                                                                        |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|                                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Enable                                                                                                                                                                                                                                                                                                                                                                                     |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Disable                                                                                                                                                                                                                                                                                                                                                                                    |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|                                           | <p><b>PDR:</b> The ILI9806H driver enters the "SLPIN" mode, PDR is set to high (=0) then GRAM internal power shutdown.</p> <p>Note1: The <b>PDR</b> function only operation in SLPIN mode.</p> <p>Note2:: When <b>PDR</b> set to high(=0) , the data content of GRAM will be to random state.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|                                           | Restriction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|                                           | Register Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |      |          |    |    |    |     |      |    |    |     |     |        | Status              | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes  | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes  | Partial Mode On, Idle Mode On, Sleep Out | Yes  | Sleep In  | Yes  |      |      |           |      |      |      |
|                                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Availability                                                                                                                                                                                                                                                                                                                                                                               |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|                                           | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Yes                                                                                                                                                                                                                                                                                                                                                                                        |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| Default                                   | <table><tr><th rowspan="2">Status</th><th colspan="3">Default Value</th></tr><tr><th>DSTB</th><th>PDR</th><th>LVD</th></tr><tr><td>Power ON Sequence</td><td>1'b0</td><td>1'b0</td><td>1'b0</td></tr><tr><td>S/W Reset</td><td>1'b0</td><td>1'b0</td><td>1'b0</td></tr><tr><td>H/W Reset</td><td>1'b0</td><td>1'b0</td><td>1'b0</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     | Status | Default Value       |              |                                          | DSTB | PDR                                     | LVD | Power ON Sequence                         | 1'b0 | 1'b0                                     | 1'b0 | S/W Reset | 1'b0 | 1'b0 | 1'b0 | H/W Reset | 1'b0 | 1'b0 | 1'b0 |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                            |      |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
|                                           | DSTB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | PDR                                                                                                                                                                                                                                                                                                                                                                                        | LVD  |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| Power ON Sequence                         | 1'b0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1'b0                                                                                                                                                                                                                                                                                                                                                                                       | 1'b0 |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| S/W Reset                                 | 1'b0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1'b0                                                                                                                                                                                                                                                                                                                                                                                       | 1'b0 |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |
| H/W Reset                                 | 1'b0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1'b0                                                                                                                                                                                                                                                                                                                                                                                       | 1'b0 |          |    |    |    |     |      |    |    |     |     |        |                     |              |                                          |      |                                         |     |                                           |      |                                          |      |           |      |      |      |           |      |      |      |

## Interface Setting (B8h)

| Frame Memory Access and Interface Setting                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------|----------|----|--------|-----------|----|----|----|----|----|--------|--------------|------------------------------------------|-----|-----------------------------------------|-----------|-------------------------------------------|------|------------------------------------------|-----------|----------|-------|
| B8H                                                                                                                                                                                                                                                                                                                                                                                                                      | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | RDX           | WRX       | D [23:8] | D7 | D6     | D5        | D4 | D3 | D2 | D1 | D0 | HEX    |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| Command                                                                                                                                                                                                                                                                                                                                                                                                                  | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1             | ↑         | XX       | 1  | 0      | 1         | 1  | 1  | 0  | 0  | 0  | B8h    |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| 1 <sup>st</sup> parameter                                                                                                                                                                                                                                                                                                                                                                                                | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1             | ↑         | XX       | 0  | WEMODE | EPF [1:0] |    | 0  | 0  | 0  | 0  | 70     |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| Description                                                                                                                                                                                                                                                                                                                                                                                                              | <b>WEMODE:</b> Memory write control<br><br>WEMODE = 0: When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the exceeding data is ignored.<br><br>WEMODE = 1: When the transfer number of data exceeds (EC-SC+1)*(EP-SP+1), the column and page number are reset, and the exceeding data is written into the following column and page.<br><br><b>EPF [1:0]:</b> Set the data format from 16/18-bit (R, G, B) to 24-bit (r, g, b) that is stored in the internal GRAM.<br><br>See chapter 0 “16/18-bit color data mapping to 24-bit pixel data operation” for detail description. |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                          | Restriction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                          | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                          | Register Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| <table><thead><tr><th>Status</th><th>Availability</th></tr></thead><tbody><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></tbody></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |           |          |    |        |           |    |    |    |    |    | Status | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes  | Partial Mode On, Idle Mode On, Sleep Out | Yes       | Sleep In | Yes   |
| Status                                                                                                                                                                                                                                                                                                                                                                                                                   | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| Sleep In                                                                                                                                                                                                                                                                                                                                                                                                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| Default                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |               |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                          | <table><thead><tr><th rowspan="2">Status</th><th colspan="2">Default Value</th></tr><tr><th>WEMODE</th><th>EPF [1:0]</th></tr></thead><tbody><tr><td>Power ON Sequence</td><td>1b'1</td><td>2b'11</td></tr><tr><td>H/W Reset</td><td>1b'1</td><td>2b'11</td></tr></tbody></table>                                                                                                                                                                                                                                                                                                          |               |           |          |    |        |           |    |    |    |    |    |        | Status       | Default Value                            |     | WEMODE                                  | EPF [1:0] | Power ON Sequence                         | 1b'1 | 2b'11                                    | H/W Reset | 1b'1     | 2b'11 |
|                                                                                                                                                                                                                                                                                                                                                                                                                          | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Default Value |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
|                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | WEMODE        | EPF [1:0] |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| Power ON Sequence                                                                                                                                                                                                                                                                                                                                                                                                        | 1b'1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2b'11         |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |
| H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                | 1b'1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2b'11         |           |          |    |        |           |    |    |    |    |    |        |              |                                          |     |                                         |           |                                           |      |                                          |           |          |       |

**Panel Control (B9h)**

| B9h                                                                       | PANELCTRL (Set panel operation mode)                                                                                                                                                                                                                                                                                                                                                       |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------------------------------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------|--------------|---------------|--------------|---------------|--------------|-----|----------|------------------------------|------------------------------------------|------------|-----------------------------------------|------------|-------------------------------------------|--------|------------------------------------------|---------|----------|-------|-------------|---|----------------|--------|-------|-------------|--------|-------|---------|
|                                                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX                  | WRX                            | D [23:8]                                    | D7                                                                                                                                                                                                                                                                                                                                                                                                                                             | D6           | D5           | D4           | D3            | D2           | D1            | D0           | HEX |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Command                                                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1                    | ↑                              | XX                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0            | 1            | 1            | 1             | 0            | 0             | 1            | B9h |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| 1 <sup>st</sup> parameter                                                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1                    | ↑                              | XX                                          | MY_<br>Panel                                                                                                                                                                                                                                                                                                                                                                                                                                   | MX_<br>Panel | MV_<br>Panel | ML_<br>Panel | BGR_<br>Panel | MH_<br>Panel | SS_<br>Panel  | GS_<br>Panel | 00  |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| 2 <sup>nd</sup> parameter                                                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1                    | ↑                              | XX                                          | 0                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0            | 0            | 0            | 0             | 0            | REV_<br>Panel | 0            | 00  |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Description                                                               | This command defines the panel operation mode.                                                                                                                                                                                                                                                                                                                                             |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           | Symbol                                                                                                                                                                                                                                                                                                                                                                                     |                      | Name                           |                                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                    |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           | MY_Panel                                                                                                                                                                                                                                                                                                                                                                                   |                      | Panel Row Address Order        |                                             | These 3 bits control the write/read direction from the MPU to the memory.                                                                                                                                                                                                                                                                                                                                                                      |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           | MX_Panel                                                                                                                                                                                                                                                                                                                                                                                   |                      | Panel Column Address Order     |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           | MV_Panel                                                                                                                                                                                                                                                                                                                                                                                   |                      | Panel Row/Column Exchange      |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           | ML_Panel                                                                                                                                                                                                                                                                                                                                                                                   |                      | Panel Vertical Refresh Order   |                                             | LCD vertical refresh direction control                                                                                                                                                                                                                                                                                                                                                                                                         |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           | BGR_Panel                                                                                                                                                                                                                                                                                                                                                                                  |                      | Panel RGB-BGR Order            |                                             | Color selector switch control<br>(0 = RGB color filter panel, 1 = BGR color filter panel)                                                                                                                                                                                                                                                                                                                                                      |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           | MH_Panel                                                                                                                                                                                                                                                                                                                                                                                   |                      | Panel Horizontal Refresh Order |                                             | LCD horizontal refreshing direction control                                                                                                                                                                                                                                                                                                                                                                                                    |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           | SS_Panel                                                                                                                                                                                                                                                                                                                                                                                   |                      | Panel Flip Horizontal          |                                             | Select the Source driver scan direction on the panel module                                                                                                                                                                                                                                                                                                                                                                                    |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           | GS_Panel                                                                                                                                                                                                                                                                                                                                                                                   |                      | Panel Flip Vertical            |                                             | Select the Gate driver scan direction on the panel module                                                                                                                                                                                                                                                                                                                                                                                      |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| REV_Panel                                                                 |                                                                                                                                                                                                                                                                                                                                                                                            | Panel inversion mode |                                | Panel display inversion on the panel module |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| REV_Panel: Select normally white or normally black panel.                 |                                                                                                                                                                                                                                                                                                                                                                                            |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                      |                                |                                             | <table><tr><th>REV</th><th>Panel</th><th>Data</th><th>Color</th><th>Source</th></tr><tr><td rowspan="2">0</td><td rowspan="2">Normally white</td><td>0 x 00</td><td>Black</td><td>V0+/V0-</td></tr><tr><td>0 x FF</td><td>White</td><td>V255+/V255-</td></tr><tr><td rowspan="2">1</td><td rowspan="2">normally black</td><td>0 x 00</td><td>Black</td><td>V255+/V255-</td></tr><tr><td>0 x FF</td><td>White</td><td>V0+/V0-</td></tr></table> |              |              |              |               |              |               |              |     | REV      | Panel                        | Data                                     | Color      | Source                                  | 0          | Normally white                            | 0 x 00 | Black                                    | V0+/V0- | 0 x FF   | White | V255+/V255- | 1 | normally black | 0 x 00 | Black | V255+/V255- | 0 x FF | White | V0+/V0- |
| REV                                                                       | Panel                                                                                                                                                                                                                                                                                                                                                                                      | Data                 | Color                          | Source                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| 0                                                                         | Normally white                                                                                                                                                                                                                                                                                                                                                                             | 0 x 00               | Black                          | V0+/V0-                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           |                                                                                                                                                                                                                                                                                                                                                                                            | 0 x FF               | White                          | V255+/V255-                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| 1                                                                         | normally black                                                                                                                                                                                                                                                                                                                                                                             | 0 x 00               | Black                          | V255+/V255-                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           |                                                                                                                                                                                                                                                                                                                                                                                            | 0 x FF               | White                          | V0+/V0-                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| SS_Panel: Select the shift direction of outputs from the source driver.   |                                                                                                                                                                                                                                                                                                                                                                                            |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
|                                                                           |                                                                                                                                                                                                                                                                                                                                                                                            |                      |                                |                                             | <table><tr><th>SS_Panel</th><th>Source Output Scan Direction</th></tr><tr><td>0</td><td>S1 → S1440</td></tr><tr><td>1</td><td>S1440 → S1</td></tr></table>                                                                                                                                                                                                                                                                                     |              |              |              |               |              |               |              |     | SS_Panel | Source Output Scan Direction | 0                                        | S1 → S1440 | 1                                       | S1440 → S1 |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| SS_Panel                                                                  | Source Output Scan Direction                                                                                                                                                                                                                                                                                                                                                               |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| 0                                                                         | S1 → S1440                                                                                                                                                                                                                                                                                                                                                                                 |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| 1                                                                         | S1440 → S1                                                                                                                                                                                                                                                                                                                                                                                 |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| GS_Panel: Set the direction of the gate driver scan in the display range. |                                                                                                                                                                                                                                                                                                                                                                                            |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Note: Its usage depends on the design of the Panel.                       |                                                                                                                                                                                                                                                                                                                                                                                            |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Restriction                                                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Register Availability                                                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     | Status   | Availability                 | Normal Mode On, Idle Mode Off, Sleep Out | Yes        | Normal Mode On, Idle Mode On, Sleep Out | Yes        | Partial Mode On, Idle Mode Off, Sleep Out | Yes    | Partial Mode On, Idle Mode On, Sleep Out | Yes     | Sleep In | Yes   |             |   |                |        |       |             |        |       |         |
| Status                                                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Normal Mode On, Idle Mode Off, Sleep Out                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Normal Mode On, Idle Mode On, Sleep Out                                   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Partial Mode On, Idle Mode Off, Sleep Out                                 | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Partial Mode On, Idle Mode On, Sleep Out                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |
| Sleep In                                                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |                      |                                |                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                |              |              |              |               |              |               |              |     |          |                              |                                          |            |                                         |            |                                           |        |                                          |         |          |       |             |   |                |        |       |             |        |       |         |

Default

| Status            | Default Value |              |              |              |               |
|-------------------|---------------|--------------|--------------|--------------|---------------|
|                   | MY_<br>Panel  | MX_<br>Panel | MV_<br>Panel | ML_<br>Panel | BGR_<br>Panel |
| Power On Sequence | 1b'0          | 1b'0         | 1b'0         | 1b'0         | 1b'0          |
| S/W Reset         | 1b'0          | 1b'0         | 1b'0         | 1b'0         | 1b'0          |
| H/W Reset         | 1b'0          | 1b'0         | 1b'0         | 1b'0         | 1b'0          |

| Status            | Default Value |              |              |               |
|-------------------|---------------|--------------|--------------|---------------|
|                   | MH_<br>Panel  | SS_<br>Panel | GS_<br>Panel | REV_<br>Panel |
| Power On Sequence | 1b'0          | 1b'0         | 1b'0         | 1b'0          |
| S/W Reset         | 1b'0          | 1b'0         | 1b'0         | 1b'0          |
| H/W Reset         | 1b'0          | 1b'0         | 1b'0         | 1b'0          |

## SPI Interface Setting (BAh)

| BAH                       | Frame Memory Access and Interface Setting                                                                                                                                                                                                                                                                                                                                                  |               |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----|---------|----|----|----|----|----|-----------|----|----|-----|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|-----------|-------------------------------------------|-----------|------------------------------------------|-----|----------|-----|
|                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX           | WRX | D[23:8] | D7 | D6 | D5 | D4 | D3 | D2        | D1 | D0 | HEX |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Command                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1             | ↑   | XX      | 1  | 0  | 1  | 1  | 1  | 0         | 1  | 0  | BAh |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| 1 <sup>st</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1             | ↑   | XX      | 1  | 1  | 1  | 0  | 0  | Spi8color | 0  | 0  | E0  |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Description               | <b>Spi8color:</b>                                                                                                                                                                                                                                                                                                                                                                          |               |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                           | Spi8color = 0, the data format of the SPI interface is set by the Standard Command 3Ah.                                                                                                                                                                                                                                                                                                    |               |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                           | Spi8color = 1, set the data format of the SPI interface for 3-bit/pixel (RGB 1-1-1 bits input, 8-color mode).                                                                                                                                                                                                                                                                              |               |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Restriction               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |               |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Register Availability     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |               |     |         |    |    |    |    |    |           |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes       | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                     | Availability  |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                           | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                   | Yes           |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                           | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                    | Yes           |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                           | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                  | Yes           |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                           | Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                   | Yes           |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Sleep In                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |               |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Default                   | <table><tr><th rowspan="2">Status</th><th>Default Value</th></tr><tr><th>Spi8color</th></tr><tr><td>Power ON Sequence</td><td>1b'0</td></tr><tr><td>S/W Reset</td><td>1b'0</td></tr><tr><td>H/W Reset</td><td>1b'0</td></tr></table>                                                                                                                                                       |               |     |         |    |    |    |    |    |           |    |    |     | Status | Default Value | Spi8color                                | Power ON Sequence | 1b'0                                    | S/W Reset | 1b'0                                      | H/W Reset | 1b'0                                     |     |          |     |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                     | Default Value |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                           |                                                                                                                                                                                                                                                                                                                                                                                            | Spi8color     |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                           | Power ON Sequence                                                                                                                                                                                                                                                                                                                                                                          | 1b'0          |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                           | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                  | 1b'0          |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| H/W Reset                 | 1b'0                                                                                                                                                                                                                                                                                                                                                                                       |               |     |         |    |    |    |    |    |           |    |    |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |

**Power Control 1 (C0h)**

| C0h                                             | PWCTRL 1 (Power Control 1)                                                                                                                                                                                                                                                                                                                                                                                                                                         |                         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
|-------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----|----------|---------|----|----|----|---------|----|----|----|-----|-----------------------|---------------|--------------|------------------------------------------|----------|-------------------|-----------------------------------------|-------|-----------------|-------------------------------------------|-------|-------------------------|------------------------------------------|-------|------------------------|----------|---|-----------------|
|                                                 | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX                     | WRX | D [23:8] | D7      | D6 | D5 | D4 | D3      | D2 | D1 | D0 | HEX |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Command                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                       | ↑   | XX       | 1       | 1  | 0  | 0  | 0       | 0  | 0  | 0  | C0h |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| 1 <sup>st</sup> parameter                       | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1                       | ↑   | XX       | BH[1:0] |    | 0  | 0  | BL[1:0] |    | 0  | 0  | 0A  |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Description                                     | <b>BH [1:0]:</b> Sets the factor used in the step-up circuits for VGH.<br><br>Select the optimal step-up factor for the operating voltage. To reduce power consumption, set a smaller factor.                                                                                                                                                                                                                                                                      |                         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
|                                                 | <table><tr><th colspan="3">VGH operation voltage</th></tr><tr><th colspan="2">BH [1:0]</th><th>VGH</th></tr><tr><td>0</td><td>0</td><td>2 X AVDD – AVEE</td></tr><tr><td>0</td><td>1</td><td>AVDD + VDDA(VCI) – AVEE</td></tr><tr><td>1</td><td>0</td><td>AVDD – VCL + VDDA(VCI)</td></tr><tr><td>1</td><td>1</td><td>2 X AVDD - AVEE</td></tr></table>                                                                                                            |                         |     |          |         |    |    |    |         |    |    |    |     | VGH operation voltage |               |              | BH [1:0]                                 |          | VGH               | 0                                       | 0     | 2 X AVDD – AVEE | 0                                         | 1     | AVDD + VDDA(VCI) – AVEE | 1                                        | 0     | AVDD – VCL + VDDA(VCI) | 1        | 1 | 2 X AVDD - AVEE |
|                                                 | VGH operation voltage                                                                                                                                                                                                                                                                                                                                                                                                                                              |                         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
|                                                 | BH [1:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                         | VGH |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| 0                                               | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2 X AVDD – AVEE         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| 0                                               | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | AVDD + VDDA(VCI) – AVEE |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| 1                                               | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | AVDD – VCL + VDDA(VCI)  |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| 1                                               | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2 X AVDD - AVEE         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
|                                                 | <b>BL [1:0]:</b> Sets the factor used in the step-up circuits for VGL.<br><br>Select the optimal step-up factor for the operating voltage. To reduce power consumption, set a smaller factor.                                                                                                                                                                                                                                                                      |                         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
|                                                 | <table><tr><th colspan="3">VGL operation voltage</th></tr><tr><th colspan="2">BL [1:0]</th><th>VGL</th></tr><tr><td>0</td><td>0</td><td>2 X AVEE – AVDD</td></tr><tr><td>0</td><td>1</td><td>2 X AVEE – VDDA(VCI)</td></tr><tr><td>1</td><td>0</td><td>AVEE + VCL – VDDA(VCI)</td></tr><tr><td>1</td><td>1</td><td>AVEE – AVDD</td></tr></table>                                                                                                                   |                         |     |          |         |    |    |    |         |    |    |    |     | VGL operation voltage |               |              | BL [1:0]                                 |          | VGL               | 0                                       | 0     | 2 X AVEE – AVDD | 0                                         | 1     | 2 X AVEE – VDDA(VCI)    | 1                                        | 0     | AVEE + VCL – VDDA(VCI) | 1        | 1 | AVEE – AVDD     |
|                                                 | VGL operation voltage                                                                                                                                                                                                                                                                                                                                                                                                                                              |                         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
|                                                 | BL [1:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                         | VGL |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| 0                                               | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2 X AVEE – AVDD         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| 0                                               | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 2 X AVEE – VDDA(VCI)    |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| 1                                               | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | AVEE + VCL – VDDA(VCI)  |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| 1                                               | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | AVEE – AVDD             |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Note. The restriction setting VGH – VGL < 32 V. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Restriction                                     | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                  |                         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Register Availability                           | <table><tr><th colspan="2">Status</th><th>Availability</th></tr><tr><td colspan="2">Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td colspan="2">Sleep In</td><td>Yes</td></tr></table> |                         |     |          |         |    |    |    |         |    |    |    |     | Status                |               | Availability | Normal Mode On, Idle Mode Off, Sleep Out |          | Yes               | Normal Mode On, Idle Mode On, Sleep Out |       | Yes             | Partial Mode On, Idle Mode Off, Sleep Out |       | Yes                     | Partial Mode On, Idle Mode On, Sleep Out |       | Yes                    | Sleep In |   | Yes             |
| Status                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Availability            |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Normal Mode On, Idle Mode Off, Sleep Out        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                     |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Normal Mode On, Idle Mode On, Sleep Out         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                     |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Partial Mode On, Idle Mode Off, Sleep Out       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                     |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Partial Mode On, Idle Mode On, Sleep Out        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                     |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Sleep In                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Yes                     |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Default                                         | <table><tr><th rowspan="2">Status</th><th colspan="2">Default Value</th></tr><tr><th>BH [1:0]</th><th>BL [1:0]</th></tr><tr><td>Power ON Sequence</td><td>2'b00</td><td>2'b00</td></tr><tr><td>S/W Reset</td><td>2'b00</td><td>2'b00</td></tr><tr><td>H/W Reset</td><td>2'b00</td><td>2'b00</td></tr></table>                                                                                                                                                      |                         |     |          |         |    |    |    |         |    |    |    |     | Status                | Default Value |              | BH [1:0]                                 | BL [1:0] | Power ON Sequence | 2'b00                                   | 2'b00 | S/W Reset       | 2'b00                                     | 2'b00 | H/W Reset               | 2'b00                                    | 2'b00 |                        |          |   |                 |
| Status                                          | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                         |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
|                                                 | BH [1:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                           | BL [1:0]                |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| Power ON Sequence                               | 2'b00                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2'b00                   |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| S/W Reset                                       | 2'b00                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2'b00                   |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |
| H/W Reset                                       | 2'b00                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2'b00                   |     |          |         |    |    |    |         |    |    |    |     |                       |               |              |                                          |          |                   |                                         |       |                 |                                           |       |                         |                                          |       |                        |          |   |                 |

**Power Control 2 (C1h)**

| C1h                       | PWCTRL 2 (Power Control 2)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |             |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------|-------------------------|-----------------------|----|--------------|----|--------------|-------------------|----|-------|-----|--------------|--|-------------|---|--------------|---------|---|---|---------|---------------------|---|---------|---|---|-----------------------|---|---|---|---|---------------------|---|---|---|---|---------------------|---|---|---|---|-----------------------|---|---|---|---|-------------------------|---|---|---|---|-----------------------|---|---|---|---|-----------------------|---|---|---|---|---------------------|---|---|---|---|-----------------------|---|---|---|---|---------------------|-----------------------|--|--|--|--|
|                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | RDX | WRX         | D [23:8]                | D7                    | D6 | D5           | D4 | D3           | D2                | D1 | D0    | HEX |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| Command                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑           | XX                      | 1                     | 1  | 0            | 0  | 0            | 0                 | 0  | 1     | C1h |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 1 <sup>st</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑           | XX                      | 0                     | 0  | BG_ISC [1:0] |    | BT[3:0]      |                   |    |       | 15  |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 2 <sup>nd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑           | XX                      | VRH1 [7:0]            |    |              |    |              |                   |    |       | 78  |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 3 <sup>rd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑           | XX                      | VRH2 [7:0]            |    |              |    |              |                   |    |       | 78  |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 4 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑           | XX                      | VGSP[7:0]             |    |              |    |              |                   |    |       | 00  |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 5 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑           | XX                      | VGSN[7:0]             |    |              |    |              |                   |    |       | 00  |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 6 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑           | XX                      | VRGH[7:0]             |    |              |    |              |                   |    |       | 5A  |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 7 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑           | XX                      | 0                     | 0  | 0            | 0  | VGL_REG[3:0] |                   |    |       | 08  |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 8 <sup>th</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | ↑           | XX                      | 0                     | 0  | 0            | 0  | 0            | EXT_CPK_SEL [1:0] |    | EXB1T | 04  |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| Description               | <b>BG_ISC [1:0]:</b> Source OP Amp bias control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |             |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | <table><tr><th colspan="2">BG_ISC [1:0]</th><th>Source bias</th></tr><tr><td>0</td><td>0</td><td>0.5 x I</td></tr><tr><td>0</td><td>1</td><td>1.0 x I</td></tr><tr><td>1</td><td>0</td><td>1.5 x I</td></tr><tr><td>1</td><td>1</td><td>2.0 x I</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |             |                         |                       |    |              |    |              |                   |    |       |     | BG_ISC [1:0] |  | Source bias | 0 | 0            | 0.5 x I | 0 | 1 | 1.0 x I | 1                   | 0 | 1.5 x I | 1 | 1 | 2.0 x I               |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | BG_ISC [1:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |     | Source bias |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0   | 0.5 x I     |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | 1.0 x I     |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0   | 1.5 x I     |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | 2.0 x I     |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | <b>BT [1:0]:</b> AVDD/AVEE voltage control.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |     |             |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | <table><tr><th colspan="4">BT [3:0]</th><th>AVDD<br/>AVEE</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>VCI x 2<br/>VCI x -2</td></tr><tr><td>0</td><td>0</td><td>0</td><td>1</td><td>VCI x 2<br/>VCI x -2.5</td></tr><tr><td>0</td><td>0</td><td>1</td><td>0</td><td>VCI x 2<br/>VCI x -3</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1</td><td>VCI x 2<br/>VCI x -3</td></tr><tr><td>0</td><td>1</td><td>0</td><td>0</td><td>VCI x 2.5<br/>VCI x -2</td></tr><tr><td>0</td><td>1</td><td>0</td><td>1</td><td>VCI x 2.5<br/>VCI x -2.5</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td><td>VCI x 2.5<br/>VCI x -3</td></tr><tr><td>0</td><td>1</td><td>1</td><td>1</td><td>VCI x 2.5<br/>VCI x -3</td></tr><tr><td>1</td><td>0</td><td>0</td><td>0</td><td>VCI x 3<br/>VCI x -2</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1</td><td>VCI x 3<br/>VCI x -2.5</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td><td>VCI x 3<br/>VCI x -3</td></tr><tr><td colspan="5">Other setting inhibit</td></tr></table> |     |             |                         |                       |    |              |    |              |                   |    |       |     | BT [3:0]     |  |             |   | AVDD<br>AVEE | 0       | 0 | 0 | 0       | VCI x 2<br>VCI x -2 | 0 | 0       | 0 | 1 | VCI x 2<br>VCI x -2.5 | 0 | 0 | 1 | 0 | VCI x 2<br>VCI x -3 | 0 | 0 | 1 | 1 | VCI x 2<br>VCI x -3 | 0 | 1 | 0 | 0 | VCI x 2.5<br>VCI x -2 | 0 | 1 | 0 | 1 | VCI x 2.5<br>VCI x -2.5 | 0 | 1 | 1 | 0 | VCI x 2.5<br>VCI x -3 | 0 | 1 | 1 | 1 | VCI x 2.5<br>VCI x -3 | 1 | 0 | 0 | 0 | VCI x 3<br>VCI x -2 | 1 | 0 | 0 | 1 | VCI x 3<br>VCI x -2.5 | 1 | 0 | 1 | 0 | VCI x 3<br>VCI x -3 | Other setting inhibit |  |  |  |  |
|                           | BT [3:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |             |                         | AVDD<br>AVEE          |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0   | 0           | 0                       | VCI x 2<br>VCI x -2   |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0   | 0           | 1                       | VCI x 2<br>VCI x -2.5 |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0   | 1           | 0                       | VCI x 2<br>VCI x -3   |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0   | 1           | 1                       | VCI x 2<br>VCI x -3   |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | 0           | 0                       | VCI x 2.5<br>VCI x -2 |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 0                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0   | 1           | VCI x 2.5<br>VCI x -2.5 |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 0                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | 0           | VCI x 2.5<br>VCI x -3   |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 0                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | 1           | VCI x 2.5<br>VCI x -3   |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 1                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0   | 0           | VCI x 3<br>VCI x -2     |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 1                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0   | 1           | VCI x 3<br>VCI x -2.5   |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| 1                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1   | 0           | VCI x 3<br>VCI x -3     |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
| Other setting inhibit     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |             |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |             |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |             |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |             |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |             |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |     |             |                         |                       |    |              |    |              |                   |    |       |     |              |  |             |   |              |         |   |   |         |                     |   |         |   |   |                       |   |   |   |   |                     |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                         |   |   |   |   |                       |   |   |   |   |                       |   |   |   |   |                     |   |   |   |   |                       |   |   |   |   |                     |                       |  |  |  |  |



**VRH1 [7:0]:** Sets the VGMP voltage for positive Gamma

| VRH1 [7:0] | VGMP (V) |
|------------|----------|
| 8'h00      | 3.0000   |
| 8'h01      | 3.0125   |
| 8'h02      | 3.0250   |
| :          | :        |
| 8'h7F      | 4.5875   |
| 8'h80      | 4.6000   |
| :          | :        |
| 8'h8F      | 4.7875   |
| 8'h90      | 4.8000   |
| :          | :        |
| 8'hFE      | 6.1750   |
| 8'hFF      | 6.1875   |

Note:  $VGMP \leq AVDD - 0.3V$

**VRH2 [7:0]:** Sets the VGMPN voltage for negative Gamma

| VRH2 [7:0] | VGMPN (V) |
|------------|-----------|
| 8'h00      | - 3.0000  |
| 8'h01      | - 3.0125  |
| 8'h02      | - 3.0250  |
| :          | :         |
| 8'h7F      | - 4.5875  |
| 8'h80      | - 4.6000  |
| :          | :         |
| 8'h8F      | - 4.7875  |
| 8'h90      | - 4.8000  |
| :          | :         |
| 8'hFE      | - 6.1750  |
| 8'hFF      | - 6.1875  |

Note:  $VGMPN \leq AVDD - 0.3V$

**VGSP [7:0]:** Sets the VGSP voltage for positive Gamma

| VGSP [7:0] | VGSP (V) |
|------------|----------|
| 8'h00      | 0.0000   |
| 8'h01      | 0.3000   |
| 8'h02      | 0.3125   |
| 8'h03      | 0.3250   |
| :          | :        |
| 8'h7F      | 1.8750   |
| 8'h80      | 1.8875   |
| :          | :        |
| 8'h8F      | 2.0750   |
| 8'h90      | 2.0875   |
| :          | :        |
| 8'hFE      | 3.4625   |
| 8'hFF      | 3.4750   |

**VGSN [7:0]:** Sets the VGSN voltage for negative Gamma

| VGSN [7:0] | VGSN (V) |
|------------|----------|
| 8'h00      | 0.0000   |
| 8'h01      | -0.3000  |
| 8'h02      | -0.3125  |
| 8'h03      | -0.3250  |
| :          | :        |
| 8'h7F      | -1.8750  |
| 8'h80      | -1.8875  |
| :          | :        |
| 8'h8F      | -2.0750  |
| 8'h90      | -2.0875  |
| :          | :        |
| 8'hFE      | -3.4625  |
| 8'hFF      | -3.4750  |

**VRGH [7:0]:** Sets the VRGH[7:0] voltage for GIP

| VRGH [7:0]    | VRGH (V)        |
|---------------|-----------------|
| 8'h00-8'h27   | Setting inhibit |
| 8'h28         | 7.0             |
| 8'h29         | 7.1             |
| :             | :               |
| 8'h5F         | 12.5            |
| 8'h60         | 12.6            |
| :             | :               |
| 8'h78         | 15              |
| 8'h79         | 15              |
| :             | :               |
| 8'h7F         | 15              |
| Other setting | Setting inhibit |

**VGL\_REG [3:0]:** Sets the VGL\_REG[3:0] voltage for GIP

| VGL_REG [3:0] | VGL_REG(V) |
|---------------|------------|
| 4'h0          | -6.0       |
| 4'h1          | -6.5       |
| 4'h2          | -7.0       |
| 4'h3          | -7.5       |
| :             | :          |
| 4'h8          | -10.0      |
| 4'h9          | -10.5      |
| :             | :          |
| 4'h1E         | -13.0      |
| 4'h1F         | -13.5      |

|                                           | <p><b>EXT_CPK_SEL [1:0]:</b> Pumping clock control signals selection to external control IC(EXTP/EXTN).</p> <p>Please set the register before Sleep out(R11h), when external pumping control be used.</p> <table><tr><th colspan="2">EXT_CPCK [1:0]</th><th>AVDD / AVEE</th></tr><tr><td>0</td><td>0</td><td>OutputX1.5 waveform</td></tr><tr><td>0</td><td>1</td><td>OutputX2.0 waveform</td></tr><tr><td>1</td><td>0</td><td>OutputX3.0 waveform</td></tr><tr><td>1</td><td>1</td><td>Setting inhibit</td></tr></table> <p><b>EXB1T:</b> Select the external DC/DC circuit for AVDD/AVEE.</p> <p>EXB1T= 0, using internal DC/DC circuit.</p> <p>EXB1T= 1, using external DC/DC circuit.</p>                                                                                                                                                                                                                                                                                                                          | EXT_CPCK [1:0]      |               | AVDD / AVEE                              | 0                 | 0                                       | OutputX1.5 waveform | 0                                         | 1          | OutputX2.0 waveform                      | 1                 | 0        | OutputX3.0 waveform | 1     | 1     | Setting inhibit |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------|------------------------------------------|-------------------|-----------------------------------------|---------------------|-------------------------------------------|------------|------------------------------------------|-------------------|----------|---------------------|-------|-------|-----------------|-------|---------|-------|-------|-----------|-------|---------|-------|-------|--------|---------------|--|--|--|--|--|-----------|-----------|------------|---------------|-------------------|--------|-------------------|-------|-------|-------|------|-------|------|-----------|-------|-------|-------|------|-------|------|-----------|-------|-------|-------|------|-------|------|
| EXT_CPCK [1:0]                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | AVDD / AVEE         |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| 0                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | OutputX1.5 waveform |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| 0                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | OutputX2.0 waveform |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| 1                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | OutputX3.0 waveform |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| 1                                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Setting inhibit     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Status              | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes                 | Partial Mode On, Idle Mode Off, Sleep Out | Yes        | Partial Mode On, Idle Mode On, Sleep Out | Yes               | Sleep In | Yes                 |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Default                                   | <table><tr><th rowspan="2">Status</th><th colspan="4">Default Value</th></tr><tr><th>BG_ISC[1:0]</th><th>BT[3:0]</th><th>VRH1 [7:0]</th><th>VRH2 [7:0]</th></tr><tr><td>Power ON Sequence</td><td>2'b01</td><td>4'b0101</td><td>8'h90</td><td>8'h90</td></tr><tr><td>S/W Reset</td><td>2'b01</td><td>4'b0101</td><td>8'h90</td><td>8'h90</td></tr><tr><td>H/W Reset</td><td>2'b01</td><td>4'b0101</td><td>8'h90</td><td>8'h90</td></tr></table><br><table><tr><th rowspan="2">Status</th><th colspan="6">Default Value</th></tr><tr><th>VGSP[7:0]</th><th>VGSN[7:0]</th><th>VRGH [7:0]</th><th>VGL_REG [3:0]</th><th>EXT_CPK_SEL [1:0]</th><th>EXB1 T</th></tr><tr><td>Power ON Sequence</td><td>8'h90</td><td>8'h90</td><td>8'h00</td><td>4'h8</td><td>2'b10</td><td>1'b0</td></tr><tr><td>S/W Reset</td><td>8'h90</td><td>8'h90</td><td>8'h00</td><td>4'h8</td><td>2'b10</td><td>1'b0</td></tr><tr><td>H/W Reset</td><td>8'h90</td><td>8'h90</td><td>8'h00</td><td>4'h8</td><td>2'b10</td><td>1'b0</td></tr></table> | Status              | Default Value |                                          |                   |                                         | BG_ISC[1:0]         | BT[3:0]                                   | VRH1 [7:0] | VRH2 [7:0]                               | Power ON Sequence | 2'b01    | 4'b0101             | 8'h90 | 8'h90 | S/W Reset       | 2'b01 | 4'b0101 | 8'h90 | 8'h90 | H/W Reset | 2'b01 | 4'b0101 | 8'h90 | 8'h90 | Status | Default Value |  |  |  |  |  | VGSP[7:0] | VGSN[7:0] | VRGH [7:0] | VGL_REG [3:0] | EXT_CPK_SEL [1:0] | EXB1 T | Power ON Sequence | 8'h90 | 8'h90 | 8'h00 | 4'h8 | 2'b10 | 1'b0 | S/W Reset | 8'h90 | 8'h90 | 8'h00 | 4'h8 | 2'b10 | 1'b0 | H/W Reset | 8'h90 | 8'h90 | 8'h00 | 4'h8 | 2'b10 | 1'b0 |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
|                                           | BG_ISC[1:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | BT[3:0]             | VRH1 [7:0]    | VRH2 [7:0]                               |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Power ON Sequence                         | 2'b01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 4'b0101             | 8'h90         | 8'h90                                    |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| S/W Reset                                 | 2'b01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 4'b0101             | 8'h90         | 8'h90                                    |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| H/W Reset                                 | 2'b01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 4'b0101             | 8'h90         | 8'h90                                    |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                     |               |                                          |                   |                                         |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
|                                           | VGSP[7:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | VGSN[7:0]           | VRGH [7:0]    | VGL_REG [3:0]                            | EXT_CPK_SEL [1:0] | EXB1 T                                  |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| Power ON Sequence                         | 8'h90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 8'h90               | 8'h00         | 4'h8                                     | 2'b10             | 1'b0                                    |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| S/W Reset                                 | 8'h90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 8'h90               | 8'h00         | 4'h8                                     | 2'b10             | 1'b0                                    |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |
| H/W Reset                                 | 8'h90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 8'h90               | 8'h00         | 4'h8                                     | 2'b10             | 1'b0                                    |                     |                                           |            |                                          |                   |          |                     |       |       |                 |       |         |       |       |           |       |         |       |       |        |               |  |  |  |  |  |           |           |            |               |                   |        |                   |       |       |       |      |       |      |           |       |       |       |      |       |      |           |       |       |       |      |       |      |

## Pumping Frequency Control (C6h)

| C6h                       | PFC CTRL (Pump Frequency Control)                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----|----------|----|-----------|----|----|----|-----------|----|----|-----|--------------------------|-------------------------------------------------|------------------------------------------|---------|-----------------------------------------|---------|-------------------------------------------|---------|------------------------------------------|------------------|----------|-----------|--------|-----------|--------|-----------|--------|------------|
|                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | RDX                                             | WRX | D [23:8] | D7 | D6        | D5 | D4 | D3 | D2        | D1 | D0 | HEX |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| Command                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1                                               | ↑   | XX       | 1  | 1         | 0  | 0  | 0  | 1         | 1  | 0  | C6h |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| 1 <sup>st</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1                                               | ↑   | XX       | 0  | PCK1[2:0] |    |    | 0  | PCK2[2:0] |    |    | 33  |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| 2 <sup>nd</sup> parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1                                               | ↑   | XX       | 0  | PCK3[2:0] |    |    | 0  | PCK4[2:0] |    |    | 33  |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| Description               | <b>PCK1:</b> Selects the operating frequency of the step-up circuit 1(AVDD) for Normal mode.<br><br>The higher step-up operating frequency enhances the drivability of the step-up circuit and the quality of display but increases the current consumption.<br>Adjust the frequency taking the trade-off between the display quality and the current consumption into account.                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | <b>PCK2:</b> Selects the operating frequency of the step-up circuit 2(AVEE) for Normal mode.<br><br>The higher step-up operating frequency enhances the drivability of the step-up circuit and the quality of display but increases the current consumption.<br>Adjust the frequency taking the trade-off between the display quality and the current consumption into account.                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | <b>PCK3:</b> Selects the operating frequency of the step-up circuit 3(VCL) for Normal mode.<br><br>The higher step-up operating frequency enhances the drivability of the step-up circuit and the quality of display but increases the current consumption.<br>Adjust the frequency taking the trade-off between the display quality and the current consumption into account.                                                                                      |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | <b>PCK4:</b> Selects the operating frequency of the step-up circuit 4/5(VGH/VGL) for Normal mode.<br><br>The higher step-up operating frequency enhances the drivability of the step-up circuit and the quality of display but increases the current consumption.<br>Adjust the frequency taking the trade-off between the display quality and the current consumption into account.                                                                                |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | <table><tr><th>PCK1/PCK2/PCK3/PCK4[2:0]</th><th>Step-up cycle for AVDD / AVEE / VCL / VGH / VGL</th></tr><tr><td>3'b000</td><td>8H Line</td></tr><tr><td>3'b001</td><td>4H Line</td></tr><tr><td>3'b010</td><td>2H Line</td></tr><tr><td>3'b011</td><td>1H Line(Default)</td></tr><tr><td>3'b100</td><td>1/2H Line</td></tr><tr><td>3'b101</td><td>1/4H Line</td></tr><tr><td>3'b110</td><td>1/8H Line</td></tr><tr><td>3'b111</td><td>1/16H Line</td></tr></table> |                                                 |     |          |    |           |    |    |    |           |    |    |     | PCK1/PCK2/PCK3/PCK4[2:0] | Step-up cycle for AVDD / AVEE / VCL / VGH / VGL | 3'b000                                   | 8H Line | 3'b001                                  | 4H Line | 3'b010                                    | 2H Line | 3'b011                                   | 1H Line(Default) | 3'b100   | 1/2H Line | 3'b101 | 1/4H Line | 3'b110 | 1/8H Line | 3'b111 | 1/16H Line |
|                           | PCK1/PCK2/PCK3/PCK4[2:0]                                                                                                                                                                                                                                                                                                                                                                                                                                            | Step-up cycle for AVDD / AVEE / VCL / VGH / VGL |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | 3'b000                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 8H Line                                         |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | 3'b001                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 4H Line                                         |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | 3'b010                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2H Line                                         |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | 3'b011                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 1H Line(Default)                                |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| 3'b100                    | 1/2H Line                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| 3'b101                    | 1/4H Line                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| 3'b110                    | 1/8H Line                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| 3'b111                    | 1/16H Line                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| Restriction               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                   |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| Register Availability     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                          |                                                 |     |          |    |           |    |    |    |           |    |    |     | Status                   | Availability                                    | Normal Mode On, Idle Mode Off, Sleep Out | Yes     | Normal Mode On, Idle Mode On, Sleep Out | Yes     | Partial Mode On, Idle Mode Off, Sleep Out | Yes     | Partial Mode On, Idle Mode On, Sleep Out | Yes              | Sleep In | Yes       |        |           |        |           |        |            |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Availability                                    |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                            | Yes                                             |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                             | Yes                                             |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                           | Yes                                             |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           | Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                            | Yes                                             |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
| Sleep In                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                 |     |          |    |           |    |    |    |           |    |    |     |                          |                                                 |                                          |         |                                         |         |                                           |         |                                          |                  |          |           |        |           |        |           |        |            |

| Default | Status            | Default Value |           |           |           |
|---------|-------------------|---------------|-----------|-----------|-----------|
|         |                   | PCK1[2:0]     | PCK2[2:0] | PCK3[2:0] | PCK4[2:0] |
|         | Power ON Sequence | 3'b011        | 3'b011    | 3'b011    | 3'b011    |
|         | S/W Reset         | 3'b011        | 3'b011    | 3'b011    | 3'b011    |
|         | H/W Reset         | 3'b011        | 3'b011    | 3'b011    | 3'b011    |

## VCOM Control (C7h)

| C7h                       | VMCTRL (VCOM Control) |     |     |          |            |    |    |    |      |    |    |          |     |
|---------------------------|-----------------------|-----|-----|----------|------------|----|----|----|------|----|----|----------|-----|
|                           | DCX                   | RDX | WRX | D [23:8] | D7         | D6 | D5 | D4 | D3   | D2 | D1 | D0       | HEX |
| Command                   | 0                     | 1   | ↑   | XX       | 1          | 1  | 0  | 0  | 0    | 1  | 1  | 1        | C7h |
| 1 <sup>st</sup> Parameter | 1                     | 1   | ↑   | XX       | VCM1 [7:0] |    |    |    |      |    |    |          | 69  |
| 2 <sup>nd</sup> parameter | 1                     | 1   | ↑   | XX       | 0          | 0  | 0  | 0  | 0    | 0  | 0  | VCM1 [8] | 00  |
| 3 <sup>rd</sup> parameter | 1                     | 1   | ↑   | XX       | VCM2 [7:0] |    |    |    |      |    |    |          | 8F  |
| 4 <sup>th</sup> Parameter | 1                     | 1   | ↑   | XX       | 0          | 0  | 0  | 0  | 0    | 0  | 0  | VCM2 [8] | 00  |
| 5 <sup>th</sup> Parameter | 1                     | 1   | ↑   | XX       | nVM1       | 0  | 0  | 0  | nVM2 | 0  | 0  | 0        | 00  |

**nVM1 / nVM2:** Selection of the VCM setting. When the NV memory is programmed, the nVM will be set as 1 automatically.  
 1 : NV Memory selected for VCM setting  
 0 : Register C7h for VCM setting, when NV memory is already programmed,  
 nVM = 0 will be valid when VCM1 / VCM2[8:0] is set.

**VCM1[8:0] / VCM2[8:0]** is used to set factors to generate the VCOM voltage.

| VCM1 [8:0]<br>VCM2 [8:0] | VCOM            |
|--------------------------|-----------------|
| 9'h000                   | 0.0000          |
| 9'h001                   | - 0.2000        |
| 9'h002                   | - 0.2125        |
| 9'h003                   | - 0.2250        |
| :                        | :               |
| 9'h07F                   | - 1.7750        |
| 9'h080                   | - 1.7875        |
| :                        | :               |
| 9'h08F                   | - 1.9750        |
| 9'h090                   | - 1.9875        |
| :                        | :               |
| 9'h0FE                   | - 3.3625        |
| 9'h0FF                   | - 3.3750        |
| :                        | :               |
| 9'h130                   | -3.9875         |
| 9'h131                   | -4.0000         |
| Other setting            | Setting inhibit |

Note 1: VCOM ≥ -4V + 0.3V

Note 2: GS = 1'b0, VCOM voltage = VCM1[7:0] setting, GS = 1'b1 VCOM voltage = VCM2[7:0]

|             |                                                                                   |
|-------------|-----------------------------------------------------------------------------------|
| Restriction | To enable this command, EXTC Command Set Enable Register (FFh) must be set first. |
|-------------|-----------------------------------------------------------------------------------|

| Register Availability | Status                                    | Availability |
|-----------------------|-------------------------------------------|--------------|
|                       | Normal Mode On, Idle Mode Off, Sleep Out  | Yes          |
|                       | Normal Mode On, Idle Mode On, Sleep Out   | Yes          |
|                       | Partial Mode On, Idle Mode Off, Sleep Out | Yes          |
|                       | Partial Mode On, Idle Mode On, Sleep Out  | Yes          |
|                       | Sleep In                                  | Yes          |

| Default | Status            | Default Value |            |         |         |      |
|---------|-------------------|---------------|------------|---------|---------|------|
|         |                   | VCM1 [7:0]    | VCM2 [7:0] | VCM1[8] | VCM2[8] | nVM1 |
|         | Power ON Sequence | 8'h8F         | 8'h8F      | 1'b0    | 1'b0    | 1'b1 |
|         | S/W Reset         | 8'h8F         | 8'h8F      | 1'b0    | 1'b0    | 1'b1 |
|         | H/W Reset         | 8'h8F         | 8'h8F      | 1'b0    | 1'b0    | 1'b1 |

## Backlight Control 1 (C8h)

| C8h                                                                                    | BLCTRL1 (Backlight Control 1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |                 |               |    |          |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------------|---------------|----|----------|----------------------|-----------------|----|----|-----|---------------|--|--|--|--|--|--|--|----------------------|----|----|---|----|----|----|----|----|---|---|---|---|---|---|---|---|-----------|---|---|---|---|---|---|---|---|-----------|---|---|---|---|---|---|---|---|-----------|---|---|---|---|---|---|---|---|-----------|---|---|---|---|---|---|---|---|-----------|---|--|--|--|--|--|--|--|---|---|--|--|--|--|--|--|--|---|---|---|---|---|---|---|---|---|----------|---|---|---|---|---|---|---|---|----------|---|---|---|---|---|---|---|---|----------|---|---|---|---|---|---|---|---|----------|---|---|---|---|---|---|---|---|----------|
|                                                                                        | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | RDX | WRX | D [23:8] | D7              | D6            | D5 | D4       | D3                   | D2              | D1 | D0 | HEX |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| Command                                                                                | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | ↑   | XX       | 1               | 1             | 0  | 0        | 1                    | 0               | 0  | 0  | C8h |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 1 <sup>st</sup> Parameter                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | ↑   | XX       | PWM_DIV [7:0]   |               |    |          |                      |                 |    |    | E8  |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 2 <sup>nd</sup> parameter                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | ↑   | XX       | THRES_MOV [3:0] |               |    |          | THRES_STILL [3:0]    |                 |    |    | BB  |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 3 <sup>rd</sup> parameter                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | ↑   | XX       | 0               | 0             | 0  | 0        | THRES_UI [3:0]       |                 |    |    | 0B  |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 4 <sup>th</sup> Parameter                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | ↑   | XX       | DTH_MOV [3:0]   |               |    |          | DTH_STILL [3:0]      |                 |    |    | A8  |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 5 <sup>th</sup> Parameter                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | ↑   | XX       | 0               | 0             | 1  | 1        | DTH_UI [3:0]         |                 |    |    | 34  |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 6 <sup>th</sup> Parameter                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | ↑   | XX       | 0               | DIM_MOV [2:0] |    |          | 0                    | DIM_STILL [2:0] |    |    | 43  |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 7 <sup>th</sup> Parameter                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | ↑   | XX       | DIM_MIN [3:0]   |               |    |          | 1                    | DIM_UI [2:0]    |    |    | 0B  |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| Description                                                                            | <b>PWM_DIV [7:0]:</b> PWM_OUT output period control. This command is used to adjust the PWM waveform period of PWM_OUT. The PWM period is calculated by the following equation.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |                 |               |    |          |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|                                                                                        | $f_{pwm\_out} = \frac{18 \text{ MHz}}{(\text{PWM\_DIV}[7:0] + 1) \times 255}$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |                 |               |    |          |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|                                                                                        | <table><thead><tr><th colspan="8">PWM_DIV [7:0]</th><th rowspan="2">f<sub>PWM_OUT</sub></th></tr><tr><th>D7</th><th>D6</th><th>D</th><th>D4</th><th>D3</th><th>D2</th><th>D1</th><th>D0</th></tr></thead><tbody><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>70.58 KHz</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>35.29 KHz</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>23.53 KHz</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>17.65 KHz</td></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>14.12 KHz</td></tr><tr><td colspan="8">:</td><td>:</td></tr><tr><td colspan="8">:</td><td>:</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>280.1 Hz</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>279.0 Hz</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>277.9 Hz</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>0</td><td>276.8 Hz</td></tr><tr><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>1</td><td>275.7 Hz</td></tr></tbody></table> |     |     |          |                 |               |    |          |                      |                 |    |    |     | PWM_DIV [7:0] |  |  |  |  |  |  |  | f <sub>PWM_OUT</sub> | D7 | D6 | D | D4 | D3 | D2 | D1 | D0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 70.58 KHz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 35.29 KHz | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 23.53 KHz | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 17.65 KHz | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 14.12 KHz | : |  |  |  |  |  |  |  | : | : |  |  |  |  |  |  |  | : | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 280.1 Hz | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 279.0 Hz | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 277.9 Hz | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 276.8 Hz | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 275.7 Hz |
|                                                                                        | PWM_DIV [7:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |                 |               |    |          | f <sub>PWM_OUT</sub> |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|                                                                                        | D7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | D6  | D   | D4       | D3              | D2            | D1 | D0       |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|                                                                                        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0   | 0   | 0        | 0               | 0             | 0  | 0        | 70.58 KHz            |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|                                                                                        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0   | 0   | 0        | 0               | 0             | 0  | 1        | 35.29 KHz            |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|                                                                                        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0   | 0   | 0        | 0               | 0             | 1  | 0        | 23.53 KHz            |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|                                                                                        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0   | 0   | 0        | 0               | 0             | 1  | 1        | 17.65 KHz            |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|                                                                                        | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0   | 0   | 0        | 0               | 1             | 0  | 0        | 14.12 KHz            |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| :                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |                 |               |    | :        |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| :                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |                 |               |    | :        |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 1                                                                                      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | 1   | 1        | 0               | 1             | 1  | 280.1 Hz |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 1                                                                                      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | 1   | 1        | 1               | 0             | 0  | 279.0 Hz |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 1                                                                                      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | 1   | 1        | 1               | 0             | 1  | 277.9 Hz |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 1                                                                                      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | 1   | 1        | 1               | 1             | 0  | 276.8 Hz |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| 1                                                                                      | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1   | 1   | 1        | 1               | 1             | 1  | 275.7 Hz |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
|                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |                 |               |    |          |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |
| Note: The output frequency tolerance of internal frequency divider in the CABC is ±10% |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |                 |               |    |          |                      |                 |    |    |     |               |  |  |  |  |  |  |  |                      |    |    |   |    |    |    |    |    |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |   |   |   |   |   |   |   |           |   |  |  |  |  |  |  |  |   |   |  |  |  |  |  |  |  |   |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |   |   |   |   |   |   |   |   |          |

**THRES\_MOV [3:0]:** This parameter is used to set the ratio (percentage) of the maximum number of pixels that makes display image white (data = 63) in the total pixels by image process in the Moving Image mode. After this parameter sets the number of pixels that makes display image white, then the threshold grayscale value (DTH) that makes display image white is set so that the number of the pixels set by this parameter will not be changed.

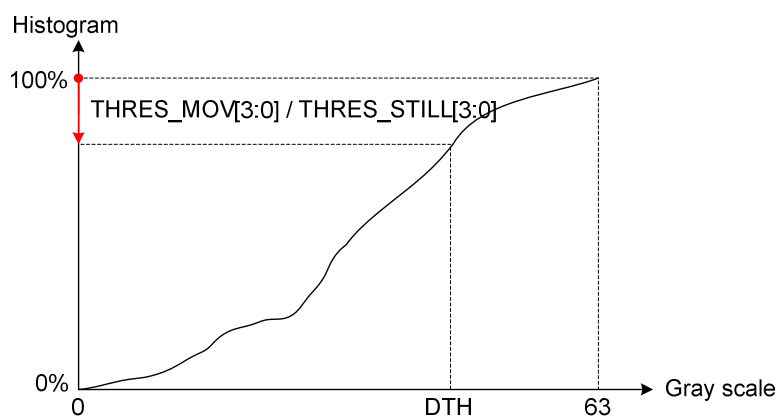
| THRES_MOV [3:0] |    |    |    | Description |
|-----------------|----|----|----|-------------|
| D3              | D2 | D1 | D0 |             |
| 0               | 0  | 0  | 0  | 99 %        |
| 0               | 0  | 0  | 1  | 98 %        |
| 0               | 0  | 1  | 0  | 96 %        |
| 0               | 0  | 1  | 1  | 94 %        |
| 0               | 1  | 0  | 0  | 92 %        |
| 0               | 1  | 0  | 1  | 90 %        |
| 0               | 1  | 1  | 0  | 88 %        |
| 0               | 1  | 1  | 1  | 86 %        |

| THRES_MOV [3:0] |    |    |    | Description |
|-----------------|----|----|----|-------------|
| D3              | D2 | D1 | D0 |             |
| 1               | 0  | 0  | 0  | 84 %        |
| 1               | 0  | 0  | 1  | 82 %        |
| 1               | 0  | 1  | 0  | 80 %        |
| 1               | 0  | 1  | 1  | 78 %        |
| 1               | 1  | 0  | 0  | 76 %        |
| 1               | 1  | 0  | 1  | 74 %        |
| 1               | 1  | 1  | 0  | 72 %        |
| 1               | 1  | 1  | 1  | 70 %        |

**THRES\_STILL [3:0]:** This parameter is used to set the ratio (percentage) of the maximum number of pixels that makes display image white (data = 63) in the total pixels by image process in the Still Picture mode. After this parameter sets the number of pixels that makes display image white, then the threshold grayscale value (DTH) that makes display image white is set so that the number of the pixels set by this parameter will not be changed.

| THRES_STILL [3:0] |    |    |    | Description |
|-------------------|----|----|----|-------------|
| D3                | D2 | D1 | D0 |             |
| 0                 | 0  | 0  | 0  | 99 %        |
| 0                 | 0  | 0  | 1  | 98 %        |
| 0                 | 0  | 1  | 0  | 96 %        |
| 0                 | 0  | 1  | 1  | 94 %        |
| 0                 | 1  | 0  | 0  | 92 %        |
| 0                 | 1  | 0  | 1  | 90 %        |
| 0                 | 1  | 1  | 0  | 88 %        |
| 0                 | 1  | 1  | 1  | 86 %        |

| THRES_STILL [3:0] |    |    |    | Description |
|-------------------|----|----|----|-------------|
| D3                | D2 | D1 | D0 |             |
| 1                 | 0  | 0  | 0  | 84 %        |
| 1                 | 0  | 0  | 1  | 82 %        |
| 1                 | 0  | 1  | 0  | 80 %        |
| 1                 | 0  | 1  | 1  | 78 %        |
| 1                 | 1  | 0  | 0  | 76 %        |
| 1                 | 1  | 0  | 1  | 74 %        |
| 1                 | 1  | 1  | 0  | 72 %        |
| 1                 | 1  | 1  | 1  | 70 %        |

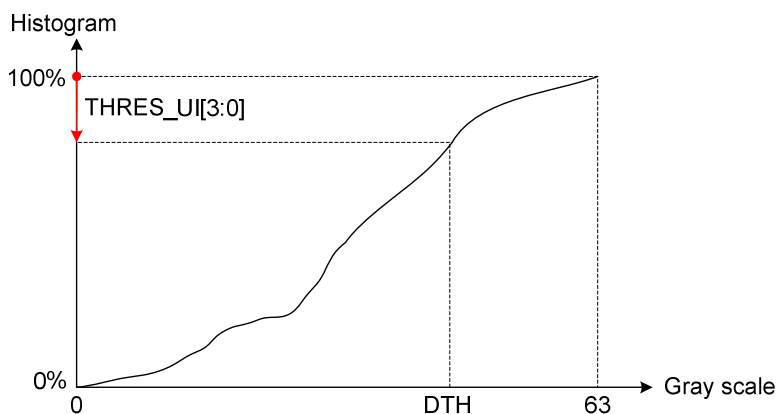




**THRES\_UI [3:0]:** This parameter is used to set the ratio (percentage) of the maximum number of pixels that makes display image white (data = 63) in the total pixels by image process in the UI (User Interface Image mode). After this parameter sets the number of pixels that makes display image white, then the threshold grayscale value (DTH) that makes display image white is set so that the number of the pixels set by this parameter will not be changed.

| THRES_UI [3:0] |    |    |    | Description |
|----------------|----|----|----|-------------|
| D3             | D2 | D1 | D0 |             |
| 0              | 0  | 0  | 0  | 99 %        |
| 0              | 0  | 0  | 1  | 98 %        |
| 0              | 0  | 1  | 0  | 96 %        |
| 0              | 0  | 1  | 1  | 94 %        |
| 0              | 1  | 0  | 0  | 92 %        |
| 0              | 1  | 0  | 1  | 90 %        |
| 0              | 1  | 1  | 0  | 88 %        |
| 0              | 1  | 1  | 1  | 86 %        |

| THRES_UI [3:0] |    |    |    | Description |
|----------------|----|----|----|-------------|
| D3             | D2 | D1 | D0 |             |
| 1              | 0  | 0  | 0  | 84 %        |
| 1              | 0  | 0  | 1  | 82 %        |
| 1              | 0  | 1  | 0  | 80 %        |
| 1              | 0  | 1  | 1  | 78 %        |
| 1              | 1  | 0  | 0  | 76 %        |
| 1              | 1  | 0  | 1  | 74 %        |
| 1              | 1  | 1  | 0  | 72 %        |
| 1              | 1  | 1  | 1  | 70 %        |



**DTH\_MOV [3:0]:** This parameter is used to set the minimum limitation of the grayscale threshold value in the Moving Image mode.

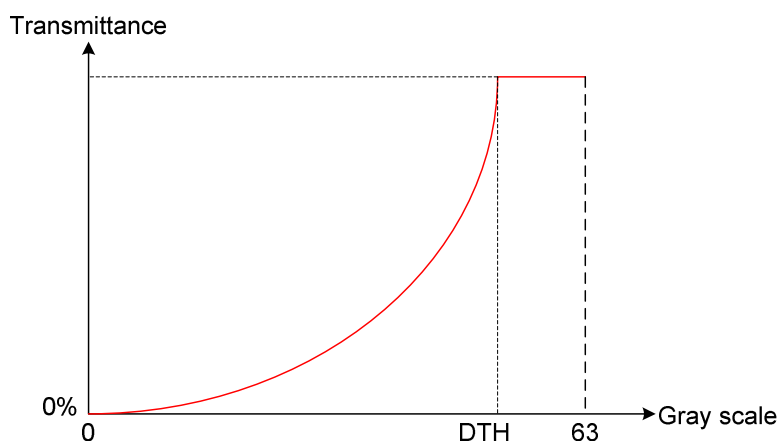
| DTH_MOV [3:0] |    |    |    | Description |
|---------------|----|----|----|-------------|
| D3            | D2 | D1 | D0 |             |
| 0             | 0  | 0  | 0  | 224         |
| 0             | 0  | 0  | 1  | 220         |
| 0             | 0  | 1  | 0  | 216         |
| 0             | 0  | 1  | 1  | 212         |
| 0             | 1  | 0  | 0  | 208         |
| 0             | 1  | 0  | 1  | 204         |
| 0             | 1  | 1  | 0  | 200         |
| 0             | 1  | 1  | 1  | 196         |

| DTH_MOV [3:0] |    |    |    | Description |
|---------------|----|----|----|-------------|
| D3            | D2 | D1 | D0 |             |
| 1             | 0  | 0  | 0  | 192         |
| 1             | 0  | 0  | 1  | 188         |
| 1             | 0  | 1  | 0  | 184         |
| 1             | 0  | 1  | 1  | 180         |
| 1             | 1  | 0  | 0  | 176         |
| 1             | 1  | 0  | 1  | 172         |
| 1             | 1  | 1  | 0  | 168         |
| 1             | 1  | 1  | 1  | 164         |

**DTH\_STILL [3:0]:** This parameter is used to set the minimum limitation of the grayscale threshold value in the Still Picture mode.

| DTH_STILL [3:0] |    |    |    | Description |
|-----------------|----|----|----|-------------|
| D3              | D2 | D1 | D0 |             |
| 0               | 0  | 0  | 0  | 224         |
| 0               | 0  | 0  | 1  | 220         |
| 0               | 0  | 1  | 0  | 216         |
| 0               | 0  | 1  | 1  | 212         |
| 0               | 1  | 0  | 0  | 208         |
| 0               | 1  | 0  | 1  | 204         |
| 0               | 1  | 1  | 0  | 200         |
| 0               | 1  | 1  | 1  | 196         |

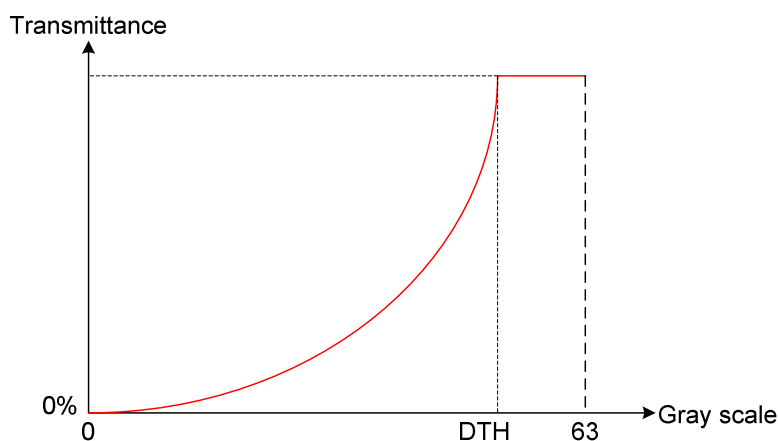
| DTH_STILL [3:0] |    |    |    | Description |
|-----------------|----|----|----|-------------|
| D3              | D2 | D1 | D0 |             |
| 1               | 0  | 0  | 0  | 192         |
| 1               | 0  | 0  | 1  | 188         |
| 1               | 0  | 1  | 0  | 184         |
| 1               | 0  | 1  | 1  | 180         |
| 1               | 1  | 0  | 0  | 176         |
| 1               | 1  | 0  | 1  | 172         |
| 1               | 1  | 1  | 0  | 168         |
| 1               | 1  | 1  | 1  | 164         |



**DTH\_UI [3:0]:** This parameter is used to set the minimum limitation of the grayscale threshold value in the UI (User Interface Image mode)

| DTH_UI [3:0] |   |    |    | Description |
|--------------|---|----|----|-------------|
| D3           | D | D1 | D0 |             |
| 0            | 0 | 0  | 0  | 252         |
| 0            | 0 | 0  | 1  | 248         |
| 0            | 0 | 1  | 0  | 244         |
| 0            | 0 | 1  | 1  | 240         |
| 0            | 1 | 0  | 0  | 236         |
| 0            | 1 | 0  | 1  | 232         |
| 0            | 1 | 1  | 0  | 228         |
| 0            | 1 | 1  | 1  | 224         |

| DTH_UI [3:0] |    |    |    | Description |
|--------------|----|----|----|-------------|
| D3           | D2 | D1 | D0 |             |
| 1            | 0  | 0  | 0  | 220         |
| 1            | 0  | 0  | 1  | 216         |
| 1            | 0  | 1  | 0  | 212         |
| 1            | 0  | 1  | 1  | 208         |
| 1            | 1  | 0  | 0  | 204         |
| 1            | 1  | 0  | 1  | 200         |
| 1            | 1  | 1  | 0  | 196         |
| 1            | 1  | 1  | 1  | 192         |

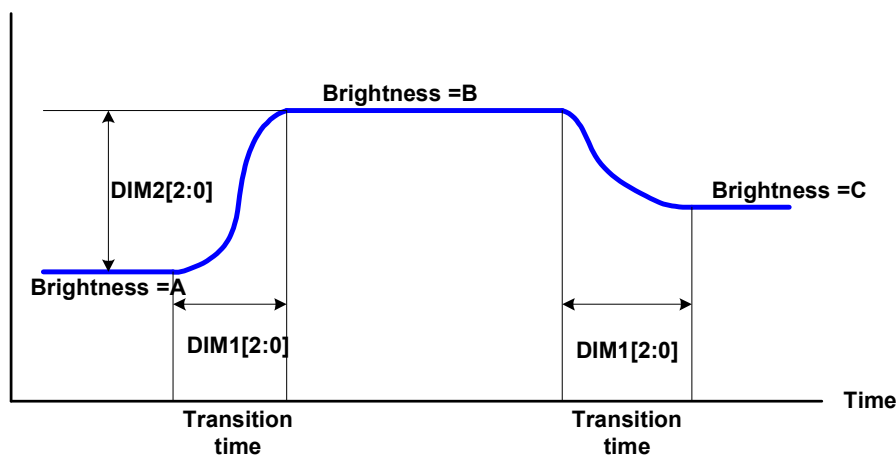


**DIM\_STILL [2:0]:** This parameter is used to set the transition time of the brightness level change to avoid the sharp brightness change in the Still Picture mode.

**DIM\_MOV [2:0]:** This parameter is used to set the transition time of the brightness level change to avoid the sharp brightness change in the Moving Image mode.

**DIM\_UI [2:0]:** This parameter is used to set the transition time of the brightness level change to avoid the sharp brightness change in the UI mode (User Interface Image mode).

| DIM_MOV [2:0]/DIM_STILL [2:0]/DIM_UI |    |    | Description |
|--------------------------------------|----|----|-------------|
| D2                                   | D1 | D0 |             |
| 0                                    | 0  | 0  | 1 frame     |
| 0                                    | 0  | 1  | 1 frame     |
| 0                                    | 1  | 0  | 2 frames    |
| 0                                    | 1  | 1  | 4 frames    |
| 1                                    | 0  | 0  | 8 frames    |
| 1                                    | 0  | 1  | 16 frames   |
| 1                                    | 1  | 0  | 32 frames   |
| 1                                    | 1  | 1  | 64 frames   |



Note1: In the above picture, DIM1 [2:0] means DIM\_MOV [2:0], DIM\_STILL [2:0], and DIM\_UI [2:0] are in different modes.

Note2: In the above picture, DIM2 [3:0] means DIM\_MIN [3:0].

**DIM\_MIN [3:0]:** This parameter is used to set the imitation of the minimum brightness change. If this parameter is larger than the difference between target brightness and current brightness, then the brightness will not change.

**Restriction** To enable this command, EXTC Command Set Enable Register (FFh) must be set first.

**Register Availability**

| Status                                    | Availability |
|-------------------------------------------|--------------|
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes          |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes          |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes          |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes          |
| Sleep In                                  | Yes          |

**Default**

| Status            | Default Value |                 |                    |                |
|-------------------|---------------|-----------------|--------------------|----------------|
|                   | PWM_DIV [7:0] | THRES_MOV [3:0] | THRES_STILLI [3:0] | THRES_UI [3:0] |
| Power ON Sequence | 8'hE8         | 4'b1011         | 4'b1011            | 4'b1011        |
| H/W Reset         | 8'hE8         | 4'b1011         | 4'b1011            | 4'b1011        |

| Status            | Default Value |                 |              |
|-------------------|---------------|-----------------|--------------|
|                   | DTH_MOV [3:0] | DTH_STILL [3:0] | DTH_UI [3:0] |
| Power ON Sequence | 4'b1010       | 4'b1000         | 4'b0100      |
| H/W Reset         | 4'b1010       | 4'b1000         | 4'b0100      |

| Status            | Default Value |                 |               |              |
|-------------------|---------------|-----------------|---------------|--------------|
|                   | DIM_MOV [2:0] | DIM_STILL [2:0] | DIM_MIN [3:0] | DIM_UI [2:0] |
| Power ON Sequence | 3'b100        | 3'b011          | 4'b0000       | 3'b010       |
| H/W Reset         | 3'b100        | 3'b011          | 4'b0000       | 3'b010       |

**Backlight Control 2 (C9h)**

| C9h                                                                                                                                                                                                                                                   | BLCTRL2 (Backlight Control 2)                                                                                                                                                                                                                                                                                                                                                                         |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------|----------|-------------------|----|----|-----------------|----|--------|----------|--------|--------|-------------|---------------|------------------------------------------|-----|-----------------------------------------|------------|-------------------------------------------|-----------------|------------------------------------------|----------|----------|---------------------------------|---------|-----------------|---------------------------------|------|------|-----------|---------|------|------|------|------|
|                                                                                                                                                                                                                                                       | DCX                                                                                                                                                                                                                                                                                                                                                                                                   | RDX             | WRX                             | D [23:8] | D7                | D6 | D5 | D4              | D3 | D2     | D1       | D0     | HEX    |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Command                                                                                                                                                                                                                                               | 0                                                                                                                                                                                                                                                                                                                                                                                                     | 1               | ↑                               | XX       | 1                 | 1  | 0  | 0               | 1  | 0      | 0        | 1      | C9h    |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| 1 <sup>st</sup> Parameter                                                                                                                                                                                                                             | 1                                                                                                                                                                                                                                                                                                                                                                                                     | 1               | ↑                               | XX       | LABC_SRE_THR[3:0] |    |    | LABC_SRE_ENABLE |    | LEDONR | LEDONPOL | PWMPOL | B0     |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Description                                                                                                                                                                                                                                           | <b>LABC_SRE_THR[3:0]:</b> The threshold value of LABC to turn-on SRE with hysteresis if LABC_SRE_ENABLE=1.<br><br>AmbientLightSensor[7:0]>=LABC_SRE_THE[3:0]*16, turn-on SRE.<br><br>AmbientLightSensor[7:0]<=(LABC_SRE_THE[3:0]-1)*16, turn-off SRE.                                                                                                                                                 |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | <b>LABC_SRE_ENABLE:</b> The bit is used to switch SRE function.<br><br>0:Disable SRE<br><br>1:Enable SRE                                                                                                                                                                                                                                                                                              |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | <b>PWMPOL:</b> The bit is used to define the polarity of the LEDPWM signal.                                                                                                                                                                                                                                                                                                                           |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | <table><tr><th>BL</th><th>LEDPWMPOL</th><th>LEDPWM pin</th></tr><tr><td>0</td><td>0</td><td>Always low</td></tr><tr><td>0</td><td>1</td><td>Always high</td></tr><tr><td>1</td><td>0</td><td>Original polarity of PWM signal</td></tr><tr><td>1</td><td>1</td><td>Inversed polarity of PWM signal</td></tr></table>                                                                                   |                 |                                 |          |                   |    |    |                 |    |        |          |        |        | BL          | LEDPWMPOL     | LEDPWM pin                               | 0   | 0                                       | Always low | 0                                         | 1               | Always high                              | 1        | 0        | Original polarity of PWM signal | 1       | 1               | Inversed polarity of PWM signal |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | BL                                                                                                                                                                                                                                                                                                                                                                                                    | LEDPWMPOL       | LEDPWM pin                      |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | 0                                                                                                                                                                                                                                                                                                                                                                                                     | 0               | Always low                      |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | 0                                                                                                                                                                                                                                                                                                                                                                                                     | 1               | Always high                     |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | 1                                                                                                                                                                                                                                                                                                                                                                                                     | 0               | Original polarity of PWM signal |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | 1                                                                                                                                                                                                                                                                                                                                                                                                     | 1               | Inversed polarity of PWM signal |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | <b>LEDONPOL:</b> This bit is used to control the LEDON pin.                                                                                                                                                                                                                                                                                                                                           |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| <table><tr><th>BL</th><th>LEDONPOL</th><th>LEDON pin</th></tr><tr><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td></tr><tr><td>1</td><td>0</td><td>LEDONR</td></tr><tr><td>1</td><td>1</td><td>Inversed LEDONR</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                                 |          |                   |    |    |                 |    |        |          |        | BL     | LEDONPOL    | LEDON pin     | 0                                        | 0   | 0                                       | 0          | 1                                         | 1               | 1                                        | 0        | LEDONR   | 1                               | 1       | Inversed LEDONR |                                 |      |      |           |         |      |      |      |      |
| BL                                                                                                                                                                                                                                                    | LEDONPOL                                                                                                                                                                                                                                                                                                                                                                                              | LEDON pin       |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| 0                                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                     | 0               |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| 0                                                                                                                                                                                                                                                     | 1                                                                                                                                                                                                                                                                                                                                                                                                     | 1               |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| 1                                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                     | LEDONR          |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| 1                                                                                                                                                                                                                                                     | 1                                                                                                                                                                                                                                                                                                                                                                                                     | Inversed LEDONR |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| <b>LEDONR:</b> This bit is used to control the LEDON pin.                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| <table><tr><th>LEDONR</th><th>Description</th></tr><tr><td>0</td><td>Low</td></tr><tr><td>1</td><td>High</td></tr></table>                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                       |                 |                                 |          |                   |    |    |                 |    |        |          |        | LEDONR | Description | 0             | Low                                      | 1   | High                                    |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| LEDONR                                                                                                                                                                                                                                                | Description                                                                                                                                                                                                                                                                                                                                                                                           |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| 0                                                                                                                                                                                                                                                     | Low                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| 1                                                                                                                                                                                                                                                     | High                                                                                                                                                                                                                                                                                                                                                                                                  |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Restriction                                                                                                                                                                                                                                           | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                     |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Register Availability                                                                                                                                                                                                                                 | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>            |                 |                                 |          |                   |    |    |                 |    |        |          |        |        | Status      | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes        | Partial Mode On, Idle Mode Off, Sleep Out | Yes             | Partial Mode On, Idle Mode On, Sleep Out | Yes      | Sleep In | Yes                             |         |                 |                                 |      |      |           |         |      |      |      |      |
| Status                                                                                                                                                                                                                                                | Availability                                                                                                                                                                                                                                                                                                                                                                                          |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                              | Yes                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                               | Yes                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                             | Yes                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                              | Yes                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Sleep In                                                                                                                                                                                                                                              | Yes                                                                                                                                                                                                                                                                                                                                                                                                   |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Default                                                                                                                                                                                                                                               | <table><tr><th rowspan="2">Status</th><th colspan="5">Default Value</th></tr><tr><th>LABC_SRE_THR[3:0]</th><th>LABC_SRE_ENABLE</th><th>LEDONR</th><th>LEDONPOL</th><th>PWMPOL</th></tr><tr><td>Power On Sequence</td><td>4'b1011</td><td>1'b0</td><td>1'b0</td><td>1'b0</td><td>1'b0</td></tr><tr><td>H/W Reset</td><td>4'b1011</td><td>1'b0</td><td>1'b0</td><td>1'b0</td><td>1'b0</td></tr></table> |                 |                                 |          |                   |    |    |                 |    |        |          |        |        | Status      | Default Value |                                          |     |                                         |            | LABC_SRE_THR[3:0]                         | LABC_SRE_ENABLE | LEDONR                                   | LEDONPOL | PWMPOL   | Power On Sequence               | 4'b1011 | 1'b0            | 1'b0                            | 1'b0 | 1'b0 | H/W Reset | 4'b1011 | 1'b0 | 1'b0 | 1'b0 | 1'b0 |
| Status                                                                                                                                                                                                                                                | Default Value                                                                                                                                                                                                                                                                                                                                                                                         |                 |                                 |          |                   |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
|                                                                                                                                                                                                                                                       | LABC_SRE_THR[3:0]                                                                                                                                                                                                                                                                                                                                                                                     | LABC_SRE_ENABLE | LEDONR                          | LEDONPOL | PWMPOL            |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| Power On Sequence                                                                                                                                                                                                                                     | 4'b1011                                                                                                                                                                                                                                                                                                                                                                                               | 1'b0            | 1'b0                            | 1'b0     | 1'b0              |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |
| H/W Reset                                                                                                                                                                                                                                             | 4'b1011                                                                                                                                                                                                                                                                                                                                                                                               | 1'b0            | 1'b0                            | 1'b0     | 1'b0              |    |    |                 |    |        |          |        |        |             |               |                                          |     |                                         |            |                                           |                 |                                          |          |          |                                 |         |                 |                                 |      |      |           |         |      |      |      |      |

## NV Memory Write (D0h)

| D0h                       | NVMWR (NV Memory Write)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------|----------|---------------------------------|----|----|----|----|----|----|----|-----|---------------|------------------|------------------------------------------|---------------------------------|-----------------------------------------|-------------------|-------------------------------------------|-------|------------------------------------------|-----------|-----------|-----------|-------|-----------|-------|---------|-------|-------|-------|-------|-------|-------|-------|-------|--------|------------------|--------|------------------|
|                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | RDX                             | WRX            | D [23:8] | D7                              | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| Command                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1                               | ↑              | XX       | 1                               | 1  | 0  | 1  | 0  | 0  | 0  | 0  | D0h |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| 1 <sup>st</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1                               | ↑              | XX       | PGM_DATA [7:0]                  |    |    |    |    |    |    |    | XX  |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| 2 <sup>nd</sup> Parameter | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1                               | ↑              | XX       | PGM_ADR [7:0]/NVM_Read_ADR[7:0] |    |    |    |    |    |    |    | XX  |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| Description               | This command is used to program or read the NV memory data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | After a successful OTP operation, the information of PGM_DATA [7:0] will be programmed to the NV memory.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | PGM_DATA [7:0]: The programmed data.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | PGM_ADR [7:0]: Set the address of the NV memory for programming data. See “NV Memory Programming flow”.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | <table><tr><th>PGM_ADR [7:0]</th><th>Programming data</th></tr><tr><td>8'h00</td><td>ID1</td></tr><tr><td>8'h01</td><td>ID2</td></tr><tr><td>8'h02</td><td>ID3</td></tr><tr><td>8'h03</td><td>VCM1[7:0]</td></tr><tr><td>8'h04</td><td>VCM1[8]</td></tr><tr><td>8'h05</td><td>VCM2[7:0]</td></tr><tr><td>8'h06</td><td>VCM2[8]</td></tr><tr><td>8'h07</td><td>ID4_A</td></tr><tr><td>8'h08</td><td>ID4_B</td></tr><tr><td>8'h09</td><td>ID4_C</td></tr><tr><td>8'h0a</td><td>ID4_D</td></tr><tr><td>8'h 3B</td><td>RB9h parameter 1</td></tr><tr><td>8'h 3C</td><td>RB9h parameter 2</td></tr></table> |                                 |                |          |                                 |    |    |    |    |    |    |    |     | PGM_ADR [7:0] | Programming data | 8'h00                                    | ID1                             | 8'h01                                   | ID2               | 8'h02                                     | ID3   | 8'h03                                    | VCM1[7:0] | 8'h04     | VCM1[8]   | 8'h05 | VCM2[7:0] | 8'h06 | VCM2[8] | 8'h07 | ID4_A | 8'h08 | ID4_B | 8'h09 | ID4_C | 8'h0a | ID4_D | 8'h 3B | RB9h parameter 1 | 8'h 3C | RB9h parameter 2 |
|                           | PGM_ADR [7:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Programming data                |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ID1                             |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ID2                             |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ID3                             |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | VCM1[7:0]                       |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | VCM1[8]                         |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | VCM2[7:0]                       |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | VCM2[8]                         |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ID4_A                           |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ID4_B                           |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ID4_C                           |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | 8'h0a                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ID4_D                           |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| 8'h 3B                    | RB9h parameter 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| 8'h 3C                    | RB9h parameter 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| Restriction               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| Register Availability     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                             |                                 |                |          |                                 |    |    |    |    |    |    |    |     | Status        | Availability     | Normal Mode On, Idle Mode Off, Sleep Out | Yes                             | Normal Mode On, Idle Mode On, Sleep Out | Yes               | Partial Mode On, Idle Mode Off, Sleep Out | Yes   | Partial Mode On, Idle Mode On, Sleep Out | Yes       | Sleep In  | Yes       |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Availability                    |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Yes                             |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Yes                             |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Yes                             |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Yes                             |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| Sleep In                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                 |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| Default                   | <table><tr><th rowspan="2">Status</th><th colspan="2">Default Value</th></tr><tr><th>PGM_ADR [7:0]/NVM_Read_ADR[7:0]</th><th>PGM_DATA [7:0]</th></tr><tr><td>Power ON Sequence</td><td>8'h00</td><td>8'h00</td></tr><tr><td>S/W Reset</td><td>No change</td><td>No change</td></tr><tr><td>H/W Reset</td><td>8'h00</td><td>8'h00</td></tr></table>                                                                                                                                                                                                                                                     |                                 |                |          |                                 |    |    |    |    |    |    |    |     | Status        | Default Value    |                                          | PGM_ADR [7:0]/NVM_Read_ADR[7:0] | PGM_DATA [7:0]                          | Power ON Sequence | 8'h00                                     | 8'h00 | S/W Reset                                | No change | No change | H/W Reset | 8'h00 | 8'h00     |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Default Value                   |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | PGM_ADR [7:0]/NVM_Read_ADR[7:0] | PGM_DATA [7:0] |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | Power ON Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 8'h00                           | 8'h00          |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
|                           | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | No change                       | No change      |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |
| H/W Reset                 | 8'h00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 8'h00                           |                |          |                                 |    |    |    |    |    |    |    |     |               |                  |                                          |                                 |                                         |                   |                                           |       |                                          |           |           |           |       |           |       |         |       |       |       |       |       |       |       |       |        |                  |        |                  |

## NV Memory Protection Key (D1h)

| D1h                                       | NVMPKEY (NV Memory Protection Key)                                                                                                                                                                                                                                                                                                                                                         |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-------------|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-------------|-----------------------------------------|-------------|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7          | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 1           | 1  | 0  | 1  | 0  | 0  | 0  | 1  | D1h |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | KEY [23:16] |    |    |    |    |    |    |    | XX  |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | KEY [15:8]  |    |    |    |    |    |    |    | XX  |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| 3 <sup>rd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | KEY [7:0]   |    |    |    |    |    |    |    | XX  |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Description                               | <p><b>KEY [23:0]:</b> NV memory programming protection key.</p> <p>Write an OTP data to D0h, this KEY [23:0] must set to 0x55AA66h to enable the OTP programming. If the KEY [23:0] is not 0 x 55AA66h, the NV Memory program will be aborted.</p>                                                                                                                                         |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |             |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes         | Normal Mode On, Idle Mode On, Sleep Out | Yes         | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power ON Sequence</td><td>24'h000000h</td></tr><tr><td>S/W Reset</td><td>24'h000000h</td></tr></table>                                                                                                                                                                                                                        |     |     |          |             |    |    |    |    |    |    |    |     | Status | Default Value | Power ON Sequence                        | 24'h000000h | S/W Reset                               | 24'h000000h |                                           |     |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| Power ON Sequence                         | 24'h000000h                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |
| S/W Reset                                 | 24'h000000h                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |             |    |    |    |    |    |    |    |     |        |               |                                          |             |                                         |             |                                           |     |                                          |     |          |     |

## NV Memory Status Read (D2h)

| D2h                                                                                                                                                                                                                                                                                | RDNVM (NV Memory Status Read)                                                                                                                                                                                                                                                                                                                                                                                                  |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----|----------------------------|----------|---------------|----|----|-----------|---------------------------------|---------------------------------------------------------------------|-------------|------|-------------|---------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|----------------------------|------------------------------------------|-----|----------|-----|----------------------------|---|---|---|----------------------------|
|                                                                                                                                                                                                                                                                                    | DCX                                                                                                                                                                                                                                                                                                                                                                                                                            | RDX                        | WRX | D [23:8]                   | D7       | D6            | D5 | D4 | D3        | D2                              | D1                                                                  | D0          | HEX  |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| Command                                                                                                                                                                                                                                                                            | 0                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                          | ↑   | XX                         | 1        | 1             | 0  | 1  | 0         | 0                               | 1                                                                   | 0           | D2h  |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 1 <sup>st</sup> Parameter                                                                                                                                                                                                                                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | ↑                          | 1   | XX                         | 0        | 0             | 0  | 0  | 0         | 0                               | 0                                                                   | 0           | 00   |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 2 <sup>nd</sup> Parameter                                                                                                                                                                                                                                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | ↑                          | 1   | XX                         | 0        | ID2_Mk [2:0]  |    |    | 0         | ID1_Mk [2:0]                    |                                                                     |             | 00   |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 3 <sup>rd</sup> Parameter                                                                                                                                                                                                                                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | ↑                          | 1   | XX                         | OTP Busy | VCM1_Mk [2:0] |    |    | 0         | ID3_Mk [2:0]                    |                                                                     |             | 00   |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 4 <sup>th</sup> Parameter                                                                                                                                                                                                                                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | ↑                          | 1   | XX                         | 0        | VCM2_Mk [2:0] |    |    | RB9_P2_Mk |                                 | RB9_P1_Mk                                                           |             | 00   |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 5 <sup>th</sup> Parameter                                                                                                                                                                                                                                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | ↑                          | 1   | NVM_Read_Data 1 [7:0]      |          |               |    |    |           |                                 |                                                                     |             | 00   |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 6 <sup>th</sup> Parameter                                                                                                                                                                                                                                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | ↑                          | 1   | NVM_Read_Data 2 [7:0]      |          |               |    |    |           |                                 |                                                                     |             | 00   |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 7 <sup>th</sup> Parameter                                                                                                                                                                                                                                                          | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | ↑                          | 1   | NVM_Read_Data 3 [7:0]      |          |               |    |    |           |                                 |                                                                     |             | 00   |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| Description                                                                                                                                                                                                                                                                        | The register uses a mark to record the NV memory programmed time. The bits are increase “+1” automatically after writing the PGM_DATA [7:0] to the NV memory.                                                                                                                                                                                                                                                                  |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
|                                                                                                                                                                                                                                                                                    | ID1_Mk [2:0]/ID2_Mk [2:0]/ID3_Mk [2:0]/VCM1_Mk [2:0] /VCM2_Mk [2:0]:                                                                                                                                                                                                                                                                                                                                                           |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
|                                                                                                                                                                                                                                                                                    | <table><tr><th colspan="3">ID1_MK [2:0]/ID2_MK [2:0]/ID3_MK [2:0]/VCM1_MK [2:0]/ VCM2_MK [2:0]</th><th>Description</th></tr><tr><td>0</td><td>0</td><td>0</td><td>No Programmed</td></tr><tr><td>0</td><td>0</td><td>1</td><td>Programmed 1 time already</td></tr><tr><td>0</td><td>1</td><td>1</td><td>Programmed 2 times already</td></tr><tr><td>1</td><td>1</td><td>1</td><td>Programmed 3 times already</td></tr></table> |                            |     |                            |          |               |    |    |           |                                 | ID1_MK [2:0]/ID2_MK [2:0]/ID3_MK [2:0]/VCM1_MK [2:0]/ VCM2_MK [2:0] |             |      | Description | 0             | 0                                        | 0   | No Programmed                           | 0   | 0                                         | 1                          | Programmed 1 time already                | 0   | 1        | 1   | Programmed 2 times already | 1 | 1 | 1 | Programmed 3 times already |
|                                                                                                                                                                                                                                                                                    | ID1_MK [2:0]/ID2_MK [2:0]/ID3_MK [2:0]/VCM1_MK [2:0]/ VCM2_MK [2:0]                                                                                                                                                                                                                                                                                                                                                            |                            |     | Description                |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
|                                                                                                                                                                                                                                                                                    | 0                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                          | 0   | No Programmed              |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
|                                                                                                                                                                                                                                                                                    | 0                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                          | 1   | Programmed 1 time already  |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
|                                                                                                                                                                                                                                                                                    | 0                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                          | 1   | Programmed 2 times already |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
|                                                                                                                                                                                                                                                                                    | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | 1                          | 1   | Programmed 3 times already |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
|                                                                                                                                                                                                                                                                                    | RB9_P1_Mk: Include MY_Panel, MX_Panel, MV_Panel, ML_Panel, BGR_Panel, MH_Panel,SS_Panel, GS_Panel bits                                                                                                                                                                                                                                                                                                                         |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
|                                                                                                                                                                                                                                                                                    | RB9_P2_Mk: Include REV_Panel, SM_Panel bits                                                                                                                                                                                                                                                                                                                                                                                    |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| <table><tr><th colspan="2">RB9_P1_Mk [2:0]/RB9_P1_Mk [2:0]</th><th>Description</th></tr><tr><td>0</td><td>0</td><td>No Programmed</td></tr><tr><td>0</td><td>1</td><td>Programmed 1 time already</td></tr><tr><td>1</td><td>1</td><td>Programmed 2 times already</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                |                            |     |                            |          |               |    |    |           | RB9_P1_Mk [2:0]/RB9_P1_Mk [2:0] |                                                                     | Description | 0    | 0           | No Programmed | 0                                        | 1   | Programmed 1 time already               | 1   | 1                                         | Programmed 2 times already |                                          |     |          |     |                            |   |   |   |                            |
| RB9_P1_Mk [2:0]/RB9_P1_Mk [2:0]                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                | Description                |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 0                                                                                                                                                                                                                                                                                  | 0                                                                                                                                                                                                                                                                                                                                                                                                                              | No Programmed              |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 0                                                                                                                                                                                                                                                                                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | Programmed 1 time already  |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 1                                                                                                                                                                                                                                                                                  | 1                                                                                                                                                                                                                                                                                                                                                                                                                              | Programmed 2 times already |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| OTP Busy: The status bit of the NV memory programming.                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| <table><tr><th>BUSY</th><th>The Status of NV Memory</th></tr><tr><td>0</td><td>Idle</td></tr><tr><td>1</td><td>Busy</td></tr></table>                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                |                            |     |                            |          |               |    |    |           | BUSY                            | The Status of NV Memory                                             | 0           | Idle | 1           | Busy          |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| BUSY                                                                                                                                                                                                                                                                               | The Status of NV Memory                                                                                                                                                                                                                                                                                                                                                                                                        |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 0                                                                                                                                                                                                                                                                                  | Idle                                                                                                                                                                                                                                                                                                                                                                                                                           |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| 1                                                                                                                                                                                                                                                                                  | Busy                                                                                                                                                                                                                                                                                                                                                                                                                           |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| Restriction                                                                                                                                                                                                                                                                        | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                              |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| Register Availability                                                                                                                                                                                                                                                              | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                     |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      | Status      | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes                        | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |                            |   |   |   |                            |
| Status                                                                                                                                                                                                                                                                             | Availability                                                                                                                                                                                                                                                                                                                                                                                                                   |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                           | Yes                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                            | Yes                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                          | Yes                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                           | Yes                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |
| Sleep In                                                                                                                                                                                                                                                                           | Yes                                                                                                                                                                                                                                                                                                                                                                                                                            |                            |     |                            |          |               |    |    |           |                                 |                                                                     |             |      |             |               |                                          |     |                                         |     |                                           |                            |                                          |     |          |     |                            |   |   |   |                            |



Default

| Status            | Default Value    |                  |                  |                  |                  |             |           |           |
|-------------------|------------------|------------------|------------------|------------------|------------------|-------------|-----------|-----------|
|                   | ID3_<br>Mk [2:0] | ID2_<br>Mk [2:0] | ID1_<br>Mk [2:0] | VCM1_Mk<br>[2:0] | VCM2_Mk<br>[2:0] | OTP<br>Busy | RB9_P1_MK | RB9_P2_MK |
| Power ON Sequence | 3'b000           | 3'b000           | 3'b000           | 3'b000           | 3'b000           | 1'b 0       | 2'b00     | 2'b00     |
| S/W Reset         | 3'b000           | 3'b000           | 3'b000           | 3'b000           | 3'b000           | 1'b 0       | 2'b00     | 2'b00     |

| Status            | Default Value            |                          |                         |
|-------------------|--------------------------|--------------------------|-------------------------|
|                   | NVM_Read_Data 1<br>[7:0] | NVM_Read_Data 2<br>[7:0] | NVM_Read_Data3<br>[7:0] |
| Power ON Sequence | 8'h00                    | 8'h00                    | 8'h00                   |
| S/W Reset         | 8'h00                    | 8'h00                    | 8'h00                   |

**Read Device Code (D3h)**

| D3h                       | Read Device Code                                                               |     |     |          |    |    |    |    |    |    |    |    |     |
|---------------------------|--------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|
|                           | DCX                                                                            | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |
| Command                   | 0                                                                              | 1   | ↑   | XX       | 1  | 1  | 0  | 1  | 0  | 0  | 1  | 1  | D3h |
| 1 <sup>st</sup> Parameter | 1                                                                              | ↑   | 1   | XX       | X  | X  | X  | X  | X  | X  | X  | X  | XX  |
| 2 <sup>nd</sup> Parameter | 1                                                                              | ↑   | 1   | XX       | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 00  |
| 3 <sup>rd</sup> Parameter | 1                                                                              | ↑   | 1   | XX       | 1  | 0  | 0  | 1  | 1  | 0  | 0  | 0  | 98  |
| 4 <sup>th</sup> Parameter | 1                                                                              | ↑   | 1   | XX       | 0  | 0  | 1  | 0  | 0  | 1  | 1  | 0  | 26  |
| Description               | Read IC device code.                                                           |     |     |          |    |    |    |    |    |    |    |    |     |
|                           | The 1 <sup>st</sup> parameter is a dummy data                                  |     |     |          |    |    |    |    |    |    |    |    |     |
|                           | The 2 <sup>nd</sup> parameter is reserved for future use.                      |     |     |          |    |    |    |    |    |    |    |    |     |
|                           | The 3 <sup>rd</sup> and 4 <sup>th</sup> parameters indicate the IC model name. |     |     |          |    |    |    |    |    |    |    |    |     |
|                           | X=void                                                                         |     |     |          |    |    |    |    |    |    |    |    |     |
| Restriction               | none                                                                           |     |     |          |    |    |    |    |    |    |    |    |     |
| Register Availability     |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
|                           |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
|                           |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
|                           |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
|                           |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
|                           |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
| Default                   |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
|                           |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
|                           |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
|                           |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |
|                           |                                                                                |     |     |          |    |    |    |    |    |    |    |    |     |

## Clamp Control (D7h)

| D7h                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | CLAMPCTRL (D7h)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----|----------|------------|---------------|----|--------------|----|----|----|----|--------------|-----------------------|-----------------------|---------|---------|--------|--------|-------|-------|-------|-------|-------|-----|---|---|---|---|---|-------------|-------------|-------|-------|-------|-------|-------|------------|------------|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | RDX                   | WRX | D [23:8] | D7         | D6            | D5 | D4           | D3 | D2 | D1 | D0 | HEX          |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| Command                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                     | ↑   | XX       | 1          | 1             | 0  | 1            | 0  | 1  | 1  | 1  | D7h          |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 1 <sup>st</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                     | ↑   | XX       | VGH_CLPEN  | 0             | 0  | VGH_CLP[4:0] |    |    |    |    | 10           |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 2 <sup>nd</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                     | ↑   | XX       | VGL_CLPEN  | 0             | 0  | VGL_CLP[4:0] |    |    |    |    | 06           |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 3 <sup>rd</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                     | ↑   | XX       | AVDD_CLPEN | AVDD_CLP[4:0] |    |              |    |    | 0  | 0  | B4           |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 4 <sup>th</sup> Parameter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                     | ↑   | XX       | AVEE_CLPEN | AVEE_CLP[4:0] |    |              |    |    | 1  | 1  | BF           |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <b>VGH_CLPEN:</b> Enable VGH clamp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <table><tr><th>VGH_CLPEN</th><th>VGH Clamp</th></tr><tr><td>0</td><td>Disable</td></tr><tr><td>1</td><td>Enable</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                            |                       |     |          |            |               |    |              |    |    |    |    |              | VGH_CLPEN             | VGH Clamp             | 0       | Disable | 1      | Enable |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | VGH_CLPEN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | VGH Clamp             |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Disable               |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Enable                |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>VGH_CLP[4:0]:</b> Set VGH clamp voltage.The way of the setting is illustrate as below.                                                                                                                                                                                                                                                                                                                                                                                                                    |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <table><tr><th>VGH_CLP[4:0]</th><th>VGH Clamp Voltage (V)</th></tr><tr><td>5'h00</td><td>7.0</td></tr><tr><td>5'h01</td><td>7.5</td></tr><tr><td>5'h02</td><td>8.0</td></tr><tr><td>5'h03</td><td>8.5</td></tr><tr><td>5'h04</td><td>9.0</td></tr><tr><td>.</td><td>.</td></tr><tr><td>.</td><td>.</td></tr><tr><td>.</td><td>.</td></tr><tr><td colspan="2">0.5V / Step</td></tr><tr><td>5'h15</td><td>17.5</td></tr><tr><td>5'h16</td><td>18.0</td></tr><tr><td>other</td><td>inhibition</td></tr></table> |                       |     |          |            |               |    |              |    |    |    |    |              | VGH_CLP[4:0]          | VGH Clamp Voltage (V) | 5'h00   | 7.0     | 5'h01  | 7.5    | 5'h02 | 8.0   | 5'h03 | 8.5   | 5'h04 | 9.0 | . | . | . | . | . | .           | 0.5V / Step |       | 5'h15 | 17.5  | 5'h16 | 18.0  | other      | inhibition |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | VGH_CLP[4:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | VGH Clamp Voltage (V) |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5'h00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 7.0                   |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 5'h01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 7.5                   |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 8.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 8.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 9.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 0.5V / Step                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 17.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 18.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | inhibition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| <b>VGL_CLPEN:</b> Enable VGH clamp.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| <table><tr><th>VGL_CLPEN</th><th>VGL Clamp</th></tr><tr><td>0</td><td>Disable</td></tr><tr><td>1</td><td>Enable</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |     |          |            |               |    |              |    |    |    |    | VGL_CLPEN    | VGL Clamp             | 0                     | Disable | 1       | Enable |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| VGL_CLPEN                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | VGL Clamp                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Disable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Enable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| <b>VGL_CLP[4:0]:</b> Set VGL clamp voltage.The way of the setting is illustrate as below.                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| <table><tr><th>VGL_CLP[4:0]</th><th>VGL Clamp Voltage (V)</th></tr><tr><td>5'h00</td><td>-7.0</td></tr><tr><td>5'h01</td><td>-7.5</td></tr><tr><td>5'h02</td><td>-8.0</td></tr><tr><td>5'h03</td><td>-8.5</td></tr><tr><td>5'h04</td><td>-9.0</td></tr><tr><td>.</td><td>.</td></tr><tr><td>.</td><td>.</td></tr><tr><td>.</td><td>.</td></tr><tr><td colspan="2">0.5V / Step</td></tr><tr><td>5'h15</td><td>-17.5</td></tr><tr><td>5'h16</td><td>-18.0</td></tr><tr><td>other</td><td>inhibition</td></tr></table> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |     |          |            |               |    |              |    |    |    |    | VGL_CLP[4:0] | VGL Clamp Voltage (V) | 5'h00                 | -7.0    | 5'h01   | -7.5   | 5'h02  | -8.0  | 5'h03 | -8.5  | 5'h04 | -9.0  | .   | . | . | . | . | . | 0.5V / Step |             | 5'h15 | -17.5 | 5'h16 | -18.0 | other | inhibition |            |
| VGL_CLP[4:0]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | VGL Clamp Voltage (V)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -7.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -7.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -8.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -8.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -9.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | .                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 0.5V / Step                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -17.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| 5'h16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -18.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |
| other                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | inhibition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                       |     |          |            |               |    |              |    |    |    |    |              |                       |                       |         |         |        |        |       |       |       |       |       |     |   |   |   |   |   |             |             |       |       |       |       |       |            |            |

**AVDD\_CLPEN:** Enable AVDD clamp.

| AVDD_CLPEN | AVDD Clamp |
|------------|------------|
| 0          | Disable    |
| 1          | Enable     |

**AVDD\_CLP[4:0]:** Set AVDD clamp voltage. The way of the setting is illustrate as below.

| AVDD_CLP[4:0] | AVDD Clamp Voltage (V) |
|---------------|------------------------|
| 5'b00000      | 6.5                    |
| 5'b00001      | 6.4                    |
| 5'b00010      | 6.3                    |
| 5'b00011      | 6.2                    |
| 5'b00100      | 6.1                    |
| .             | .                      |
| .             | .                      |
| .             | .                      |
| -0.1V / Step  |                        |
| 5'b10011      | 4.6                    |
| 5'b10100      | 4.5                    |
| other         | inhibition             |

**AVEE\_CLPEN:** Enable AVEE clamp.

| AVEE_CLPEN | AVEE Clamp |
|------------|------------|
| 0          | Disable    |
| 1          | Enable     |

**AVEE\_CLP[4:0]:** Set AVEE clamp voltage. The way of the setting is illustrate as below.

| AVEE_CLP[4:0] | AVEE Clamp Voltage (V) |
|---------------|------------------------|
| 5'b00000      | -6.5                   |
| 5'b00001      | -6.4                   |
| 5'b00010      | -6.3                   |
| 5'b00011      | -6.2                   |
| 5'b00100      | -6.1                   |
| .             | .                      |
| .             | .                      |
| .             | .                      |
| 0.1V / Step   |                        |
| 5'b10011      | -4.6                   |
| 5'b10100      | -4.5                   |
| other         | inhibition             |

**Restriction** To enable this command, EXTC Command Set Enable Register (FFh) must be set first.

| Register<br>Availability | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                    | Status        | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes          | Normal Mode On, Idle Mode On, Sleep Out | Yes        | Partial Mode On, Idle Mode Off, Sleep Out | Yes        | Partial Mode On, Idle Mode On, Sleep Out | Yes               | Sleep In | Yes      |      |          |           |      |          |      |          |           |      |          |      |          |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------|------------------------------------------|--------------|-----------------------------------------|------------|-------------------------------------------|------------|------------------------------------------|-------------------|----------|----------|------|----------|-----------|------|----------|------|----------|-----------|------|----------|------|----------|
|                          | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Availability  |               |                                          |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          | Normal Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                      | Yes           |               |                                          |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          | Normal Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                       | Yes           |               |                                          |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          | Partial Mode On, Idle Mode Off, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                     | Yes           |               |                                          |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          | Partial Mode On, Idle Mode On, Sleep Out                                                                                                                                                                                                                                                                                                                                                                                                                      | Yes           |               |                                          |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
| Sleep In                 | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                           |               |               |                                          |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
| Default                  | <table><tr><th rowspan="2">Status</th><th colspan="4">Default Value</th></tr><tr><th>VGH_CLPEN</th><th>VGH_CLP[4:0]</th><th>VGL_CLPEN</th><th>VGL_CLP[4:0]</th></tr><tr><td>Power ON Sequence</td><td>1'b0</td><td>5'h02</td><td>1'b0</td><td>5'h02</td></tr><tr><td>S/W Reset</td><td>1'b0</td><td>5'h02</td><td>1'b0</td><td>5'h02</td></tr><tr><td>H/W Reset</td><td>1'b0</td><td>5'h02</td><td>1'b0</td><td>5'h02</td></tr></table>                       | Status        | Default Value |                                          |              |                                         | VGH_CLPEN  | VGH_CLP[4:0]                              | VGL_CLPEN  | VGL_CLP[4:0]                             | Power ON Sequence | 1'b0     | 5'h02    | 1'b0 | 5'h02    | S/W Reset | 1'b0 | 5'h02    | 1'b0 | 5'h02    | H/W Reset | 1'b0 | 5'h02    | 1'b0 | 5'h02    |
|                          | Status                                                                                                                                                                                                                                                                                                                                                                                                                                                        |               | Default Value |                                          |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                               | VGH_CLPEN     | VGH_CLP[4:0]  | VGL_CLPEN                                | VGL_CLP[4:0] |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          | Power ON Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                             | 1'b0          | 5'h02         | 1'b0                                     | 5'h02        |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          | S/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1'b0          | 5'h02         | 1'b0                                     | 5'h02        |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          | H/W Reset                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1'b0          | 5'h02         | 1'b0                                     | 5'h02        |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          | <table><tr><th rowspan="2">Status</th><th colspan="4">Default Value</th></tr><tr><th>AVDD_CLPEN</th><th>AVDD_CLP[4:0]</th><th>AVEE_CLPEN</th><th>AVEE_CLP[4:0]</th></tr><tr><td>Power ON Sequence</td><td>1'b1</td><td>5'b01101</td><td>1'b1</td><td>5'b01111</td></tr><tr><td>S/W Reset</td><td>1'b1</td><td>5'b01101</td><td>1'b1</td><td>5'b01111</td></tr><tr><td>H/W Reset</td><td>1'b1</td><td>5'b01101</td><td>1'b1</td><td>5'b01111</td></tr></table> | Status        | Default Value |                                          |              |                                         | AVDD_CLPEN | AVDD_CLP[4:0]                             | AVEE_CLPEN | AVEE_CLP[4:0]                            | Power ON Sequence | 1'b1     | 5'b01101 | 1'b1 | 5'b01111 | S/W Reset | 1'b1 | 5'b01101 | 1'b1 | 5'b01111 | H/W Reset | 1'b1 | 5'b01101 | 1'b1 | 5'b01111 |
| Status                   | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                 |               |               |                                          |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
|                          | AVDD_CLPEN                                                                                                                                                                                                                                                                                                                                                                                                                                                    | AVDD_CLP[4:0] | AVEE_CLPEN    | AVEE_CLP[4:0]                            |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
| Power ON Sequence        | 1'b1                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5'b01101      | 1'b1          | 5'b01111                                 |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
| S/W Reset                | 1'b1                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5'b01101      | 1'b1          | 5'b01111                                 |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |
| H/W Reset                | 1'b1                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 5'b01101      | 1'b1          | 5'b01111                                 |              |                                         |            |                                           |            |                                          |                   |          |          |      |          |           |      |          |      |          |           |      |          |      |          |

**Positive Gamma Control (E0h)**

| E0h                                       | PGAMCTRL (Positive Gamma Control)                                                                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|-------------|-------------|-------------|----|----|----|-----|--------|--------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5          | D4          | D3          | D2 | D1 | D0 | HEX |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 1  | 1  | 1           | 0           | 0           | 0  | 0  | 0  | E0h |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VP0 [5:0]   |             |             |    |    |    | 00  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VP4 [5:0]   |             |             |    |    |    | 0F  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 3 <sup>rd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VP8 [5:0]   |             |             |    |    |    | 19  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 4 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VP16 [4:0]  |             |    |    |    | 12  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 5 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VP32 [4:0]  |             |    |    |    | 13  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 6 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VP52 [4:0]  |             |    |    |    | 1A  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 7 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 1  | 1  | 0           | 0           | VP80 [3:0]  |    |    |    | CD  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 8 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | 0           | VP108 [3:0] |    |    |    | 0C  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 9 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | 0           | VP147 [3:0] |    |    |    | 00  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 10 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | 0           | VP175 [3:0] |    |    |    | 04  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 11 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VP203 [4:0] |             |    |    |    | 04  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 12 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VP223 [4:0] |             |    |    |    | 0D  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 13 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VP239 [4:0] |             |    |    |    | 0B  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 14 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VP247 [5:0] |             |             |    |    | 2A |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 15 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VP251 [5:0] |             |             |    |    | 20 |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 16 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VP255 [5:0] |             |             |    |    | 00 |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | Set the gray scale voltage to adjust the Gamma characteristics of the TFT panel.                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |             |             |             |    |    |    |     | Status | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Negative Gamma Control (E1h)

| E1h                                       | NGAMCTRL (Negative Gamma Correction)                                                                                                                                                                                                                                                                                                                                                       |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|-------------|-------------|-------------|----|----|----|-----|--------|--------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5          | D4          | D3          | D2 | D1 | D0 | HEX |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 1  | 1  | 1           | 0           | 0           | 0  | 0  | 1  | E1h |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VN0 [5:0]   |             |             |    |    |    | 00  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VN4 [5:0]   |             |             |    |    |    | 0F  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 3 <sup>rd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VN8 [5:0]   |             |             |    |    |    | 19  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 4 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VN16 [4:0]  |             |    |    |    | 12  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 5 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VN32 [4:0]  |             |    |    |    | 13  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 6 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VN52 [4:0]  |             |    |    |    | 1A  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 7 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 1  | 1           | 1           | VN80 [3:0]  |    |    |    | 7D  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 8 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | 0           | VN108 [3:0] |    |    |    | 0C  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 9 <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | 0           | VN147 [3:0] |    |    |    | 00  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 10 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | 0           | VN175 [3:0] |    |    |    | 04  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 11 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VN203 [4:0] |             |    |    |    | 04  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 12 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VN223 [4:0] |             |    |    |    | 0D  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 13 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0           | VN239 [4:0] |             |    |    |    | 0B  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 14 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VN247 [5:0] |             |             |    |    |    | 2A  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 15 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VN251 [5:0] |             |             |    |    |    | 20  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 16 <sup>th</sup> Parameter                | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | VN255 [5:0] |             |             |    |    |    | 00  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | Set the gray scale voltage to adjust the Gamma characteristics of the TFT panel.                                                                                                                                                                                                                                                                                                           |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode OFF, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |             |             |             |    |    |    |     | Status | Availability | Normal Mode On, Idle Mode OFF, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode OFF, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |             |             |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Digital Gamma Control 1 (E2h)

| E2h                                       | DGAMCTRL (Digital Gamma Control 1)                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|-------------|----|----|----|-----|--------|--------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3          | D2 | D1 | D0 | HEX |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 1  | 1  | 1  | 0  | 0           | 0  | 1  | 0  | E2h |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | RCA0 [3:0]  |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | BCA0 [3:0]  |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| :                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   |          |    |    |    |    |             |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| x <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | RCAx [3:0]  |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| X+1 <sup>th</sup> Parameter               | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | BCAx [3:0]  |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| :                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   |          |    |    |    |    |             |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 127 <sup>rd</sup> Parameter               | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | RCA63 [3:0] |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 128 <sup>rd</sup> Parameter               | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | BCA63 [3:0] |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <b>RCAx [3:0]</b> : Gamma Macro-adjustment registers for red Gamma curve.<br><b>BCAx [3:0]</b> : Gamma Macro-adjustment registers for blue Gamma curve.                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |    |    |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |             |    |    |    |     | Status | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |             |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |



## Digital Gamma Control 2 (E3h)

| E3h                                       | DGAMCTRL (Digital Gamma Control 2)                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|--------------|----|----|----|-----|--------|--------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3           | D2 | D1 | D0 | HEX |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 1  | 1  | 1  | 0  | 0            | 0  | 1  | 1  | E3h |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | RFA0 [3:0]   |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | BFA0 [3:0]   |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| :                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   |          |    |    |    |    |              |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| x <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | RFAx [3:0]   |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| X+1 <sup>th</sup> Parameter               | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | BFAx [3:0]   |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| :                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   |          |    |    |    |    |              |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 255 <sup>th</sup> Parameter               | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | RFA127 [3:0] |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 256 <sup>th</sup> Parameter               | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | BFA127 [3:0] |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | RFAx [3:0]: Gamma Micro-adjustment registers for red Gamma curve.<br>BFAx [3:0]: Gamma Micro-adjustment registers for blue Gamma curve.                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |              |    |    |    |     | Status | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Digital Gamma Control 3 (E4h)

| E4h                                       | DGAMCTRL (Digital Gamma Control 3)                                                                                                                                                                                                                                                                                                                                                         |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|--------------|----|----|----|-----|--------|--------------|------------------------------------------|-----|-----------------------------------------|-----|-------------------------------------------|-----|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3           | D2 | D1 | D0 | HEX |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 1  | 1  | 1  | 0  | 0            | 1  | 0  | 0  | E4h |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | RFA128 [3:0] |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | BFA128 [3:0] |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| :                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   |          | :  |    |    |    | :            |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| x <sup>th</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | RFAx [3:0]   |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| X+1 <sup>th</sup> Parameter               | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | BFAx [3:0]   |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| :                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   |          | :  |    |    |    | :            |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 255 <sup>th</sup> Parameter               | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | RFA255 [3:0] |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| 256 <sup>th</sup> Parameter               | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 0  | 0  | BFA255 [3:0] |    |    |    | XX  |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Description                               | <b>RFAx [3:0]:</b> Gamma Micro-adjustment registers for red Gamma curve.<br><b>BFAx [3:0]:</b> Gamma Micro-adjustment registers for blue Gamma curve.                                                                                                                                                                                                                                      |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |              |    |    |    |     | Status | Availability | Normal Mode On, Idle Mode Off, Sleep Out | Yes | Normal Mode On, Idle Mode On, Sleep Out | Yes | Partial Mode On, Idle Mode Off, Sleep Out | Yes | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |              |    |    |    |     |        |              |                                          |     |                                         |     |                                           |     |                                          |     |          |     |

## Digital 3 Gamma Enable (EAh)

| EAh                                       | D3GE (Digital 3 Gamma Enable)                                                                                                                                                                                                                                                                                                                                                              |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|----------|----|----|----|----|----|----|-------|---------|-----|--------|---------------|------------------------------------------|-------|-----------------------------------------|-------------------|-------------------------------------------|------|------------------------------------------|------|----------|-----------|------|------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX     | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1    | D0      | HEX |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1       | ↑   | XX       | 1  | 1  | 1  | 0  | 1  | 0  | 1     | 0       | EAh |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1       | ↑   | XX       | 0  | 0  | 0  | 0  | 0  | 0  | En_3G | Dith_en | 00  |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Description                               | <b>En_3G:</b>                                                                                                                                                                                                                                                                                                                                                                              |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
|                                           | 1: digital 3 gamma enable                                                                                                                                                                                                                                                                                                                                                                  |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
|                                           | 0: digital 3 gamma disable                                                                                                                                                                                                                                                                                                                                                                 |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
|                                           | <b>Dith_en:</b>                                                                                                                                                                                                                                                                                                                                                                            |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
|                                           | 1: dithering function enable                                                                                                                                                                                                                                                                                                                                                               |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
|                                           | 0: dithering function disable                                                                                                                                                                                                                                                                                                                                                              |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |         |     |          |    |    |    |    |    |    |       |         |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes   | Normal Mode On, Idle Mode On, Sleep Out | Yes               | Partial Mode On, Idle Mode Off, Sleep Out | Yes  | Partial Mode On, Idle Mode On, Sleep Out | Yes  | Sleep In | Yes       |      |      |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Default                                   | <table><tr><th rowspan="2">Status</th><th colspan="2">Default Value</th></tr><tr><th>En_3G</th><th>Dith_en</th></tr><tr><td>Power ON Sequence</td><td>1'b0</td><td>1'b0</td></tr><tr><td>S/W Reset</td><td>1'b0</td><td>1'b0</td></tr><tr><td>H/W Reset</td><td>1'b0</td><td>1'b0</td></tr></table>                                                                                        |         |     |          |    |    |    |    |    |    |       |         |     | Status | Default Value |                                          | En_3G | Dith_en                                 | Power ON Sequence | 1'b0                                      | 1'b0 | S/W Reset                                | 1'b0 | 1'b0     | H/W Reset | 1'b0 | 1'b0 |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |         |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
|                                           | En_3G                                                                                                                                                                                                                                                                                                                                                                                      | Dith_en |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| Power ON Sequence                         | 1'b0                                                                                                                                                                                                                                                                                                                                                                                       | 1'b0    |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| S/W Reset                                 | 1'b0                                                                                                                                                                                                                                                                                                                                                                                       | 1'b0    |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |
| H/W Reset                                 | 1'b0                                                                                                                                                                                                                                                                                                                                                                                       | 1'b0    |     |          |    |    |    |    |    |    |       |         |     |        |               |                                          |       |                                         |                   |                                           |      |                                          |      |          |           |      |      |

## DSI LAN Select (ECh)

| ECh                                       | DSILS (DSI LAN Select)                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|---------|-----|--------|---------------|------------------------------------------|-------------------|-----------------------------------------|-----------|-------------------------------------------|-----------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0      | HEX |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 1  | 1  | 1  | 0  | 1  | 0  | 1  | 0       | ECh |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑   | XX       | 0  | 0  | 1  | 0  | 0  | 1  | 0  | 2LAN_EN | 25  |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Description                               | <b>2LAN_EN:</b><br>1: 2 data lanes<br><br>0: 1 data lane                                                                                                                                                                                                                                                                                                                                   |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |     |          |    |    |    |    |    |    |    |         |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes               | Normal Mode On, Idle Mode On, Sleep Out | Yes       | Partial Mode On, Idle Mode Off, Sleep Out | Yes       | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Default                                   | <table><tr><th rowspan="2">Status</th><th>Default Value</th></tr><tr><th>2LAN_EN</th></tr><tr><td>Power ON Sequence</td><td>1'b1</td></tr><tr><td>S/W Reset</td><td>1'b1</td></tr><tr><td>H/W Reset</td><td>1'b1</td></tr></table>                                                                                                                                                         |     |     |          |    |    |    |    |    |    |    |         |     | Status | Default Value | 2LAN_EN                                  | Power ON Sequence | 1'b1                                    | S/W Reset | 1'b1                                      | H/W Reset | 1'b1                                     |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
|                                           | 2LAN_EN                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| Power ON Sequence                         | 1'b1                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| S/W Reset                                 | 1'b1                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |
| H/W Reset                                 | 1'b1                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |    |    |    |    |    |    |    |         |     |        |               |                                          |                   |                                         |           |                                           |           |                                          |     |          |     |

## Panel Timing Control 1 (F1h)

| F1h                                                                                          | PTCTRL1 (Panel Timing Control 1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------------|--------------------------------------------------|-------------|----|-------------------|----|----|----|----|--------|-----|-------------|-----------------|------------------------------------------|-------------|-----------------------------------------|-------------------|-------------------------------------------|-------------------|------------------------------------------|-------|----------|-----------------|------|-------|------|-----------------|------|-------|------|-----------------|---|---|---|--------------------------------------------------|---|---|---|--------------------------------------------------|---|---|---|--------------------------------------------------|---|---|---|--------------------------------------------------|
|                                                                                              | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | RDX               | WRX                                              | D [23:8]                                         | D7          | D6 | D5                | D4 | D3 | D2 | D1 | D0     | HEX |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Command                                                                                      | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                 | ↑                                                | XX                                               | 1           | 1  | 1                 | 1  | 0  | 0  | 0  | 1      | F1h |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| 1 <sup>st</sup> Parameter                                                                    | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                 | ↑                                                | XX                                               | Chopper_opt | 0  | Chopper_sel [1:0] |    | 1  | 0  | 0  | Outsre | A8  |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Description                                                                                  | <b>Chopper_opt:</b> Source Op-amp chopper function option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|                                                                                              | <b>Chopper_sel [1:0]:</b> Source Op-amp chopper function option                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|                                                                                              | <table><tr><th>Chopper_opt</th><th>Chopper_sel [1]</th><th>Chopper_sel [0]</th><th>Description</th></tr><tr><td>0</td><td>0</td><td>0</td><td>chopper disable</td></tr><tr><td>0</td><td>0</td><td>1</td><td>1 frame chopper</td></tr><tr><td>0</td><td>1</td><td>0</td><td>2 frame chopper</td></tr><tr><td>0</td><td>1</td><td>1</td><td>3 frame chopper</td></tr><tr><td>1</td><td>0</td><td>0</td><td>1 line chopper (1 frame chopper polarity change)</td></tr><tr><td>1</td><td>0</td><td>1</td><td>2 line chopper (1 frame chopper polarity change)</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1 line chopper (2 frame chopper polarity change)</td></tr><tr><td>1</td><td>1</td><td>1</td><td>2 line chopper (2 frame chopper polarity change)</td></tr></table> |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     | Chopper_opt | Chopper_sel [1] | Chopper_sel [0]                          | Description | 0                                       | 0                 | 0                                         | chopper disable   | 0                                        | 0     | 1        | 1 frame chopper | 0    | 1     | 0    | 2 frame chopper | 0    | 1     | 1    | 3 frame chopper | 1 | 0 | 0 | 1 line chopper (1 frame chopper polarity change) | 1 | 0 | 1 | 2 line chopper (1 frame chopper polarity change) | 1 | 1 | 0 | 1 line chopper (2 frame chopper polarity change) | 1 | 1 | 1 | 2 line chopper (2 frame chopper polarity change) |
|                                                                                              | Chopper_opt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Chopper_sel [1]   | Chopper_sel [0]                                  | Description                                      |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|                                                                                              | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0                 | 0                                                | chopper disable                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|                                                                                              | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0                 | 1                                                | 1 frame chopper                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|                                                                                              | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                 | 0                                                | 2 frame chopper                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|                                                                                              | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                 | 1                                                | 3 frame chopper                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|                                                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0                 | 0                                                | 1 line chopper (1 frame chopper polarity change) |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|                                                                                              | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0                 | 1                                                | 2 line chopper (1 frame chopper polarity change) |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| 1                                                                                            | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0                 | 1 line chopper (2 frame chopper polarity change) |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| 1                                                                                            | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1                 | 2 line chopper (2 frame chopper polarity change) |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| <b>Outsre:</b> Increase SRC Opamp output driving ability. 0:normal driving, 1:double driving |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Restriction                                                                                  | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Register Availability                                                                        | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                   |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     | Status      | Availability    | Normal Mode On, Idle Mode Off, Sleep Out | Yes         | Normal Mode On, Idle Mode On, Sleep Out | Yes               | Partial Mode On, Idle Mode Off, Sleep Out | Yes               | Partial Mode On, Idle Mode On, Sleep Out | Yes   | Sleep In | Yes             |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Status                                                                                       | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Normal Mode On, Idle Mode Off, Sleep Out                                                     | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Normal Mode On, Idle Mode On, Sleep Out                                                      | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Partial Mode On, Idle Mode Off, Sleep Out                                                    | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Partial Mode On, Idle Mode On, Sleep Out                                                     | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Sleep In                                                                                     | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Default                                                                                      | <table><tr><th rowspan="2">Status</th><th colspan="3">Default Value</th></tr><tr><th>Chopper_opt</th><th>Chopper_sel [1:0]</th><th>Outsre</th></tr><tr><td>Power ON Sequence</td><td>1'b1</td><td>2'b10</td><td>1'b0</td></tr><tr><td>S/W Reset</td><td>1'b1</td><td>2'b10</td><td>1'b0</td></tr><tr><td>H/W Reset</td><td>1'b1</td><td>2'b10</td><td>1'b0</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                 |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     | Status      | Default Value   |                                          |             | Chopper_opt                             | Chopper_sel [1:0] | Outsre                                    | Power ON Sequence | 1'b1                                     | 2'b10 | 1'b0     | S/W Reset       | 1'b1 | 2'b10 | 1'b0 | H/W Reset       | 1'b1 | 2'b10 | 1'b0 |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Status                                                                                       | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                   |                                                  |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
|                                                                                              | Chopper_opt                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Chopper_sel [1:0] | Outsre                                           |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| Power ON Sequence                                                                            | 1'b1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2'b10             | 1'b0                                             |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| S/W Reset                                                                                    | 1'b1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2'b10             | 1'b0                                             |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |
| H/W Reset                                                                                    | 1'b1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2'b10             | 1'b0                                             |                                                  |             |    |                   |    |    |    |    |        |     |             |                 |                                          |             |                                         |                   |                                           |                   |                                          |       |          |                 |      |       |      |                 |      |       |      |                 |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |   |   |   |                                                  |

## Panel Timing Control 2 (F2h)

| F2h                       | PTCTRL2 (Panel Timing Control 2) |     |     |          |            |          |    |    |    |    |    |    |     |
|---------------------------|----------------------------------|-----|-----|----------|------------|----------|----|----|----|----|----|----|-----|
|                           | DCX                              | RDX | WRX | D [23:8] | D7         | D6       | D5 | D4 | D3 | D2 | D1 | D0 | HEX |
| Command                   | 0                                | 1   | ↑   | XX       | 1          | 1        | 1  | 1  | 0  | 0  | 1  | 0  | F2h |
| 1 <sup>st</sup> Parameter | 1                                | 1   | ↑   | XX       | 0          | CRT[6:0] |    |    |    |    |    |    | 09  |
| 2 <sup>nd</sup> Parameter | 1                                | 1   | ↑   | XX       | 0          | EQT[6:0] |    |    |    |    |    |    | 06  |
| 3 <sup>rd</sup> Parameter | 1                                | 1   | ↑   | XX       | 0          | PCT[6:0] |    |    |    |    |    |    | 08  |
| 4 <sup>th</sup> Parameter | 1                                | 1   | ↑   | XX       | Creqpc     | SDT[6:0] |    |    |    |    |    |    | 8A  |
| 5 <sup>th</sup> Parameter | 1                                | 1   | ↑   | XX       | GEQ1W[7:0] |          |    |    |    |    |    | 00 |     |
| 6 <sup>th</sup> Parameter | 1                                | 1   | ↑   | XX       | GEQ2W[7:0] |          |    |    |    |    |    | 00 |     |

**CRT[6:0]:** Source CR external timing adjustment (time scale: internal op\_clk).

The timing can be adjusted from 0 to 127 time scales.

**EQT[6:0]:** Source EQ external timing adjustment (time scale: internal op\_clk).

The timing can be adjusted from 1 to 127 time scales.

**PCT[6:0]:** PC external timing adjustment (time scale: internal op\_clk).

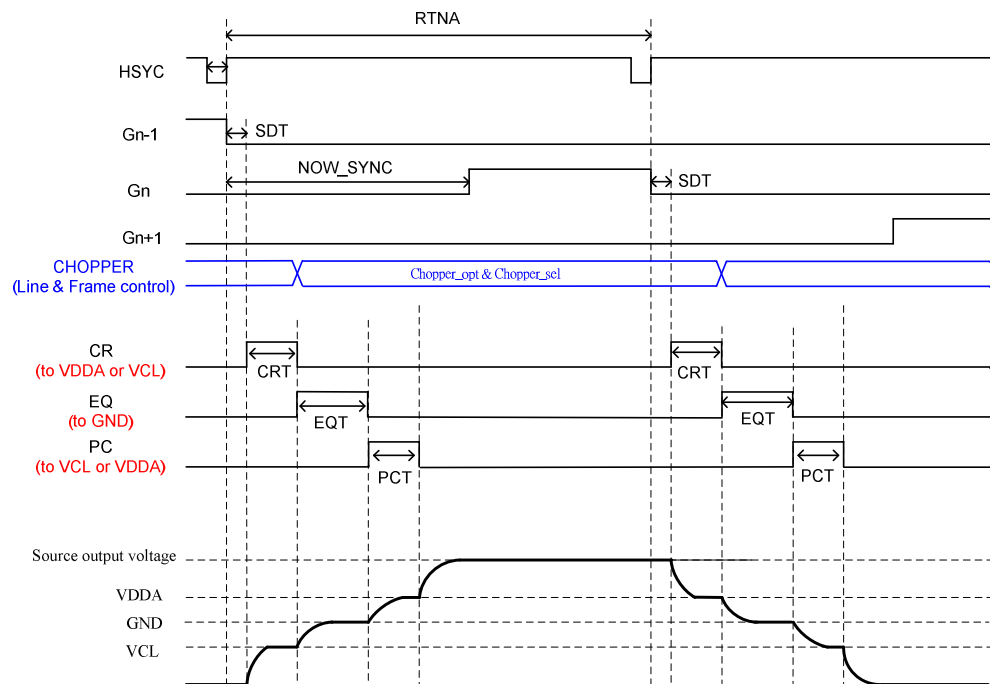
The timing can be adjusted from 0 to 127 time scales.

**Creqpc:** CR/EQ/PC function enable signal.

**SDT[6:0]:** Source SDT internal timing adjustment (time scale: internal op\_clk).

The timing can be adjusted 0 to 127 time scales.

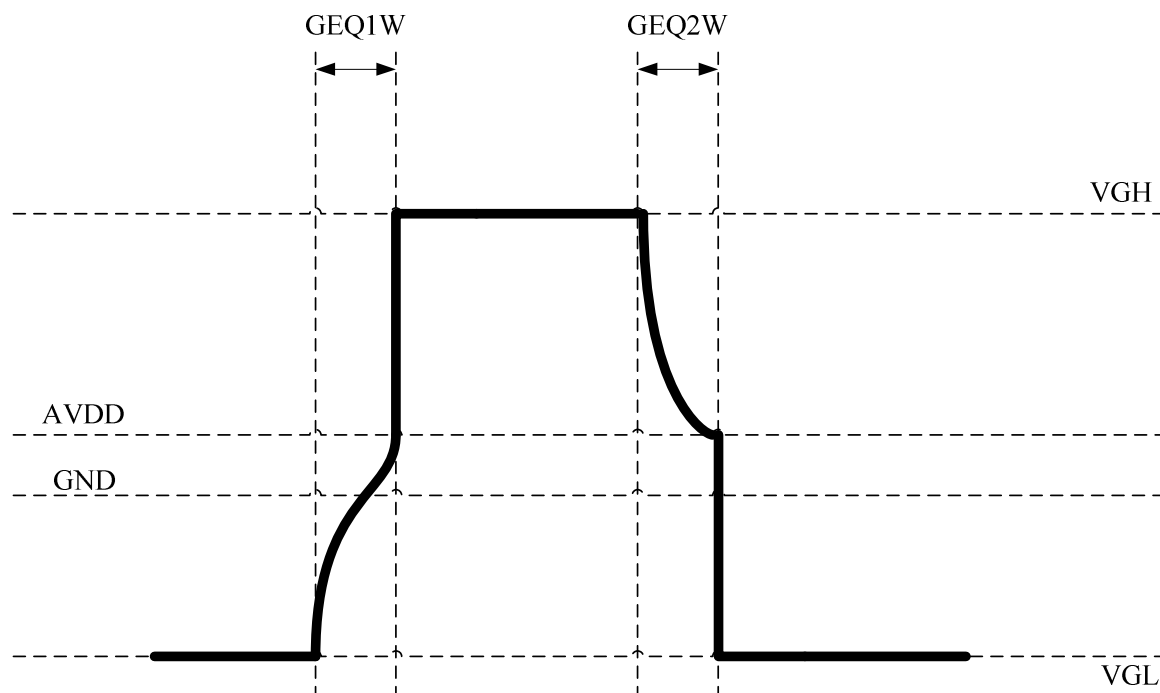
Description



**GEQ1W[7:0]:** Gate power modulation 0 – 255T.(VGL - AVDD)

**GEQ2W[7:0]:** Gate power modulation 0 – 255T.( VGH - AVDD)

Note: GEQ1W[7:0] / GEQ2W[7:0] 1T=220nS



**Restriction** To enable this command, EXTC Command Set Enable Register (FFh) must be set first.

**Register Availability**

| Status                                    | Availability |
|-------------------------------------------|--------------|
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes          |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes          |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes          |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes          |
| Sleep In                                  | Yes          |

**Default**

| Status            | Default Value                                                                                                                                                                                                             |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power ON Sequence | 1 <sup>st</sup> Parameter = 8'h05<br>2 <sup>nd</sup> Parameter = 8'h0e<br>3 <sup>rd</sup> Parameter = 8'h05<br>4 <sup>th</sup> Parameter = 8'h85<br>5 <sup>th</sup> Parameter = 8'h00<br>6 <sup>th</sup> Parameter =8'h00 |
| S/W Reset         | 1 <sup>st</sup> Parameter = 8'h05<br>2 <sup>nd</sup> Parameter = 8'h0e<br>3 <sup>rd</sup> Parameter = 8'h05<br>4 <sup>th</sup> Parameter = 8'h85<br>5 <sup>th</sup> Parameter = 8'h00<br>6 <sup>th</sup> Parameter =8'h00 |

|           |                                                                                                                                                                                                                           | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>H/W Reset</td><td>1<sup>st</sup> Parameter = 8'h05<br/>2<sup>nd</sup> Parameter = 8'h0e<br/>3<sup>rd</sup> Parameter = 8'h05<br/>4<sup>th</sup> Parameter = 8'h85<br/>5<sup>th</sup> Parameter = 8'h00<br/>6<sup>th</sup> Parameter =8'h00</td></tr></table> |  | Status | Default Value | H/W Reset | 1 <sup>st</sup> Parameter = 8'h05<br>2 <sup>nd</sup> Parameter = 8'h0e<br>3 <sup>rd</sup> Parameter = 8'h05<br>4 <sup>th</sup> Parameter = 8'h85<br>5 <sup>th</sup> Parameter = 8'h00<br>6 <sup>th</sup> Parameter =8'h00 |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------|---------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Status    | Default Value                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                           |  |        |               |           |                                                                                                                                                                                                                           |
| H/W Reset | 1 <sup>st</sup> Parameter = 8'h05<br>2 <sup>nd</sup> Parameter = 8'h0e<br>3 <sup>rd</sup> Parameter = 8'h05<br>4 <sup>th</sup> Parameter = 8'h85<br>5 <sup>th</sup> Parameter = 8'h00<br>6 <sup>th</sup> Parameter =8'h00 |                                                                                                                                                                                                                                                                                                                           |  |        |               |           |                                                                                                                                                                                                                           |



**Resolution Control (F7h)**

| F7h                                       | RSO (Resolution Control)                                                                                                                                                                                                                                                                                                                                                                   |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------------|--------------------------|----|----|----|----|----|----------|----|----|-----|----------|---------------|------------------------------------------|------------|-----------------------------------------|--------|-------------------------------------------|--------------------------|------------------------------------------|--------|----------|--------------------------|---|---|---|--------------------------|---|---|---|--------------------------|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                        | RDX | WRX                      | D [23:8]                 | D7 | D6 | D5 | D4 | D3 | D2       | D1 | D0 | HEX |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑                        | XX                       | 1  | 1  | 1  | 1  | 0  | 1        | 1  | 1  | F7h |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | ↑                        | XX                       | 0  | 0  | 0  | 0  | 0  | RSO[2:0] |    | 00 |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Description                               | Set the resolution of the RGB interface. The setting becomes effective as soon as the command is received.                                                                                                                                                                                                                                                                                 |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
|                                           | RSO:RSO[2:0] is used for selecting resolution.                                                                                                                                                                                                                                                                                                                                             |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
|                                           | <table><tr><th colspan="3">RSO[2:0]</th><th>Resolution</th></tr><tr><td>0</td><td>0</td><td>0</td><td>480(RGB) X 864 gate line</td></tr><tr><td>0</td><td>0</td><td>1</td><td>480(RGB) X 854 gate line</td></tr><tr><td>0</td><td>1</td><td>0</td><td>480(RGB) X 800 gate line</td></tr><tr><td>0</td><td>1</td><td>1</td><td>480(RGB) X 640 gate line</td></tr></table>                   |     |                          |                          |    |    |    |    |    |          |    |    |     | RSO[2:0] |               |                                          | Resolution | 0                                       | 0      | 0                                         | 480(RGB) X 864 gate line | 0                                        | 0      | 1        | 480(RGB) X 854 gate line | 0 | 1 | 0 | 480(RGB) X 800 gate line | 0 | 1 | 1 | 480(RGB) X 640 gate line |
|                                           | RSO[2:0]                                                                                                                                                                                                                                                                                                                                                                                   |     |                          | Resolution               |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
|                                           | 0                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 0                        | 480(RGB) X 864 gate line |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
|                                           | 0                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 1                        | 480(RGB) X 854 gate line |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| 0                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 0   | 480(RGB) X 800 gate line |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| 0                                         | 1                                                                                                                                                                                                                                                                                                                                                                                          | 1   | 480(RGB) X 640 gate line |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Other settings are prohibited             |                                                                                                                                                                                                                                                                                                                                                                                            |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                            |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Restriction                               | To enable this command, EXTC Command Set Enable Register (FFh) must be set first.                                                                                                                                                                                                                                                                                                          |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table> |     |                          |                          |    |    |    |    |    |          |    |    |     | Status   | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes        | Normal Mode On, Idle Mode On, Sleep Out | Yes    | Partial Mode On, Idle Mode Off, Sleep Out | Yes                      | Partial Mode On, Idle Mode On, Sleep Out | Yes    | Sleep In | Yes                      |   |   |   |                          |   |   |   |                          |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                               |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                        |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td></td><td>RSO[2:0]</td></tr><tr><td>Power ON Sequence</td><td>3'b000</td></tr><tr><td>S/W Reset</td><td>3'b000</td></tr><tr><td>H/W Reset</td><td>3'b000</td></tr></table>                                                                                                                                                     |     |                          |                          |    |    |    |    |    |          |    |    |     | Status   | Default Value |                                          | RSO[2:0]   | Power ON Sequence                       | 3'b000 | S/W Reset                                 | 3'b000                   | H/W Reset                                | 3'b000 |          |                          |   |   |   |                          |   |   |   |                          |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                              |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
|                                           | RSO[2:0]                                                                                                                                                                                                                                                                                                                                                                                   |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| Power ON Sequence                         | 3'b000                                                                                                                                                                                                                                                                                                                                                                                     |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| S/W Reset                                 | 3'b000                                                                                                                                                                                                                                                                                                                                                                                     |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |
| H/W Reset                                 | 3'b000                                                                                                                                                                                                                                                                                                                                                                                     |     |                          |                          |    |    |    |    |    |          |    |    |     |          |               |                                          |            |                                         |        |                                           |                          |                                          |        |          |                          |   |   |   |                          |   |   |   |                          |

## Read EXTC Command In SPI Mode (FBh)

| FBh                                       | RDEXTCSPI(Read EXTC command In SPI)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|-----------------|-------------------|----|----|----|----|-------------------|----|-----|--------|---------------|------------------------------------------|------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------|-------------------------------------------|------------------------------------------------------------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | RDX | WRX | D [23:8] | D7              | D6                | D5 | D4 | D3 | D2 | D1                | D0 | HEX |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1   | ↑   | XX       | 1               | 1                 | 1  | 1  | 1  | 0  | 1                 | 1  | FBh |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1   | ↑   | XX       | ext_spi_read_en | ext_spi_cnt [6:0] |    |    |    |    |                   |    | XX  |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1   | ↑   | XX       | 0               | 0                 | 0  | 0  | 0  | 0  | ext_spi_cnt [8:7] |    | XX  |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Description                               | <div>ext_spi_read_en: enable the read function of the EXTC Command in the SPI operation mode</div> <div>ext_spi_cnt [8:0]: the N parameter which wants to be read out</div> <div><div><div>START</div><div>Read the EXTC command in SPI operation mode<br/>(Example: read Register XXh, N parameter)</div><div>EXTC Command Set enable register (FFh)<br/>1st Parameter : FFh<br/>2nd Parameter : 98h<br/>3rd Parameter : 26h</div><div>Set Register FBh<br/>1. enable SPI read (ext_spi_read_en=1)<br/>2. N parameter to be read out (ext_spi_cnt[8:0])</div><div>Set Register XXh command<br/>And read out the N Parameter</div><div>END SPI read</div><div>Set Register FBh<br/>Disable SPI read (ext_spi_read_en=0)<br/>(Enable SPI write)</div></div><div>Read others<br/>command /<br/>Parameter</div></div> |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                         |     |     |          |                 |                   |    |    |    |    |                   |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                                                    | Normal Mode On, Idle Mode On, Sleep Out | Yes                                                                    | Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                    | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power ON Sequence</td><td>1<sup>st</sup> Parameter = 8'h00<br/>2<sup>nd</sup> Parameter = 8'h00</td></tr><tr><td>S/W Reset</td><td>1<sup>st</sup> Parameter = 8'h00<br/>2<sup>nd</sup> Parameter = 8'h00</td></tr><tr><td>H/W Reset</td><td>1<sup>st</sup> Parameter = 8'h00<br/>2<sup>nd</sup> Parameter = 8'h00</td></tr></table>                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |                 |                   |    |    |    |    |                   |    |     | Status | Default Value | Power ON Sequence                        | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00 | S/W Reset                               | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00 | H/W Reset                                 | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00 |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| Power ON Sequence                         | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| S/W Reset                                 | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |
| H/W Reset                                 | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |                 |                   |    |    |    |    |                   |    |     |        |               |                                          |                                                                        |                                         |                                                                        |                                           |                                                                        |                                          |     |          |     |

**EXTC Command Set enable register (FFh)**

| FFh                                       | ENEXTC (EXTC command set enable register)                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|----------|----|----|----|----|----|----|----|----|-----|--------|---------------|------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------------------------------------------------------------|------------------------------------------|-----|----------|-----|
|                                           | DCX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | RDX | WRX | D [23:8] | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | HEX |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Command                                   | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | FFh |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| 1 <sup>st</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 1  | 1  | 1  | 1  | 1  | 1  | 1  | 1  | FF  |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| 2 <sup>nd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 1  | 0  | 0  | 1  | 1  | 0  | 0  | 0  | 98  |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| 3 <sup>rd</sup> Parameter                 | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1   | ↑   | XX       | 0  | 0  | 1  | 0  | 0  | 1  | 1  | 0  | 26  |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Description                               | Set the register, 1 <sup>st</sup> Parameter = FFh, 2 <sup>nd</sup> Parameter = 98h, 3 <sup>rd</sup> Parameter = 26h to enable “EXTC command set”.<br>Set the register, 1 <sup>st</sup> Parameter = FFh, 2 <sup>nd</sup> Parameter = 98h, 3 <sup>rd</sup> Parameter = any value except 26h to disable “EXTC command set”.                                                                                                                                                                                        |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Restriction                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Register Availability                     | <table><tr><th>Status</th><th>Availability</th></tr><tr><td>Normal Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Normal Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode Off, Sleep Out</td><td>Yes</td></tr><tr><td>Partial Mode On, Idle Mode On, Sleep Out</td><td>Yes</td></tr><tr><td>Sleep In</td><td>Yes</td></tr></table>                                                                                                                      |     |     |          |    |    |    |    |    |    |    |    |     | Status | Availability  | Normal Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                         | Normal Mode On, Idle Mode On, Sleep Out | Yes                                                                                                         | Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                         | Partial Mode On, Idle Mode On, Sleep Out | Yes | Sleep In | Yes |
| Status                                    | Availability                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Normal Mode On, Idle Mode Off, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Normal Mode On, Idle Mode On, Sleep Out   | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Partial Mode On, Idle Mode Off, Sleep Out | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Partial Mode On, Idle Mode On, Sleep Out  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Sleep In                                  | Yes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Default                                   | <table><tr><th>Status</th><th>Default Value</th></tr><tr><td>Power ON Sequence</td><td>1<sup>st</sup> Parameter = 8'h00<br/>2<sup>nd</sup> Parameter = 8'h00<br/>3<sup>rd</sup> Parameter = 8'h00</td></tr><tr><td>S/W Reset</td><td>1<sup>st</sup> Parameter = 8'h00<br/>2<sup>nd</sup> Parameter = 8'h00<br/>3<sup>rd</sup> Parameter = 8'h00</td></tr><tr><td>H/W Reset</td><td>1<sup>st</sup> Parameter = 8'h00<br/>2<sup>nd</sup> Parameter = 8'h00<br/>3<sup>rd</sup> Parameter = 8'h00</td></tr></table> |     |     |          |    |    |    |    |    |    |    |    |     | Status | Default Value | Power ON Sequence                        | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00<br>3 <sup>rd</sup> Parameter = 8'h00 | S/W Reset                               | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00<br>3 <sup>rd</sup> Parameter = 8'h00 | H/W Reset                                 | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00<br>3 <sup>rd</sup> Parameter = 8'h00 |                                          |     |          |     |
| Status                                    | Default Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| Power ON Sequence                         | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00<br>3 <sup>rd</sup> Parameter = 8'h00                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| S/W Reset                                 | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00<br>3 <sup>rd</sup> Parameter = 8'h00                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |
| H/W Reset                                 | 1 <sup>st</sup> Parameter = 8'h00<br>2 <sup>nd</sup> Parameter = 8'h00<br>3 <sup>rd</sup> Parameter = 8'h00                                                                                                                                                                                                                                                                                                                                                                                                     |     |     |          |    |    |    |    |    |    |    |    |     |        |               |                                          |                                                                                                             |                                         |                                                                                                             |                                           |                                                                                                             |                                          |     |          |     |

## 6. Tearing Effect Information

The Tearing Effect Line (TE) signal supplies panel synchronization information to the MPU. The TE signal determines the position for refreshing GRAM data for the display panel; the MPU can reference the TE to decide when to send image data in order to avoid abnormal visual effect on the display panel.

The TE signal is enabled or disabled with the Tearing Effect Line ON or OFF commands.

The TE Line output mode is defined by the parameter of the “Tearing Effect Line ON” command.

Tearing Effect information is sent in two different ways:

- Separated Line, which is the Tearing Effect Line (TE).
- Tearing Effect Bus Trigger (TEE), the ILI9806H sends a trigger to inform the MPU.

The TE is used in the MPU parallel interface.

The TE can also be used in the DSI case if the Tearing Effect Bus Trigger (TEE) is not possible to be used.

The Tearing Effect (TEE) Bus Trigger is only used in the DSI.

## 6.1. Tearing Effect Line

### Tearing Effect Line Modes

**Mode 1:** illustrated in Figure 150, the Tearing Effect output signal consists of V-Sync information only:



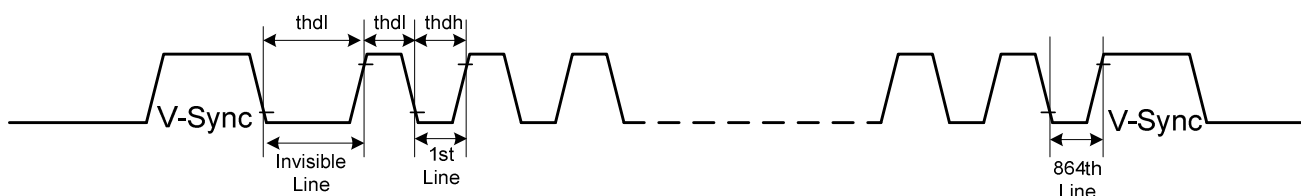
**Figure 150: Tearing Effect Line Mode 1**

tvdh = The LCD display is not updated from the Frame Memory.

tvdl = The LCD display is updated from the Frame Memory (except Invisible Line – see the figure above).

**Mode 2:** illustrated in Figure 151, the Tearing Effect output signal consists of V-Sync and H-Sync information; there is one V-sync and “N” H-sync pulses per field.

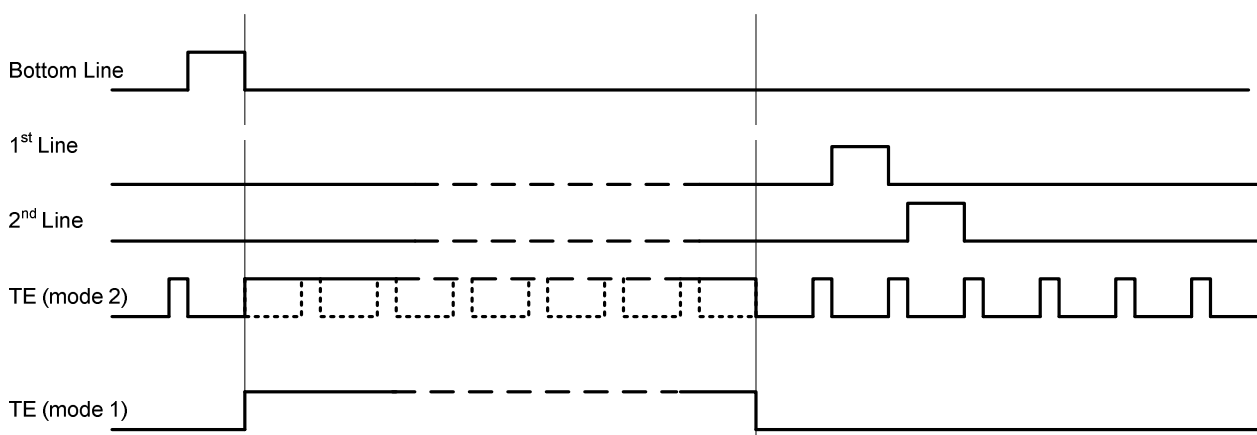
N: If RSO [2:0] = 3'b000, the resolution is 480 (RGB) X 864 and N = 864.



**Figure 151: Tearing Effect Line Mode 2**

thdh = The LCD display is not updated from the Frame Memory.

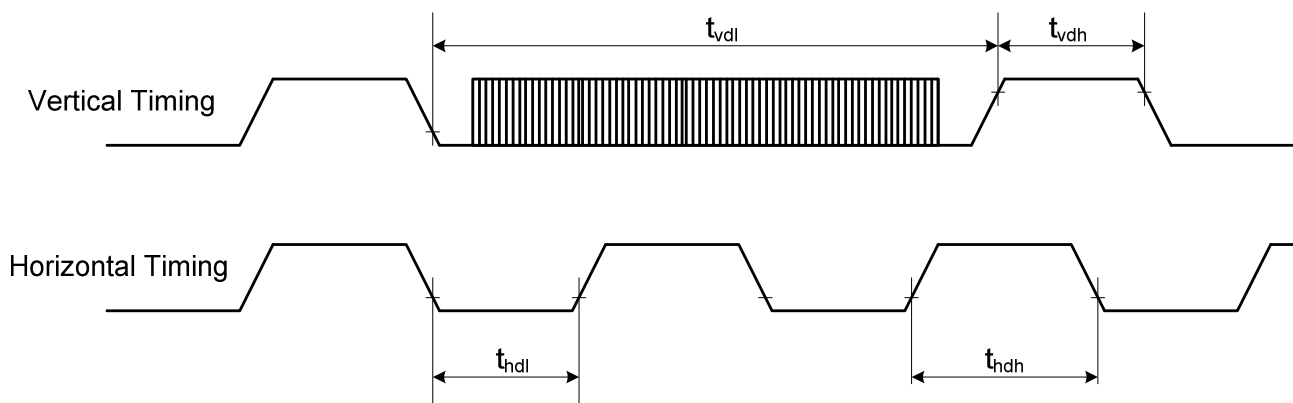
thdl = The LCD display is updated from the Frame Memory (except Invisible Line – see the figure above).



Note: During the Sleep In Mode, the Tearing Effect Output Pin is active Low.

## Tearing Effect Line Timing

The tearing effect signal is described below:

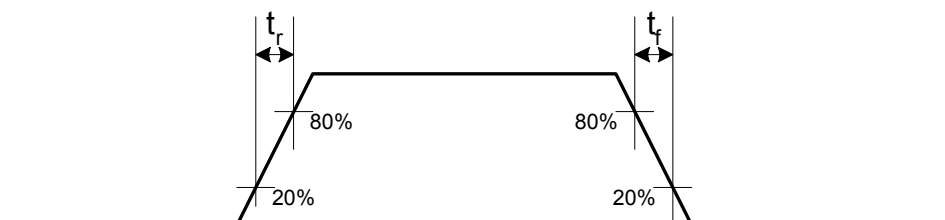


AC characteristics of the Tearing Effect Signal is: (Resolution 480(RGB)x800, Frame Rate = 60.5 Hz)

**Table 41: Tearing Effect Line Timing**

| Symbol    | Parameter                       | Min. | Typ. | Max. | Unit |
|-----------|---------------------------------|------|------|------|------|
| $t_{vdl}$ | Vertical timing low duration    | 15   | -    |      | ms   |
| $t_{vdh}$ | Vertical timing high duration   | 1000 | -    |      | us   |
| $t_{hdl}$ | Horizontal timing low duration  | 18   | -    |      | us   |
| $t_{hdh}$ | Horizontal timing high duration | 0.13 | 500  |      | us   |

- Notes:
1. The timings in Table 41 are applied when MADCTL D4 = 0 and D4 = 1.
  2. The signal's rising and falling times ( $t_r$ ,  $t_f$ ) are stipulated to be equal to or less than 15ns.



The Tearing Effect Output Line is feedback to the MPU and should be used to avoid the Tearing Effect.

## 6.2. Tearing Effect Bus Trigger

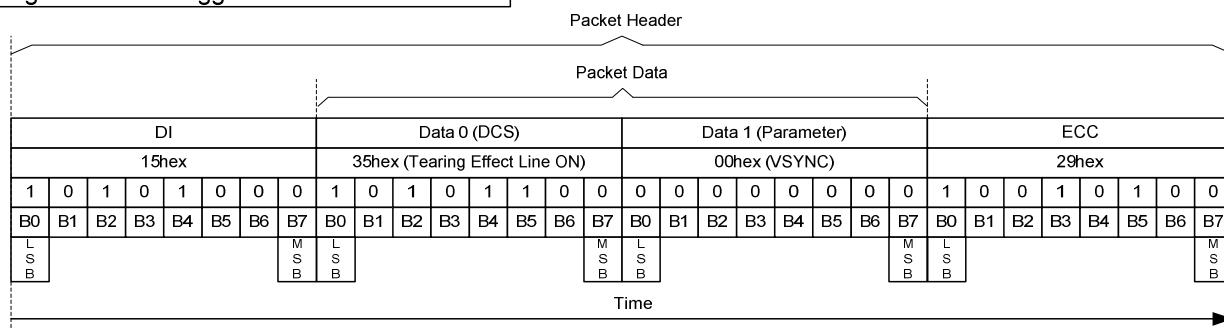
Tearing Effect Bus Trigger information supplies to the MPU a Panel synchronization trigger, and this Tearing Effect Bus Trigger information can enable or disable by “Tearing Effect Line Off (34h)” and “Tearing Effect Line On (35h)” commands when the only mode of the Tearing Effect Signal is VS information.

The ILI9806H sends this trigger information in the Escape Mode after the Bus Turnaround (BTA), and the Tearing Effect Bus Trigger can only be used in the DSI without the TE line.

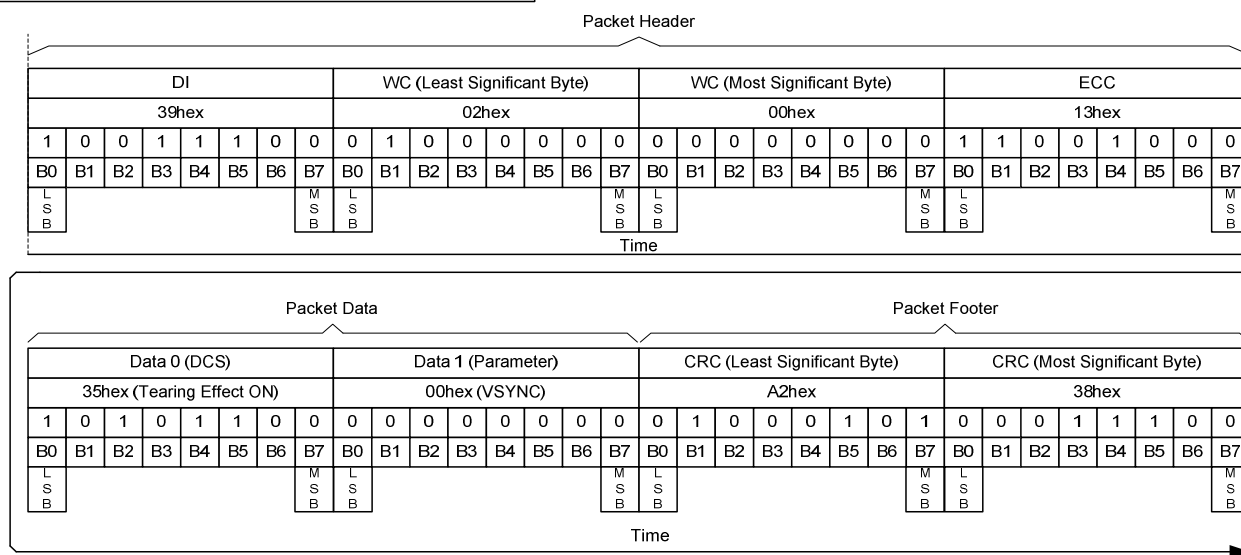
### Tearing Effect Bus Trigger Enable

The MPU can enable the Tearing Effect Bus Trigger on the ILI9806H in 2 different ways: when a Short Packet (SPa) or a Long Packet (LPa) is used. These cases are illustrated below.

**Tearing Effect Bus Trigger Enable - Short Packet**



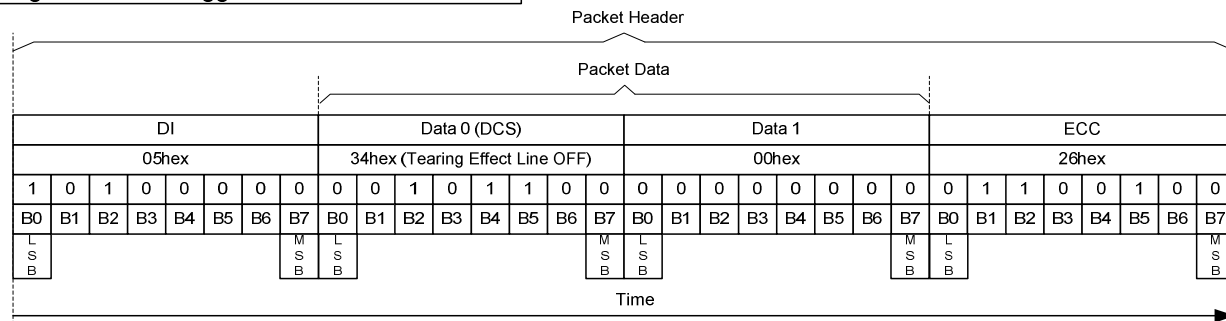
**Tearing Effect Bus Trigger Enable - Long Packet**



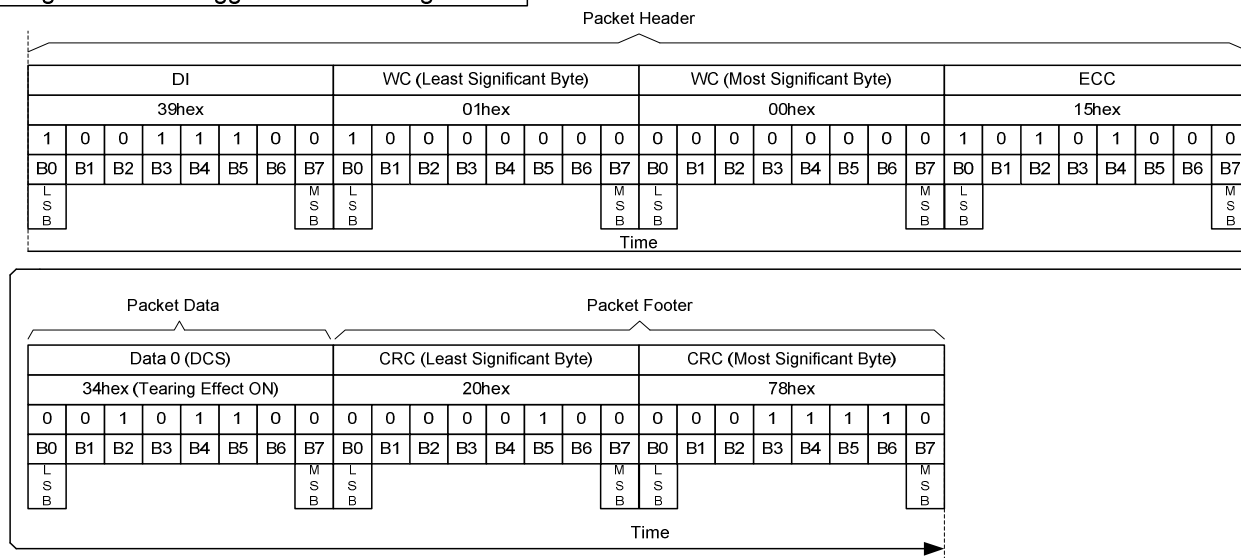
## Tearing Effect Bus Trigger Disable

The MPU can enable the Tearing Effect Bus Trigger on the ILI9806H in 2 different ways: when a Short Packet (SPa) or a Long Packet (LPa) is used. These both possibilities are illustrated below.

### Tearing Effect Bus Trigger Disable - Short Packet



### Tearing Effect Bus Trigger Disable - Long Packet





## Tearing Effect Bus Trigger Sequences

| Tearing Effect Trigger Enable Sequence – DCS Write (Long Packet) and HSDT |               |                        |                       |                           |               |                                                                                                      |
|---------------------------------------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|------------------------------------------------------------------------------------------------------|
| Line                                                                      | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                                                                              |
|                                                                           | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                                                                                      |
| 1                                                                         | -             | LP-11                  | →                     | -                         | -             | Start                                                                                                |
| 2                                                                         | DCSW-L        | HSDT                   | →                     | -                         | -             | Tearing Effect Trigger Enable                                                                        |
| 3                                                                         | EoTP          | HSDT                   | →                     | -                         | -             | End of Transmission Packet                                                                           |
| 4                                                                         | -             | LP-11                  | →                     | -                         | -             | -                                                                                                    |
| 5                                                                         | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                          |
| 6                                                                         | -             | -                      | ←                     | LP-11                     | -             | If No Error => Goto Line 8<br>If Error is Corrected by ECC => Goto Line 19, If Error => Goto Line 30 |
| 7                                                                         |               |                        |                       |                           |               |                                                                                                      |
| 8                                                                         | -             | -                      | ←                     | ACK                       | -             | No Error                                                                                             |
| 9                                                                         | -             | -                      | ←                     | LP-11                     | -             | -                                                                                                    |
| 10                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                          |
| 11                                                                        | -             | LP-11                  | →                     | -                         | -             | -                                                                                                    |
| 12                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                          |
| 13                                                                        | -             | -                      | ←                     | LP-11                     | -             | -                                                                                                    |
| 14                                                                        | -             | -                      | ←                     | TEE                       | -             | TE (Escape Trigger) on the next V-Synch.                                                             |
| 15                                                                        | -             | -                      | ←                     | LP-11                     | -             | -                                                                                                    |
| 16                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                          |
| 17                                                                        | -             | LP-11                  | →                     | -                         | -             | End                                                                                                  |
| 18                                                                        |               |                        |                       |                           |               |                                                                                                      |
| 19                                                                        | -             | -                      | ←                     | LPDT                      | AwER          | Error Report (Error is Corrected by ECC)                                                             |
| 20                                                                        | -             | -                      | ←                     | LP-11                     | -             | -                                                                                                    |
| 21                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                          |
| 22                                                                        | -             | LP-11                  | →                     | -                         | -             | -                                                                                                    |
| 23                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                          |
| 24                                                                        | -             | -                      | ←                     | LP-11                     | -             | -                                                                                                    |
| 25                                                                        | -             | -                      | ←                     | TEE                       | -             | TE (Escape Trigger) on the next V-Synch.                                                             |
| 26                                                                        | -             | -                      | ←                     | LP-11                     | -             | -                                                                                                    |
| 27                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                          |
| 28                                                                        | -             | LP-11                  | →                     | -                         | -             | End                                                                                                  |
| 29                                                                        |               |                        |                       |                           |               |                                                                                                      |
| 30                                                                        | -             | -                      | ←                     | LPDT                      | AwER          | Error Report                                                                                         |
| 31                                                                        | -             | -                      | ←                     | LP-11                     | -             | -                                                                                                    |
| 32                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                          |
| 33                                                                        | -             | LP-11                  | →                     | -                         | -             | If the MPU is not forcing BTA => Goto Line 34, If the MPU is forcing BTA => Goto Line 36             |
| 34                                                                        | -             | LP-11                  | →                     | -                         | -             | End                                                                                                  |
| 35                                                                        |               |                        |                       |                           |               |                                                                                                      |

The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.

|    |   |       |   |       |      |                                                                                                             |
|----|---|-------|---|-------|------|-------------------------------------------------------------------------------------------------------------|
| 36 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the MPU to the display module                                                 |
| 37 | - | -     | ← | LP-11 | -    | Dead-Lock (No TE information)<br>See Note 2                                                                 |
| 38 | - | LP-11 | → | -     | -    | The MPU is forced to start to control the interface. The display module detects, Bus Connection Error (BCE) |
| 39 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the MPU to the display module                                                 |
| 40 | - | -     | ← | LP-11 | -    | -                                                                                                           |
| 41 | - | -     | ← | LPDT  | AwER | Error Report (Bus Connection Error (BCE) is reported) See Note 2                                            |
| 42 | - | -     | ← | LP-11 | -    | -                                                                                                           |
| 43 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the display module to the MPU                                                 |
| 44 | - | LP-11 | → | -     | -    | End                                                                                                         |

Notes:

1. Lines 1 – 17 are needed for every frame.
2. Bits 5 and 7 of the AwER are applied.

| Tearing Effect Trigger Enable Sequence – DCS Write (Long Packet) and LPDT |               |                        |                       |                           |               |                                                                                                       |
|---------------------------------------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|-------------------------------------------------------------------------------------------------------|
| Line                                                                      | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                                                                               |
|                                                                           | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                                                                                       |
| 1                                                                         | -             | LP-11                  | ➔                     | -                         | -             | Start                                                                                                 |
| 2                                                                         | DCSW-L        | LPDT                   | ➔                     | -                         | -             | Tearing Effect Trigger Enable                                                                         |
| 3                                                                         | -             | LP-11                  | ➔                     | -                         | -             | -                                                                                                     |
| 4                                                                         | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                           |
| 5                                                                         | -             | -                      | ⬅                     | LP-11                     | -             | If No Error => Goto Line 7<br>If Error is Corrected by ECC => Goto Line 18 , If Error => Goto Line 29 |
| 6                                                                         |               |                        |                       |                           |               |                                                                                                       |
| 7                                                                         | -             | -                      | ⬅                     | ACK                       | -             | No Error                                                                                              |
| 8                                                                         | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 9                                                                         | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 10                                                                        | -             | LP-11                  | ➔                     | -                         | -             | -                                                                                                     |
| 11                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                           |
| 12                                                                        | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 13                                                                        | -             | -                      | ⬅                     | TEE                       | -             | TE (Escape Trigger) on the next V-Synch.                                                              |
| 14                                                                        | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 15                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 16                                                                        | -             | LP-11                  | ➔                     | -                         | -             | End                                                                                                   |
| 17                                                                        |               |                        |                       |                           |               |                                                                                                       |
| 18                                                                        | -             | -                      | ⬅                     | LPDT                      | AwER          | Error Report (Error is Corrected by ECC)                                                              |
| 19                                                                        | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 20                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 21                                                                        | -             | LP-11                  | ➔                     | -                         | -             | -                                                                                                     |
| 22                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                           |
| 23                                                                        | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 24                                                                        | -             | -                      | ⬅                     | TEE                       | -             | TE (Escape Trigger) on the next V-Synch.                                                              |
| 25                                                                        | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 26                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 27                                                                        | -             | LP-11                  | ➔                     | -                         | -             | End                                                                                                   |
| 28                                                                        |               |                        |                       |                           |               |                                                                                                       |
| 29                                                                        | -             | -                      | ⬅                     | LPDT                      | AwER          | Error Report                                                                                          |
| 30                                                                        | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 31                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 32                                                                        | -             | LP-11                  | ➔                     | -                         | -             | If the MPU is not forcing BTA => Goto Line 33 , If the MPU is forcing BTA => Goto Line 35             |
| 33                                                                        | -             | LP-11                  | ➔                     | -                         | -             | End                                                                                                   |
| 34                                                                        |               |                        |                       |                           |               |                                                                                                       |
| 35                                                                        | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the                                                                     |

The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.

|    |   |       |   |       |      |                                                                                                            |
|----|---|-------|---|-------|------|------------------------------------------------------------------------------------------------------------|
|    |   |       |   |       |      | MPU to the display module                                                                                  |
| 36 | - | -     | ← | LP-11 | -    | Dead-Lock (No TE information)<br>See Note 2                                                                |
| 37 | - | LP-11 | → | -     | -    | The MPU is forced to start to control the interface. The display module detects Bus Connection Error (BCE) |
| 38 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the MPU to the display module                                                |
| 39 | - | -     | ← | LP-11 | -    | -                                                                                                          |
| 40 | - | -     | ← | LPDT  | AwER | Error Report (Bus Connection Error (BCE) is reported) See Note 2                                           |
| 41 | - | -     | ← | LP-11 | -    | -                                                                                                          |
| 42 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the display module to the MPU                                                |
| 43 | - | LP-11 | → | -     | -    | End                                                                                                        |

Notes:

1. Lines 1 – 16 are needed for every frame.
2. Bits 5 and 7 of the AwER are applied.

| Tearing Effect Trigger Enable Sequence – DCS Write, 1 Parameter (Short Packet) and HSDT |               |                        |                       |                           |               |                                                                                                       |
|-----------------------------------------------------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|-------------------------------------------------------------------------------------------------------|
| Line                                                                                    | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                                                                               |
|                                                                                         | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                                                                                       |
| 1                                                                                       | -             | LP-11                  | ➔                     | -                         | -             | Start                                                                                                 |
| 2                                                                                       | DCSW1-S       | HSDT                   | ➔                     | -                         | -             | Tearing Effect Trigger Enable                                                                         |
| 3                                                                                       | EoTP          | HSDT                   | ➔                     | -                         | -             | End of Transmission Packet                                                                            |
| 4                                                                                       | -             | LP-11                  | ➔                     | -                         | -             | -                                                                                                     |
| 5                                                                                       | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                           |
| 6                                                                                       | -             | -                      | ⬅                     | LP-11                     | -             | If No Error => Goto Line 8<br>If Error is Corrected by ECC => Goto Line 19 , If Error => Goto Line 30 |
| 7                                                                                       |               |                        |                       |                           |               |                                                                                                       |
| 8                                                                                       | -             | -                      | ⬅                     | ACK                       | -             | No Error                                                                                              |
| 9                                                                                       | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 10                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 11                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | -                                                                                                     |
| 12                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                           |
| 13                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 14                                                                                      | -             | -                      | ⬅                     | TEE                       | -             | TE (Escape Trigger) on the next V-Synch.                                                              |
| 15                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 16                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 17                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | End                                                                                                   |
| 18                                                                                      |               |                        |                       |                           |               |                                                                                                       |
| 19                                                                                      | -             | -                      | ⬅                     | LPDT                      | AwER          | Error Report (Error is Corrected by ECC)                                                              |
| 20                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 21                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 22                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | -                                                                                                     |
| 23                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                           |
| 24                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 25                                                                                      | -             | -                      | ⬅                     | TEE                       | -             | TE (Escape Trigger) on the next V-Synch.                                                              |
| 26                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 27                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 28                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | End                                                                                                   |
| 29                                                                                      |               |                        |                       |                           |               |                                                                                                       |
| 30                                                                                      | -             | -                      | ⬅                     | LPDT                      | AwER          | Error Report                                                                                          |
| 31                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 32                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 33                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | If the MPU is not forcing BTA => Goto Line 34 , If the MPU is forcing BTA => Goto Line 36             |
| 34                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | End                                                                                                   |
| 35                                                                                      |               |                        |                       |                           |               |                                                                                                       |

The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.

|    |   |       |   |       |      |                                                                                                            |
|----|---|-------|---|-------|------|------------------------------------------------------------------------------------------------------------|
| 36 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the MPU to the display module                                                |
| 37 | - | -     | ← | LP-11 | -    | Dead-Lock (No TE information)<br>See Note 2                                                                |
| 38 | - | LP-11 | → | -     | -    | The MPU is forced to start to control the interface. The display module detects Bus Connection Error (BCE) |
| 39 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the MPU to the display module                                                |
| 40 | - | -     | ← | LP-11 | -    | -                                                                                                          |
| 41 | - | -     | ← | LPDT  | AwER | Error Report (Bus Connection Error (BCE) is reported) See Note 2                                           |
| 42 | - | -     | ← | LP-11 | -    | -                                                                                                          |
| 43 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the display module to the MPU                                                |
| 44 | - | LP-11 | → | -     | -    | End                                                                                                        |

Notes:

1. Lines 1 – 17 are needed for every frame.
2. Bits 5 and 7 of the AwER are applied.

| Tearing Effect Trigger Enable Sequence – DCS Write, 1 Parameter (Short Packet) and LPDT |               |                        |                       |                           |               |                                                                                                       |
|-----------------------------------------------------------------------------------------|---------------|------------------------|-----------------------|---------------------------|---------------|-------------------------------------------------------------------------------------------------------|
| Line                                                                                    | MPU           |                        | Information Direction | Display Module (ILI9806H) |               | Comment                                                                                               |
|                                                                                         | Packet Sender | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                                                                                       |
| 1                                                                                       | -             | LP-11                  | ➔                     | -                         | -             | Start                                                                                                 |
| 2                                                                                       | DCSW1-S       | LPDT                   | ➔                     | -                         | -             | Tearing Effect Trigger Enable                                                                         |
| 3                                                                                       | -             | LP-11                  | ➔                     | -                         | -             | -                                                                                                     |
| 4                                                                                       | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                           |
| 5                                                                                       | -             | -                      | ⬅                     | LP-11                     | -             | If No Error => Goto Line 7<br>If Error is Corrected by ECC => Goto Line 18 , If Error => Goto Line 29 |
| 6                                                                                       |               |                        |                       |                           |               |                                                                                                       |
| 7                                                                                       | -             | -                      | ⬅                     | ACK                       | -             | No Error                                                                                              |
| 8                                                                                       | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 9                                                                                       | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 10                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | -                                                                                                     |
| 11                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                           |
| 12                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 13                                                                                      | -             | -                      | ⬅                     | TEE                       | -             | TE (Escape Trigger) on the next V-Synch.                                                              |
| 14                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 15                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 16                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | End                                                                                                   |
| 17                                                                                      |               |                        |                       |                           |               |                                                                                                       |
| 18                                                                                      | -             | -                      | ⬅                     | LPDT                      | AwER          | Error Report (Error is Corrected by ECC)                                                              |
| 19                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 20                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 21                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | -                                                                                                     |
| 22                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the MPU to the display module                                           |
| 23                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 24                                                                                      | -             | -                      | ⬅                     | TEE                       | -             | TE (Escape Trigger) on the next V-Synch.                                                              |
| 25                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 26                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 27                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | End                                                                                                   |
| 28                                                                                      |               |                        |                       |                           |               |                                                                                                       |
| 29                                                                                      | -             | -                      | ⬅                     | LPDT                      | AwER          | Error Report                                                                                          |
| 30                                                                                      | -             | -                      | ⬅                     | LP-11                     | -             | -                                                                                                     |
| 31                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the display module to the MPU                                           |
| 32                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | If the MPU is not forcing BTA => Goto Line 33 , If the MPU is forcing BTA => Goto Line 35             |
| 33                                                                                      | -             | LP-11                  | ➔                     | -                         | -             | End                                                                                                   |
| 34                                                                                      |               |                        |                       |                           |               |                                                                                                       |
| 35                                                                                      | -             | BTA                    | ↔                     | BTA                       | -             | Interface Control Change from the                                                                     |

The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.

|    |   |       |   |       |      |                                                                                                            |
|----|---|-------|---|-------|------|------------------------------------------------------------------------------------------------------------|
|    |   |       |   |       |      | MPU to the display module                                                                                  |
| 36 | - | -     | ← | LP-11 | -    | Dead-Lock (No TE information)<br>See Note 2                                                                |
| 37 | - | LP-11 | → | -     | -    | The MPU is forced to start to control the interface. The display module detects Bus Connection Error (BCE) |
| 38 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the MPU to the display module                                                |
| 39 | - | -     | ← | LP-11 | -    | -                                                                                                          |
| 40 | - | -     | ← | LPDT  | AwER | Error Report (Bus Connection Error (BCE) is reported) See Note 2                                           |
| 41 | - | -     | ← | LP-11 | -    | -                                                                                                          |
| 42 | - | BTA   | ↔ | BTA   | -    | Interface Control Change from the display module to the MPU                                                |
| 43 | - | LP-11 | → | -     | -    | End                                                                                                        |

Notes:

1. Lines 1 – 16 are needed for every frame.
2. Bits 5 and 7 of the AwER are applied.

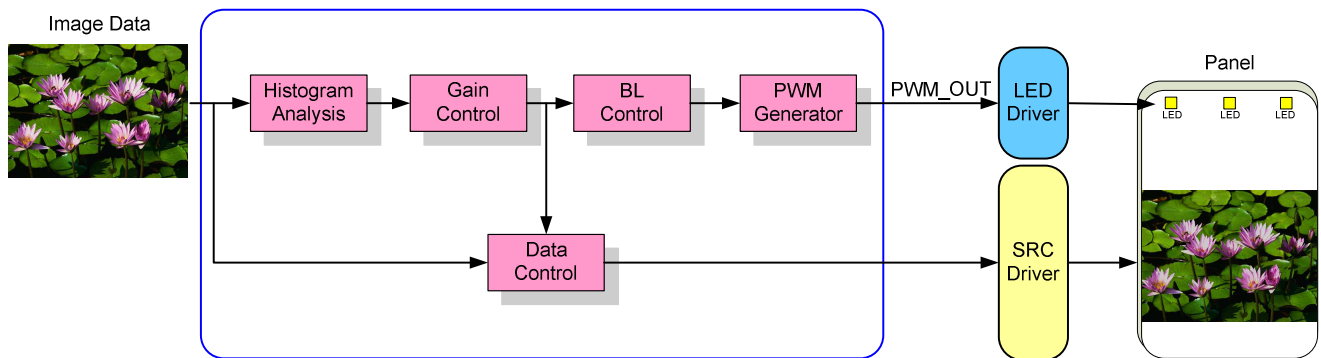


| Tearing Effect Bus Trigger Disable Sequence – DCS Write, No Parameter (Short Packet) and LPDT |                 |                        |                       |                           |               |                                    |
|-----------------------------------------------------------------------------------------------|-----------------|------------------------|-----------------------|---------------------------|---------------|------------------------------------|
| Line                                                                                          | MPU             |                        | Information Direction | Display Module (ILI9806H) |               | Comment                            |
|                                                                                               | Packet Sender   | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                    |
| 1                                                                                             | -               | LP-11                  | ➔                     | -                         | -             | Start                              |
| 2                                                                                             | DCS Write (SPa) | LPDT                   | ➔                     | -                         | -             | Tearing Effect Bus Trigger Disable |
| 3                                                                                             | -               | LP-11                  | ➔                     | -                         | -             | End                                |

| Tearing Effect Bus Trigger Disable Sequence – DCS Write, No Parameter (Short Packet) and HSDT |                 |                        |                       |                           |               |                                    |
|-----------------------------------------------------------------------------------------------|-----------------|------------------------|-----------------------|---------------------------|---------------|------------------------------------|
| Line                                                                                          | MPU             |                        | Information Direction | Display Module (ILI9806H) |               | Comment                            |
|                                                                                               | Packet Sender   | Interface Mode Control |                       | Interface Mode Control    | Packet Sender |                                    |
| 1                                                                                             | -               | LP-11                  | ➔                     | -                         | -             | Start                              |
| 2                                                                                             | DCS Write (SPa) | HSDT                   | ➔                     | -                         | -             | Tearing Effect Bus Trigger Disable |
| 3                                                                                             | -               | LP-11                  | ➔                     | -                         | -             | End                                |

## 7. Content Adaptive Brightness Control (CABC) Function

The CABC, a dynamic backlight control function, drastically reduces power consumption of the luminance source. The ILI9806H will refer the gray scale content of the display image to output in the PWM waveform then to the LED driver for backlight brightness control. The content of gray scale can be increased while simultaneously lowering the brightness of the backlight to achieve the same perceived brightness. The adjusted gray level scale and the power consumption reduction depend on the content of the image.

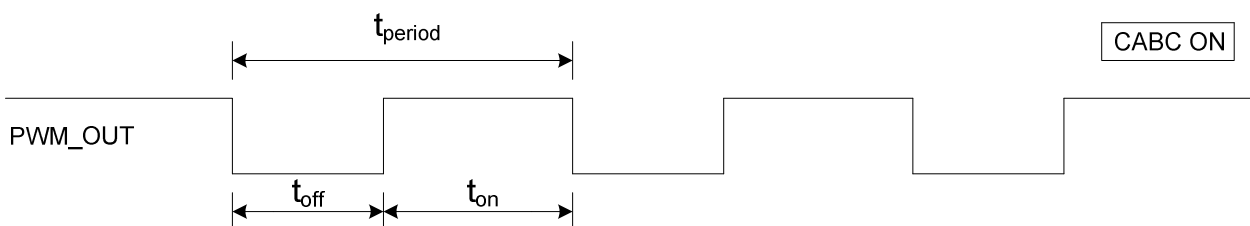


**Figure 152: CABC Block Diagram**

The ILI9806H can calculate the backlight brightness level and send a PWM\_OUT pulse to the LED driver via PWM\_OUT pin for backlight brightness control purposes. The PWM frequency can be adjusted by PWM\_DIV parameters, and the calculating equation is shown below:

$$f_{\text{pwm\_out}} = \frac{18 \text{ MHz}}{(\text{PWM\_DIV}[7:0] + 1) \times 255}$$

Figure 153 is the basic timing diagram which is applied by the ILI9806H in order to control a LED driver.



**Figure 153: PWM OUT on/off period**

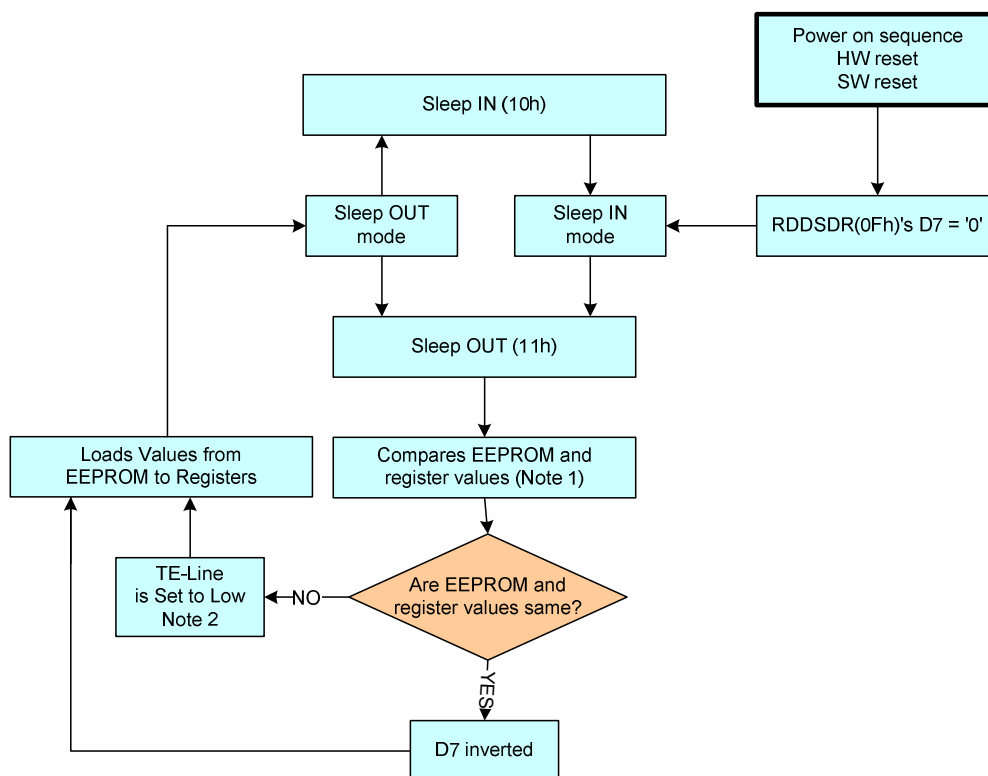
## 8. Sleep Out Command and Self-Diagnostic Functions

### 8.1. Register Loading Detection

The Sleep Out command (See “Sleep Out (11h)”) is a trigger for an internal function of the display module, which indicates if the display module loading function of factory default values from the OTP (or similar devices) to registers of the display controller works properly.

Factory values of the OTP and register values of the display controller are compared by the display controller (1<sup>st</sup> step: compare register and OTP values, 2<sup>nd</sup> step: loads OTP values to the register). If those values (OTP and register values) are the same, a bit is inverted (= increased by 1), which is defined in the command Read Display Self-Diagnostic Result (0Fh) (= RDDSDR). The used bit of this command is D7. If both values are not the same, this bit (D7) is not inverted (not increased by 1), and the used TE-line is set to low (registers, set by the “Tearing Effect Line On (35h)” command, keep their current values) and can only be reactivated by the “Tearing Effect Line On (35h)” command.

The flow chart for this internal function is:



**Figure 154: Register Loading Detection**

Notes:

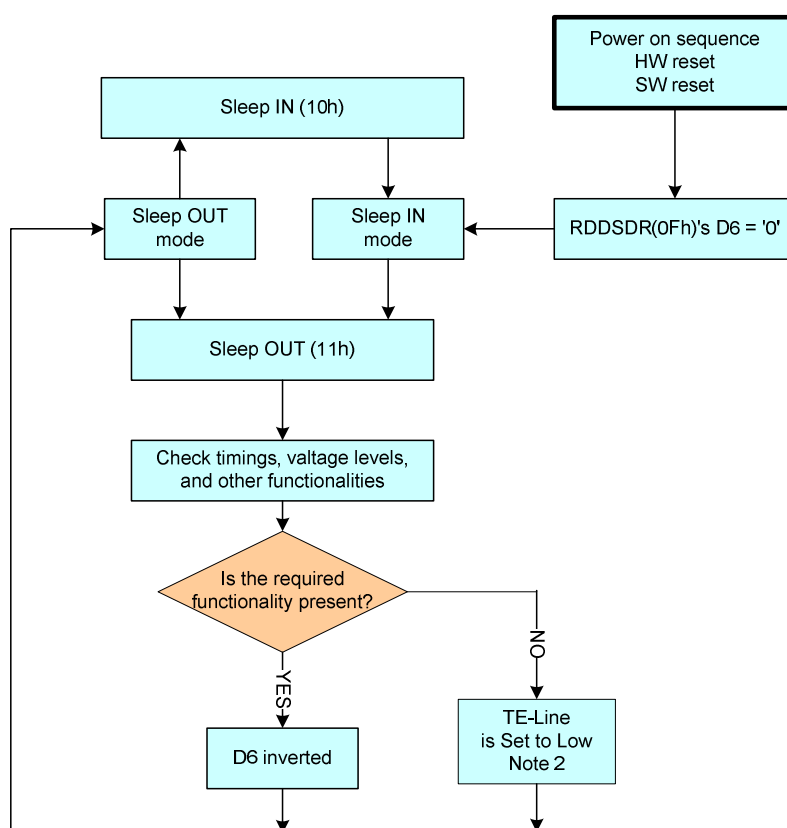
1. If the OTP and register values are not compared and loaded, they can be changed by commands 00h to AFh and DAh to DDh.
2. This information is only used when the TE line is used.

## 8.2. Functionality Detection

The Sleep Out command (See “Sleep Out (11h)”) is a trigger for an internal function of the display module. It indicates if the display module is still running and meets functionality requirements.

The internal function (the display controller) is compared when the display module meets functionality requirements (e.g. booster voltage levels, timings, etc.). If functionality requirements are met, a bit is inverted (increased by 1), defined in the command “Read Display Self-Diagnostic Result (0Fh)” (RDDSDR). The used bit of this command is D6. If functionality requirements are not the same, this bit (D6) is not inverted (not increased by 1), and the used TE-line is set to low (registers keep their current values) and can only be reactivated by “Tearing Effect Line On (35h)” command.

The flow chart for this internal function is:



**Figure 155: Functionality Detection**

### Notes:

1. When changing from the Sleep In mode to the Sleep Out mode, 120msec are needed after the Sleep Out command before it is able to check if functionality requirements are met and the value of RDDSDR's D6 is valid. Otherwise, there will be 5msec delay for the D6's value to be valid when the Sleep Out command is sent in the Sleep Out mode.
2. This function can only be used when the TE-line is used.

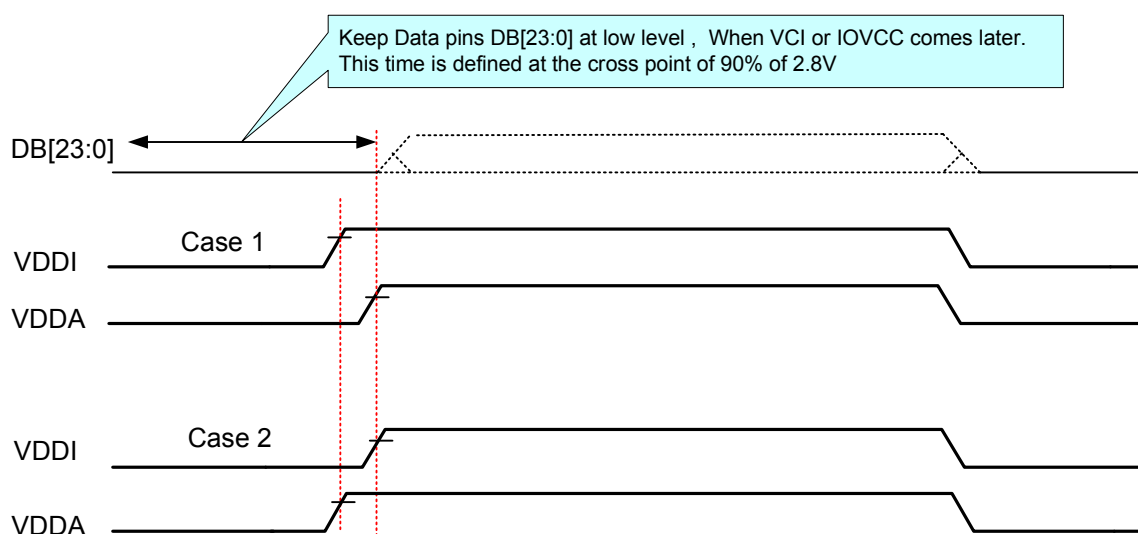
## 9. Power ON/OFF Sequence

VDDI and VDDA can be applied or powered down in any order. During the Power Off sequence, if the LCD is in the Sleep Out mode, VDDA and VDDI must be powered down with minimum 120msec. If the LCD is in the Sleep In mode, VDDA and VDDI can be powered down with minimum 0msec after the RESX is released.

CSX can be applied at any timing or can be permanently grounded. RESX has high priority over CSX.

Notes:

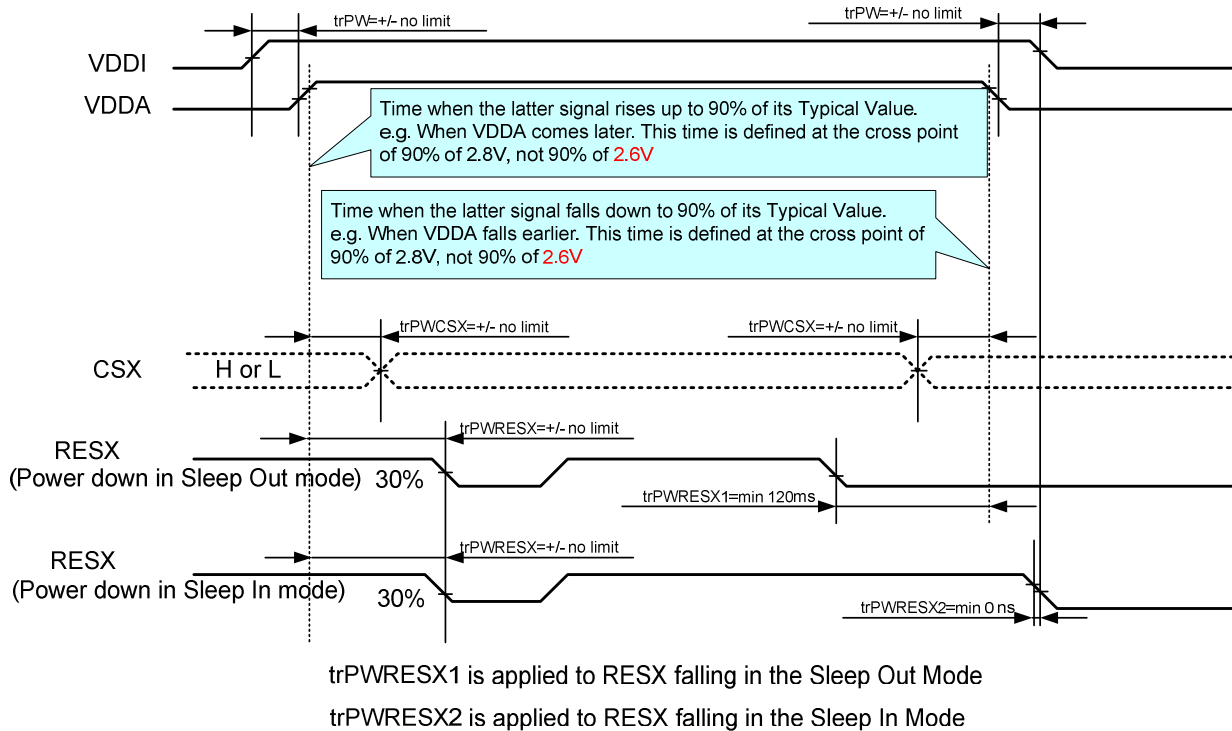
1. There will be no damage to the ILI9806H if the power sequences are not met.
2. There will be no abnormal visible effects on the display panel during the Power On/Off Sequences.
3. There will be no abnormal visible effects on the display between the end of Power On Sequence and before receiving the Sleep Out command, and also between receiving the Sleep In command and the Power Off Sequence.
4. If the RESX line is not steadily held by the host during the Power On Sequence as defined in Sections 9.1 and 9.2, then it will be necessary to apply the Hardware Reset (RESX) after the completion of the Host Power On Sequence to ensure correct operations. Otherwise, all the functions are not guaranteed
6. Keep data pins DB[23:0] at low level, when VDDA or VDDI comes later



**Figure 156: Data bus is Held Low by Host at Power ON**

## 9.1. Case 1 – RESX Line is Held High or Unstable by Host at Power ON

If the RESX line is held high or unstable by the host during Power On, then the Hardware Reset must be applied after both VDDA and VDDI have been applied. Otherwise, the correct functionality is not guaranteed. There is no timing restriction upon this hardware reset.

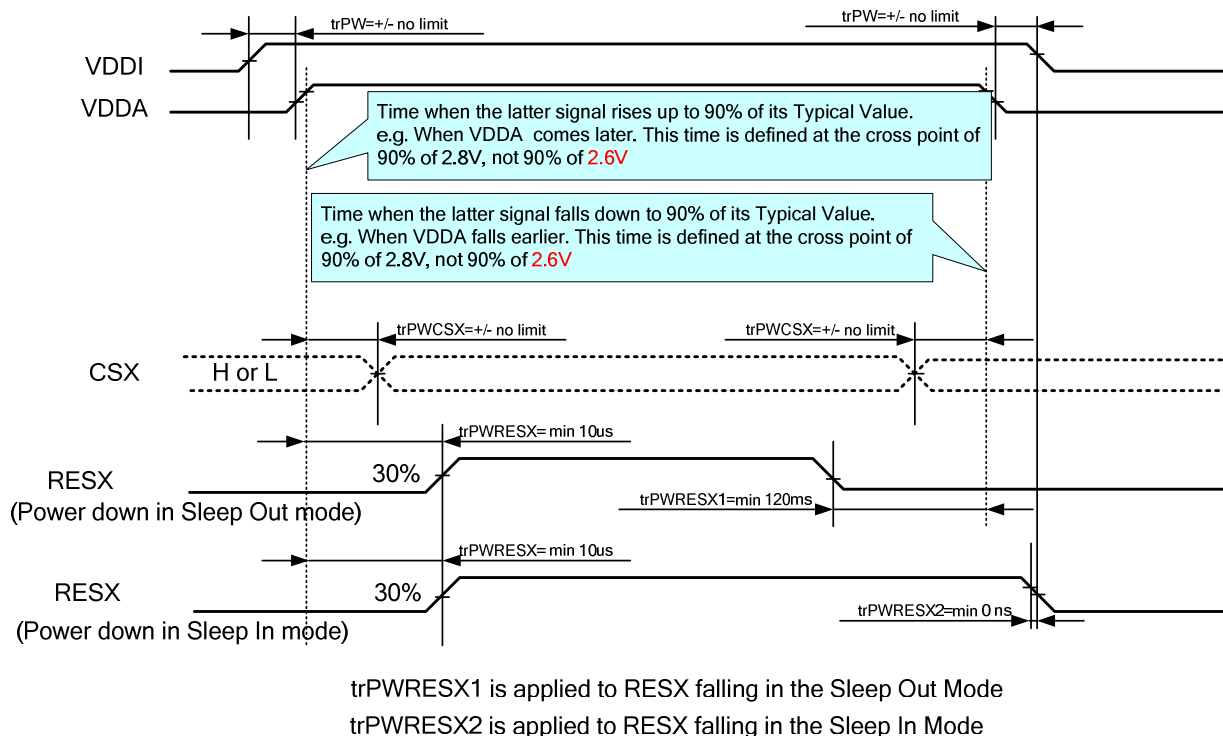


**Figure 157: Case 1 – RESX Line is Held High or Unstable by Host at Power ON**

Note: Unless otherwise specified, timings herein show the cross point at 50% of the signal power level.

## 9.2. Case 2 – RESX Line is Held Low by Host at Power ON

If the RESX line is held Low (and stable) by the host during Power On, then the RESX must be held low for a minimum of 10μsec after both VDDA and VDDI have been applied.



**Figure 158: Case 2 – RESX Line is Held Low by Host at Power ON**

Note: Unless otherwise specified, timings herein show the cross point at 50% of the signal power level.

### **9.3. Abnormal Power Off**

The Abnormal Power Off means a situation when a battery is removed without the controlled power off sequence. There will not be any damages on the display module, or the display module will not cause any damages on the host or lines of the interface. At an uncontrolled power off event, the ILI9806H will not cause any abnormal visible effects within 1 second on the display, and will force the display to become blank until the Power On Sequence powers it up.



## 10. Power Level Definition

### 10.1. Power Levels

6 level modes are defined in order from Maximum to Minimum Power Consumption:

1. Normal Mode On (full display), Idle Mode Off, Sleep Out.

In this mode, the display is able to show a maximum of 16.7M colors.

2. Partial Mode On, Idle Mode Off, Sleep Out.

In this mode, part of the display is used with a maximum of 16.7M colors.

3. Normal Mode On (full display), Idle Mode On, Sleep Out.

In this mode, the full display area is used but with 8 colors.

4. Partial Mode On, Idle Mode On, Sleep Out.

In this mode, part of the display is used but with 8 colors.

5. Sleep In Mode.

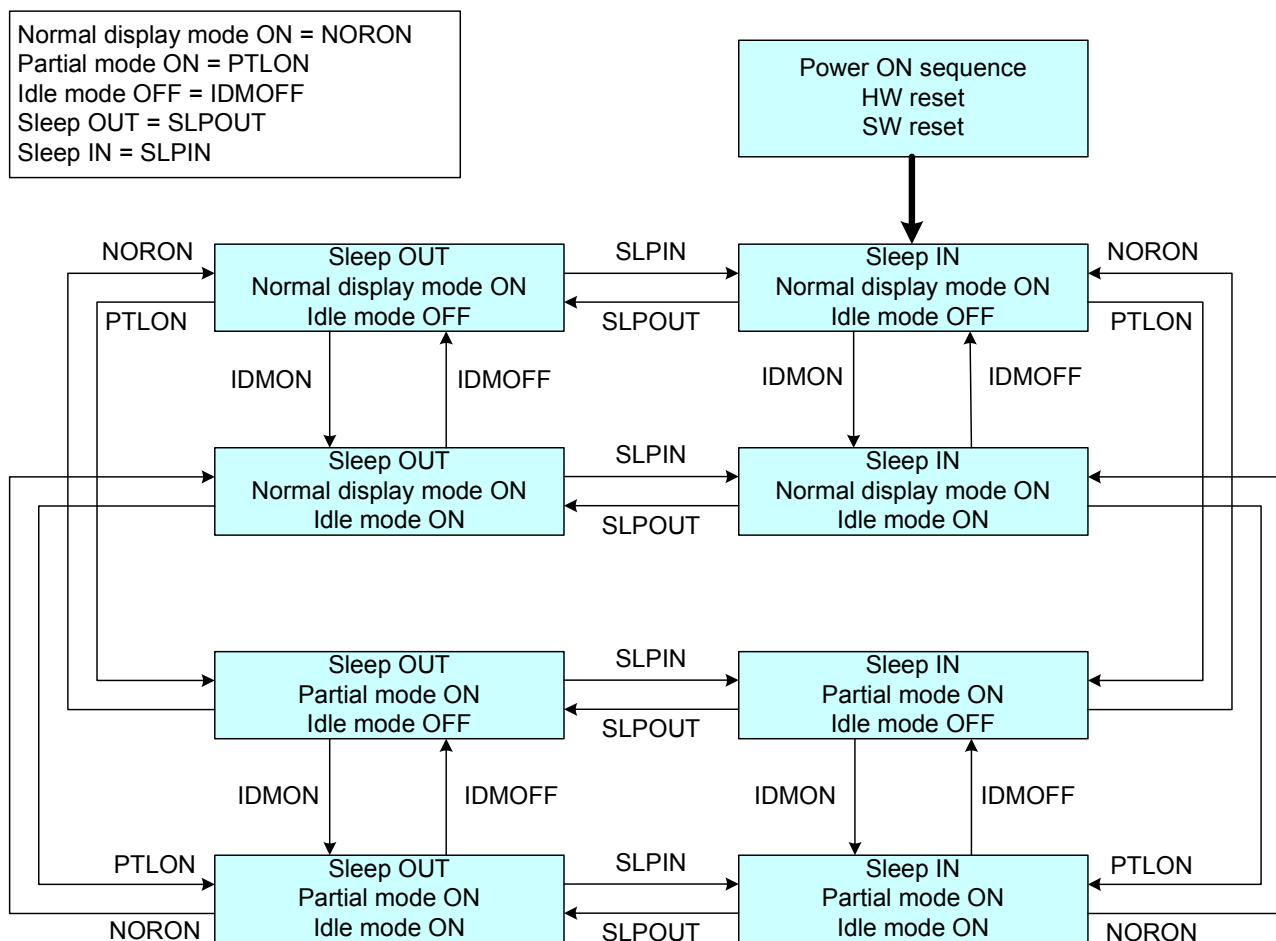
In this mode, the DC/DC converter, internal oscillator, and panel driver circuit are stopped. Only the MPU interface and memory work with VDDI power supply. Contents of the memory are safe and cannot be changed.

6. Power Off Mode.

In this mode, both VDDA and VDDI are removed.

Transition between modes 1-5 is controllable by MPU commands. Only when both Power supplies are removed can Mode 6 be entered.

## 10.2. Power Flow Chart

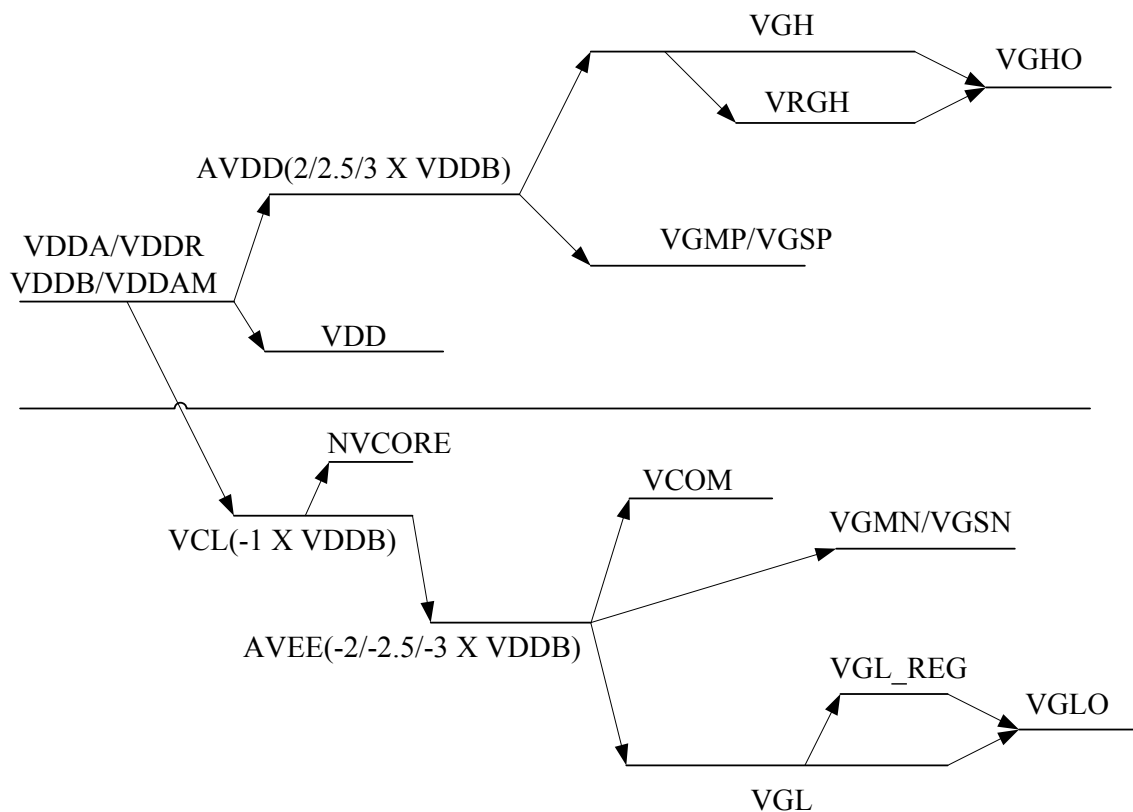


**Figure 159: Power Mode Flow Chart**

Notes:

1. There are no abnormal visual effects when one power mode changes to another power mode.
2. There is not any limitation, which is not specified by users, when one power mode changes to another power mode.

### 10.3. LCM Voltage Generation

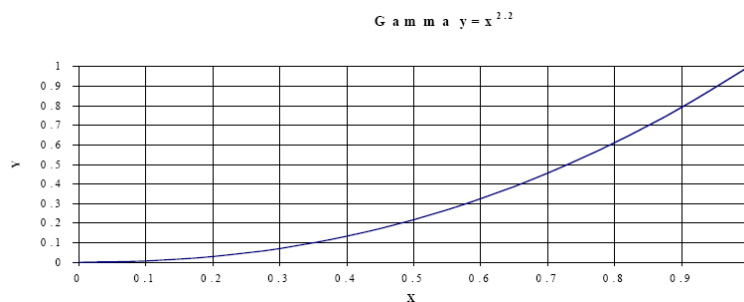


**Figure 160: Power Stage Diagram**

Note: The AVDD, AVEE, VGMP, VGMN, VCOM, VGH, VGL and VCL output voltage levels are lower than their theoretical levels (ideal voltage levels) due to the current consumption at respective outputs.

## 10.4. Gamma Curves

Gamma Curve (GC0), applies the function  $y = x^{2.2}$



**Figure 161: Gamma Curve (GC0)**

## 11. Reset

### 11.1. Registers

The initialized values of registers are listed in the Table 42.

**Table 42: Initial Values of Registers**

| Register                   | After Powered ON   | After Hardware Reset | After Software Reset |
|----------------------------|--------------------|----------------------|----------------------|
| Frame Memory               | Random             | Random               | Random               |
| Sleep                      | In                 | In                   | In                   |
| Display Mode               | Normal             | Normal               | Normal               |
| Display Status             | Display Off        | Display Off          | Display Off          |
| Idle Mode                  | Off                | Off                  | Off                  |
| All Pixels Off             | Off                | Off                  | Off                  |
| All Pixels On              | Off                | Off                  | Off                  |
| Column Start Address (2Ah) | 0000 h             | 0000 h               | 0000 h               |
| Column End Address (2Ah)   | 01DF h             | 01DF h               | 01DF h               |
| Page Start Address (2Bh)   | 0000 h             | 0000 h               | 0000 h               |
| Page End Address (2Bh)     | 480(RGB)x864=035Fh | 480(RGB)x864=035Fh   | 480(RGB)x864=035 h   |
| Partial Area Start (30h)   | 0000 h             | 0000 h               | 0000 h               |
| Partial Area End (30h)     | 480(RGB)x864=035Fh | 480(RGB)x864=035Fh   | 480(RGB)x864=035Fh   |
| MADCTL (36h)               | 00 h               | 00 h                 | 00h                  |
| RDNUMED (05h)              | 00 h               | 00 h                 | 00h                  |
| RDDPM (0Ah)                | 08 h               | 08 h                 | 08 h                 |
| RDDMADCTL (0Bh)            | 00 h               | 00 h                 | no change            |
| RDDCOLMOD (0Ch)            | 07 h               | 07 h                 | 07 h                 |
| RDDIM (0Dh)                | 00 h               | 00 h                 | 00 h                 |
| RDDSM (0Eh)                | 00 h               | 00 h                 | 00 h                 |
| RDDSDR (0Fh)               | 00 h               | 00 h                 | 00 h                 |
| Color Pixel Format (3Ah)   | 24 Bit/Pixel       | 24 Bit/Pixel         | 24 Bit/Pixel         |
| TE Output Line (35h)       | Off                | Off                  | Off                  |
| TE Line Mode (35h)         | Mode 1 (Note 3)    | Mode 1 (Note 3)      | Mode 1 (Note 3)      |
| RDDISBV (52h)              | 00 h               | 00 h                 | 00 h                 |
| RDCTRLD (54h)              | 00 h               | 00 h                 | 00 h                 |
| RDCABC (56h)               | 00 h               | 00 h                 | 00 h                 |
| RDCABCMB (5Fh)             | 00 h               | 00 h                 | 00 h                 |
| RDFCS (AAh)                | 00 h               | 00 h                 | 00 h                 |
| RDCCS (AFh)                | 00 h               | 00 h                 | 00 h                 |
| MRPS (Data Type 37h)       | 01 h               | 01 h                 | 01 h                 |
|                            |                    |                      |                      |

Notes:

1. There will be no abnormal visible effects on the display when S/W or H/W Resets are applied.
2. After the Powered-On Reset finishes within 10μs after both VDDA & VDDI are applied.
3. Mode 1 means Tearing Effect Output Line consists of V-Blanking Information only.

## 11.2. Driver IC Input and Output pins

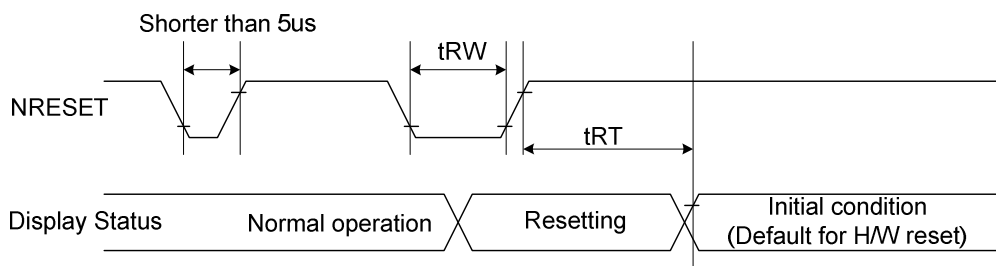
### Output Pins, I/O Pins

**Table 43: Output and I/O Pins**

| Pin/Line                    | After Power ON  | After Hardware Reset | After Software Reset |
|-----------------------------|-----------------|----------------------|----------------------|
| DB [23:0]                   | Hi-Z (Inactive) | Hi-Z (Inactive)      | Hi-Z (Inactive)      |
| SDA (Output direction), SDO | Hi-Z (Inactive) | Hi-Z (Inactive)      | Hi-Z (Inactive)      |
| DSI-DO+                     | Hi-Z (Inactive) | Hi-Z (Inactive)      | Hi-Z (Inactive)      |
| DSI-DO-                     | Hi-Z (Inactive) | Hi-Z (Inactive)      | Hi-Z (Inactive)      |
| LEDPWM                      | Low             | Low                  | Low                  |
| TE_ENABLE                   | Low             | Low                  | Low                  |

Note: There will be no output from DB [23:0], SDA, SDO, LEDPWM, TE\_ENABLE, DSI-DO+, and DSI-DO-, during the Power ON/OFF sequence, hardware reset and software reset.

## Reset Timing



**Figure 162: Reset Timing**

**Table 44: Reset Timing**

| Signal | Symbol | Parameter            | Min | Max                              | Unit |
|--------|--------|----------------------|-----|----------------------------------|------|
| RESX   | tRW    | Reset pulse duration | 10  |                                  | us   |
|        | tRT    | Reset cancel         |     | 5 (note 1,5)<br>120 (note 1,6,7) | ms   |

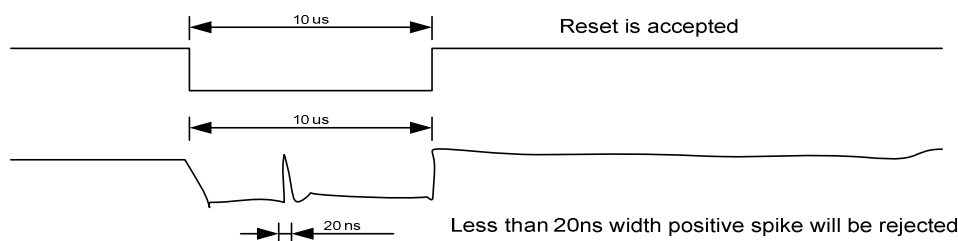
### Notes:

1. The reset cancel also includes the required time for loading ID bytes, VCOM setting and other settings from the OTP to registers. After a rising edge of RESX, this loading is done within 5 ms after the H/W reset cancel (tRT).
2. A spike due to an electrostatic discharge on the RESX line does not cause irregular system reset, according to the Table 45.

**Table 45: Reset Description**

| RESX Pulse          | Action         |
|---------------------|----------------|
| Shorter than 5us    | Reset Rejected |
| Longer than 9us     | Reset          |
| Between 5us and 9us | Reset starts   |

3. During the Resetting period, the display will be blanked (When Reset starts in the Sleep Out mode, the display will enter the blanking sequence in at least 120 ms. The display remains blank in the Sleep In mode.), and then return to the default condition for the Hardware Reset.
4. Spike Rejection can also be applied during a valid reset pulse as shown below:



**Figure 163: Positive Noise Pulse during Reset Low**

5. When Reset applied during Sleep In Mode.
6. When Reset applied during Sleep Out Mode.
7. It is necessary to wait 5msec after releasing the RESX before sending commands. Moreover, the Sleep Out command cannot be sent in 120msec.

## 12. NV Memory Programming

### 12.1. NV Memory Programming Flow

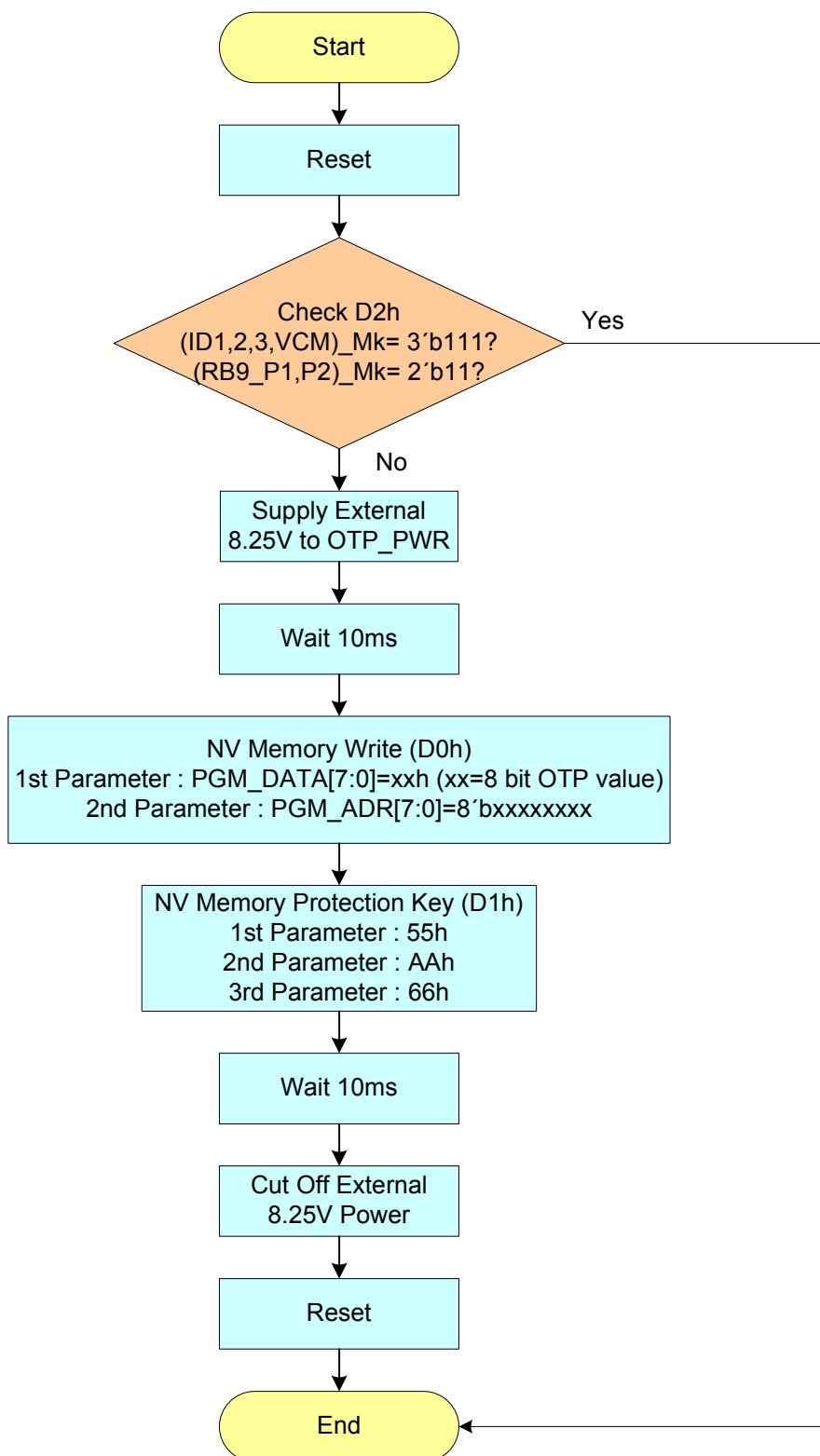
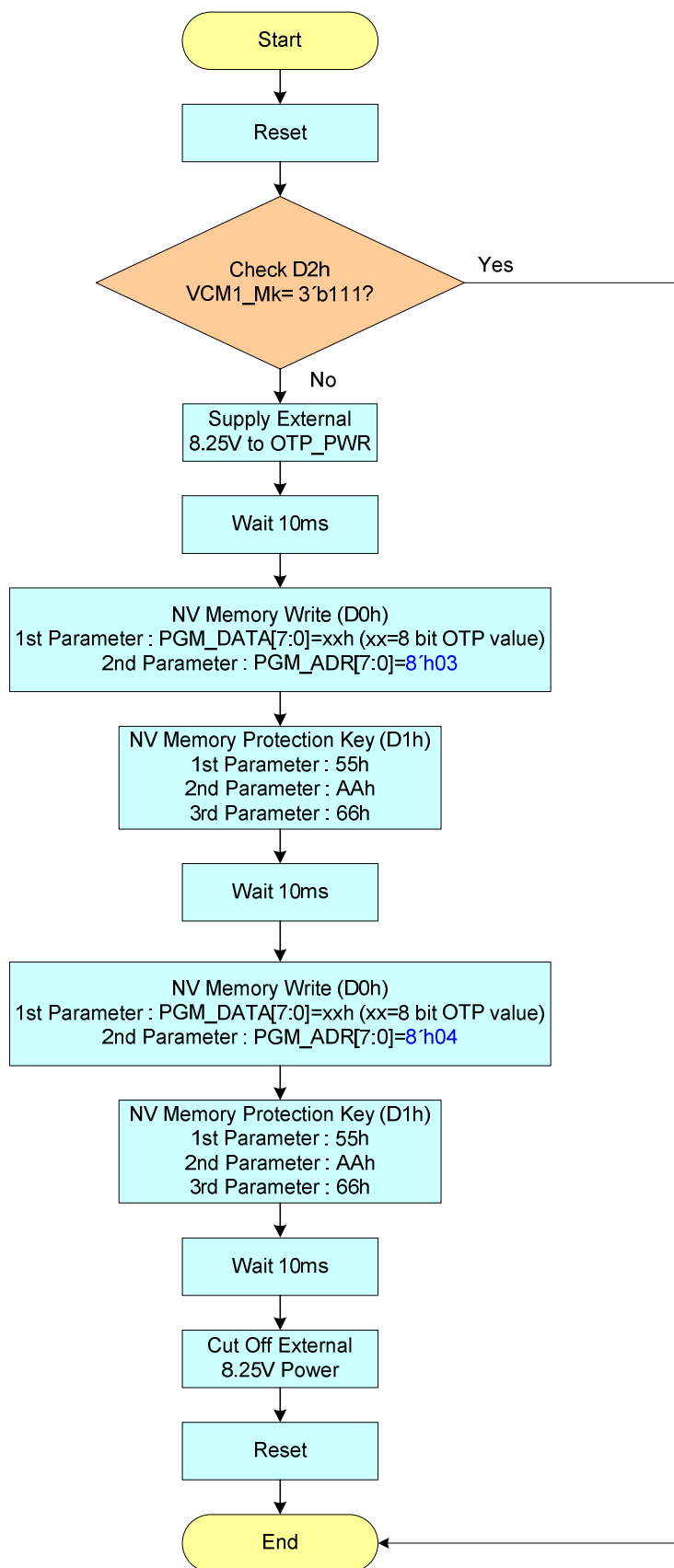


Figure 164: NV Memory Programming Flow



Example : VCM1 Programming Flow



**Figure 165 : VCM1 Programming Flow**

## 13. Gamma Correction

### Positive Gamma Control (E0h)

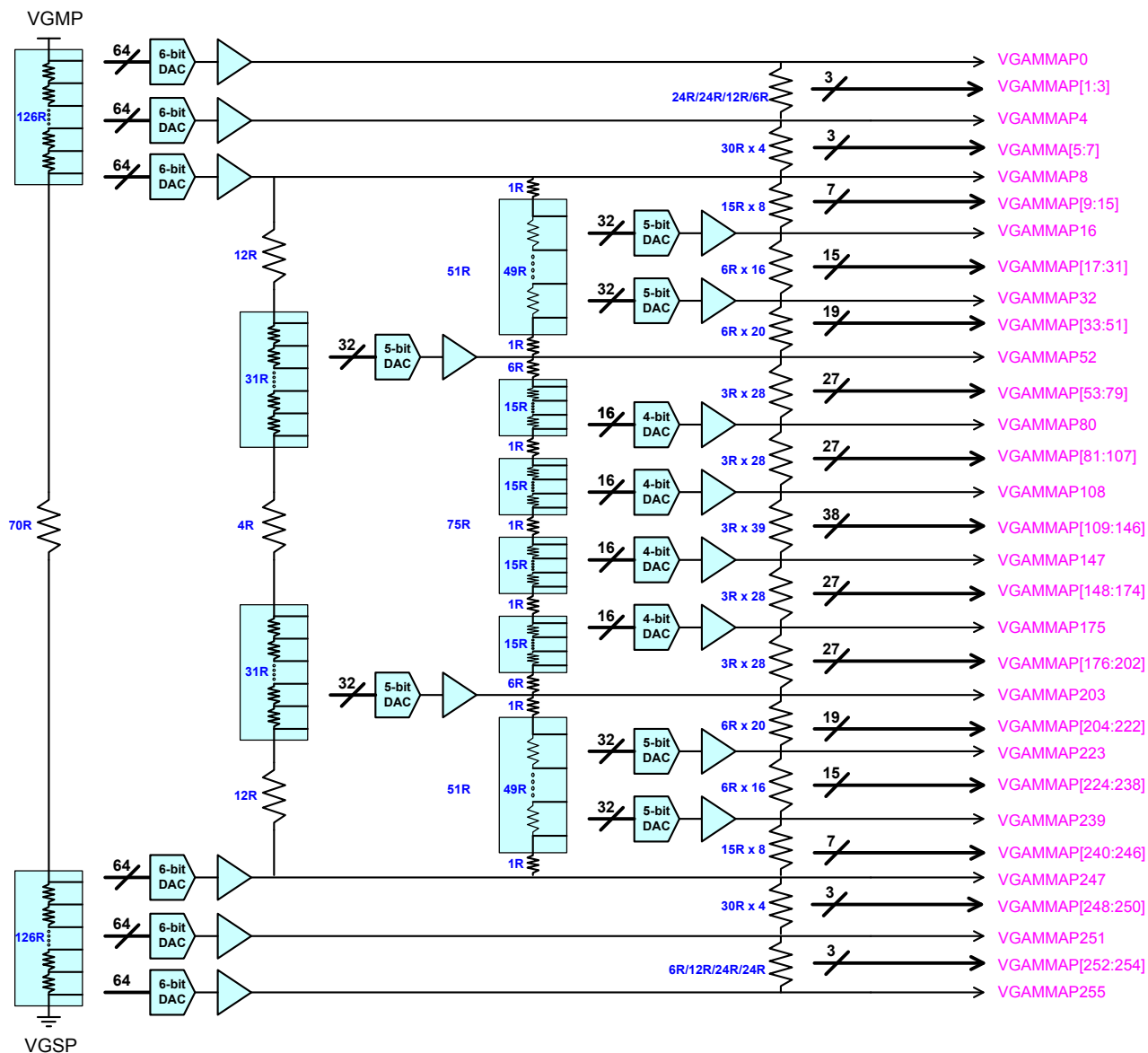
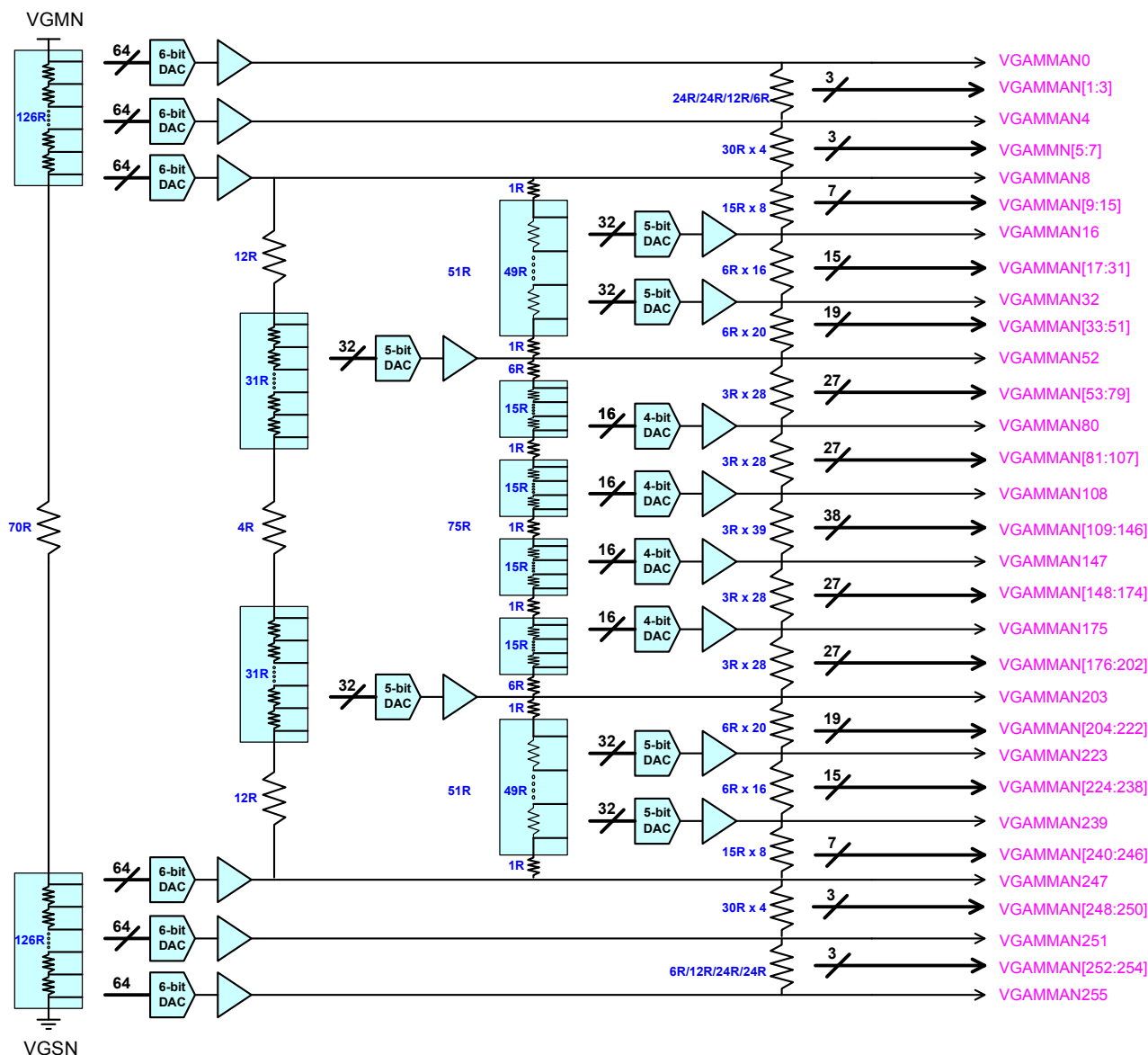


Figure 166: Positive Gamma Control (E0h)

**Negative Gamma Control (E1h)**



**Figure 167: Negative Gamma Control (E1h)**

| Positive polarity | Resister stream | Gamma 256 grayscale voltage calculation formula                                              |
|-------------------|-----------------|----------------------------------------------------------------------------------------------|
| VGAMMAP0          | 24R             | $VGSP + \Delta VDHP \cdot (322R - 2R \cdot VP0[5:0]) / 322R$ , $\Delta VDHP = (VGMP - VGSP)$ |
| VGAMMAP1          | 24R             | $VGAMMAP4 + (VGAMMP0 - VGAMMAP4) \cdot (6R + 12R + 24R) / (42R + RCGPH + 24R)$               |
| VGAMMAP2          | 12R             | $VGAMMAP4 + (VGAMMP0 - VGAMMAP4) \cdot (6R + 12R) / (42R + RCGPH + 24R)$                     |
| VGAMMAP3          | 6R              | $VGAMMAP4 + (VGAMMP0 - VGAMMAP4) \cdot (6R) / (42R + RCGPH + 24R)$                           |
| VGAMMAP4          | 30R             | $VGSP + \Delta VDHP \cdot (322R - 2R \cdot VP4[5:0]) / 322R$ , $\Delta VDHP = (VGMP - VGSP)$ |
| VGAMMAP5          | 30R             | $VGAMMAP8 + (VGAMMAP4 - VGAMMAP8) \cdot (90R / 120R)$                                        |
| VGAMMAP6          | 30R             | $VGAMMAP8 + (VGAMMAP4 - VGAMMAP8) \cdot (60R / 120R)$                                        |
| VGAMMAP7          | 30R             | $VGAMMAP8 + (VGAMMAP4 - VGAMMAP8) \cdot (30R / 120R)$                                        |

The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.

|           |     |                                                                                   |
|-----------|-----|-----------------------------------------------------------------------------------|
| VGAMMAP8  | 15R | $VGSP + \Delta VDHP(322R - 2R * VP8[5:0]) / 322R$ , $\Delta VDHP = (VGMP - VGSP)$ |
| VGAMMAP9  | 15R | $VGAMMAP16 + ((VGAMMAP8 - VGAMMAP16) * (105R / 120R))$                            |
| VGAMMAP10 | 15R | $VGAMMAP16 + ((VGAMMAP8 - VGAMMAP16) * (90R / 120R))$                             |
| VGAMMAP11 | 15R | $VGAMMAP16 + ((VGAMMAP8 - VGAMMAP16) * (75R / 120R))$                             |
| VGAMMAP12 | 15R | $VGAMMAP16 + ((VGAMMAP8 - VGAMMAP16) * (60R / 120R))$                             |
| VGAMMAP13 | 15R | $VGAMMAP16 + ((VGAMMAP8 - VGAMMAP16) * (45R / 120R))$                             |
| VGAMMAP14 | 15R | $VGAMMAP16 + ((VGAMMAP8 - VGAMMAP16) * (30R / 120R))$                             |
| VGAMMAP15 | 15R | $VGAMMAP16 + ((VGAMMAP8 - VGAMMAP16) * (15R / 120R))$                             |
| VGAMMAP16 | 6R  | $VGAMMAP52 + (VGAMMAP8 - VGAMMAP52) * ((50R - 1R * VP16[4:0]) / 51R)$             |
| VGAMMAP17 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (90R / 96R))$                             |
| VGAMMAP18 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (84R / 96R))$                             |
| VGAMMAP19 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (78R / 96R))$                             |
| VGAMMAP20 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (72R / 96R))$                             |
| VGAMMAP21 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (66R / 96R))$                             |
| VGAMMAP22 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (60R / 96R))$                             |
| VGAMMAP23 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (54R / 96R))$                             |
| VGAMMAP24 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (48R / 96R))$                             |
| VGAMMAP25 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (42R / 96R))$                             |
| VGAMMAP26 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (36R / 96R))$                             |
| VGAMMAP27 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (30R / 96R))$                             |
| VGAMMAP28 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (24R / 96R))$                             |
| VGAMMAP29 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (18R / 96R))$                             |
| VGAMMAP30 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (12R / 96R))$                             |
| VGAMMAP31 | 6R  | $VGAMMAP32 + ((VGAMMAP16 - VGAMMAP32) * (6R / 96R))$                              |
| VGAMMAP32 | 6R  | $VGAMMAP52 + (VGAMMAP8 - VGAMMAP52) * ((32R - 1R * VP32[4:0]) / 51R)$             |
| VGAMMAP33 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (114R / 120R))$                           |
| VGAMMAP34 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (108R / 120R))$                           |
| VGAMMAP35 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (102R / 120R))$                           |
| VGAMMAP36 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (96R / 120R))$                            |
| VGAMMAP37 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (90R / 120R))$                            |
| VGAMMAP38 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (84R / 120R))$                            |
| VGAMMAP39 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (78R / 120R))$                            |
| VGAMMAP40 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (72R / 120R))$                            |
| VGAMMAP41 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (66R / 120R))$                            |
| VGAMMAP42 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (60R / 120R))$                            |
| VGAMMAP43 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (54R / 120R))$                            |
| VGAMMAP44 | 6R  | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (48R / 120R))$                            |

|           |    |                                                                                                                                                                                                                                                                                                                                    |
|-----------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VGAMMAP45 | 6R | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (42R/120R))$                                                                                                                                                                                                                                                                               |
| VGAMMAP46 | 6R | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (36R/120R))$                                                                                                                                                                                                                                                                               |
| VGAMMAP47 | 6R | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (30R/120R))$                                                                                                                                                                                                                                                                               |
| VGAMMAP48 | 6R | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (24R/120R))$                                                                                                                                                                                                                                                                               |
| VGAMMAP49 | 6R | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (18R/120R))$                                                                                                                                                                                                                                                                               |
| VGAMMAP50 | 6R | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (12R/120R))$                                                                                                                                                                                                                                                                               |
| VGAMMAP51 | 6R | $VGAMMAP52 + ((VGAMMAP32 - VGAMMAP52) * (6R/120R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP52 | 3R | $VGAMMAP247 + (VGAMMAP8 - VGAMMAP247) * ((77R - 0R)/90R)$ , VP52[4:0] = 0(Dec)<br>$VGAMMAP247 + (VGAMMAP8 - VGAMMAP247) * ((77R - 2R)/90R)$ , VP52[4:0] = 1(Dec)<br>$VGAMMAP247 + (VGAMMAP8 - VGAMMAP247) * ((77R - 4R)/90R)$ , VP52[4:0] = 2(Dec)<br>$VGAMMAP247 + (VGAMMAP8 - VGAMMAP247) * ((74R - 1R * VP52[4:0])/90R)$ , else |
| VGAMMAP53 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (81R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP54 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (78R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP55 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (75R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP56 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (72R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP57 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (69R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP58 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (66R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP59 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (63R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP60 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (60R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP61 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (57R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP62 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (54R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP63 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (51R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP64 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (48R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP65 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (45R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP66 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (42R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP67 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (39R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP68 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (36R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP69 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (33R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP70 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (30R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP71 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (27R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP72 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (24R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP73 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (21R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP74 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (18R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP75 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (15R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP76 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (12R/84R))$                                                                                                                                                                                                                                                                                |
| VGAMMAP77 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (9R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAP78 | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (6R/84R))$                                                                                                                                                                                                                                                                                 |

|            |    |                                                                                                                                                                                                                                                                                                                                         |
|------------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VGAMMAP79  | 3R | $VGAMMAP80 + ((VGAMMAP52 - VGAMMAP80) * (3R/84R))$                                                                                                                                                                                                                                                                                      |
| VGAMMAP80  | 3R | $VGAMMAP203 + (VGAMMAP52 - VGAMMAP203) * ((68R - 0R)/75R)$ , VP80[3:0] =0(Dec)<br>$VGAMMAP203 + (VGAMMAP52 - VGAMMAP203) * ((68R - 2R)/75R)$ , VP80[3:0] =1(Dec)<br>$VGAMMAP203 + (VGAMMAP52 - VGAMMAP203) * ((68R - 4R)/75R)$ , VP80[3:0] =2(Dec)<br>$VGAMMAP203 + (VGAMMAP52 - VGAMMAP203) * ((65R - 1R * VP80[3:0])/75R)$ , else     |
| VGAMMAP81  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (81R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP82  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (78R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP83  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (75R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP84  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (72R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP85  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (69R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP86  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (66R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP87  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (63R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP88  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (60R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP89  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (57R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP90  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (54R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP91  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (51R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP92  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (48R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP93  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (45R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP94  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (42R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP95  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (39R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP96  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (36R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP97  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (33R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP98  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (30R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP99  | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (27R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP100 | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (24R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP101 | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (21R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP102 | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (18R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP103 | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (15R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP104 | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (12R/84R))$                                                                                                                                                                                                                                                                                   |
| VGAMMAP105 | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (9R/84R))$                                                                                                                                                                                                                                                                                    |
| VGAMMAP106 | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (6R/84R))$                                                                                                                                                                                                                                                                                    |
| VGAMMAP107 | 3R | $VGAMMAP108 + ((VGAMMAP80 - VGAMMAP108) * (3R/84R))$                                                                                                                                                                                                                                                                                    |
| VGAMMAP108 | 3R | $VGAMMAP203 + (VGAMMAP52 - VGAMMAP203) * ((52R - 0R)/75R)$ , VP108[3:0] =0(Dec)<br>$VGAMMAP203 + (VGAMMAP52 - VGAMMAP203) * ((52R - 2R)/75R)$ , VP108[3:0] =1(Dec)<br>$VGAMMAP203 + (VGAMMAP52 - VGAMMAP203) * ((52R - 4R)/75R)$ , VP108[3:0] =2(Dec)<br>$VGAMMAP203 + (VGAMMAP52 - VGAMMAP203) * ((49R - 1R * VP108[3:0])/75R)$ , else |
| VGAMMAP109 | 3R | $VGAMMAP147 + ((VGAMMAP108 - VGAMMAP147) * (114R/117R))$                                                                                                                                                                                                                                                                                |

|            |    |                                                 |
|------------|----|-------------------------------------------------|
| VGAMMAP110 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(111R/117R) |
| VGAMMAP111 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(108R/117R) |
| VGAMMAP112 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(105R/117R) |
| VGAMMAP113 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(102R/117R) |
| VGAMMAP114 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(99R/117R)  |
| VGAMMAP115 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(96R/117R)  |
| VGAMMAP116 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(93R/117R)  |
| VGAMMAP117 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(90R/117R)  |
| VGAMMAP118 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(87R/117R)  |
| VGAMMAP119 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(84R/117R)  |
| VGAMMAP120 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(81R/117R)  |
| VGAMMAP121 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(78R/117R)  |
| VGAMMAP122 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(75R/117R)  |
| VGAMMAP123 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(72R/117R)  |
| VGAMMAP124 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(69R/117R)  |
| VGAMMAP125 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(66R/117R)  |
| VGAMMAP126 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(63R/117R)  |
| VGAMMAP127 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(60R/117R)  |
| VGAMMAP128 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(57R/117R)  |
| VGAMMAP129 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(54R/117R)  |
| VGAMMAP130 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(51R/117R)  |
| VGAMMAP131 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(48R/117R)  |
| VGAMMAP132 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(45R/117R)  |
| VGAMMAP133 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(42R/117R)  |
| VGAMMAP134 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(39R/117R)  |
| VGAMMAP135 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(36R/117R)  |
| VGAMMAP136 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(33R/117R)  |
| VGAMMAP137 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(30R/117R)  |
| VGAMMAP138 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(27R/117R)  |
| VGAMMAP139 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(24R/117R)  |
| VGAMMAP140 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(21R/117R)  |
| VGAMMAP141 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(18R/117R)  |
| VGAMMAP142 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(15R/117R)  |
| VGAMMAP143 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(12R/117R)  |
| VGAMMAP144 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(9R/117R)   |
| VGAMMAP145 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(6R/117R)   |
| VGAMMAP146 | 3R | VGAMMAP147+((VGAMMAP108-VGAMMAP147)*(3R/117R)   |



|            |    |                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VGAMMAP147 | 3R | $\text{VGAMMAP203} + (\text{VGAMMAP52} - \text{VGAMMAP203}) * ((17R + 1R * VP147[3:0]) / 75R), \text{ else}$ $\text{VGAMMAP203} + (\text{VGAMMAP52} - \text{VGAMMAP203}) * ((17R + 31R / 75R), VP147[3:0] = 13(\text{Dec})$ $\text{VGAMMAP203} + (\text{VGAMMAP52} - \text{VGAMMAP203}) * ((17R + 33R / 75R), VP147[3:0] = 14(\text{Dec})$ $\text{VGAMMAP203} + (\text{VGAMMAP52} - \text{VGAMMAP203}) * ((17R + 35R / 75R), VP147[3:0] = 15(\text{Dec})$ |
| VGAMMAP148 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (81R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP149 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (78R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP150 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (75R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP151 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (72R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP152 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (69R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP153 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (66R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP154 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (63R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP155 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (60R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP156 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (57R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP157 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (54R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP158 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (51R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP159 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (48R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP160 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (45R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP161 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (42R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP162 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (39R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP163 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (36R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP164 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (33R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP165 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (30R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP166 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (27R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP167 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (24R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP168 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (21R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP169 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (18R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP170 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (15R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP171 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (12R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP172 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (9R / 84R))$                                                                                                                                                                                                                                                                                                                                                                              |
| VGAMMAP173 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (6R / 84R))$                                                                                                                                                                                                                                                                                                                                                                              |
| VGAMMAP174 | 3R | $\text{VGAMMAP175} + ((\text{VGAMMAP147} - \text{VGAMMAP175}) * (3R / 84R))$                                                                                                                                                                                                                                                                                                                                                                              |
| VGAMMAP175 | 3R | $\text{VGAMMAP203} + (\text{VGAMMAP52} - \text{VGAMMAP203}) * ((1R + 1R * VP175[3:0]) / 75R), \text{ else}$ $\text{VGAMMAP203} + (\text{VGAMMAP52} - \text{VGAMMAP203}) * ((1R + 15R / 75R), VP175[3:0] = 13(\text{Dec})$ $\text{VGAMMAP203} + (\text{VGAMMAP52} - \text{VGAMMAP203}) * ((1R + 17R / 75R), VP175[3:0] = 14(\text{Dec})$ $\text{VGAMMAP203} + (\text{VGAMMAP52} - \text{VGAMMAP203}) * ((1R + 19R / 75R), VP175[3:0] = 15(\text{Dec})$     |
| VGAMMAP176 | 3R | $\text{VGAMMAP203} + ((\text{VGAMMAP175} - \text{VGAMMAP203}) * (81R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |
| VGAMMAP177 | 3R | $\text{VGAMMAP203} + ((\text{VGAMMAP175} - \text{VGAMMAP203}) * (78R / 84R))$                                                                                                                                                                                                                                                                                                                                                                             |



|            |    |                                                                                                                                                                                                                                                                                                                                                         |
|------------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VGAMMAP178 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (75R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP179 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (72R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP180 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (69R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP181 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (66R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP182 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (63R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP183 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (60R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP184 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (57R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP185 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (54R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP186 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (51R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP187 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (48R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP188 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (45R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP189 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (42R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP190 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (39R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP191 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (36R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP192 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (33R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP193 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (30R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP194 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (27R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP195 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (24R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP196 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (21R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP197 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (18R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP198 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (15R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP199 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (12R/84R))$                                                                                                                                                                                                                                                                                                  |
| VGAMMAP200 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (9R/84R))$                                                                                                                                                                                                                                                                                                   |
| VGAMMAP201 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (6R/84R))$                                                                                                                                                                                                                                                                                                   |
| VGAMMAP202 | 3R | $VGAMMAP203 + ((VGAMMAP175 - VGAMMAP203) * (3R/84R))$                                                                                                                                                                                                                                                                                                   |
| VGAMMAP203 | 6R | $VGAMMAP247 + (VGAMMAP8 - VGAMMAP247) * ((8R + 1R * VP203[4:0]) / 90R))$ , else<br>$VGAMMAP247 + (VGAMMAP8 - VGAMMAP247) * ((8R + 38R / 90R))$ , $VP203[4:0] = 29(Dec)$<br>$VGAMMAP247 + (VGAMMAP8 - VGAMMAP247) * ((8R + 40R / 90R))$ , $VP203[4:0] = 30(Dec)$<br>$VGAMMAP247 + (VGAMMAP8 - VGAMMAP247) * ((8R + 42R / 90R))$ , $VP203[4:0] = 31(Dec)$ |
| VGAMMAP204 | 6R | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (114R/120R))$                                                                                                                                                                                                                                                                                                |
| VGAMMAP205 | 6R | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (108R/120R))$                                                                                                                                                                                                                                                                                                |
| VGAMMAP206 | 6R | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (102R/120R))$                                                                                                                                                                                                                                                                                                |
| VGAMMAP207 | 6R | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (96R/120R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAP208 | 6R | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (90R/120R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAP209 | 6R | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (84R/120R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAP210 | 6R | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (78R/120R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAP211 | 6R | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (72R/120R))$                                                                                                                                                                                                                                                                                                 |

|            |     |                                                                            |
|------------|-----|----------------------------------------------------------------------------|
| VGAMMAP212 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (66R/120R))$                    |
| VGAMMAP213 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (60R/120R))$                    |
| VGAMMAP214 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (54R/120R))$                    |
| VGAMMAP215 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (48R/120R))$                    |
| VGAMMAP216 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (42R/120R))$                    |
| VGAMMAP217 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (36R/120R))$                    |
| VGAMMAP218 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (30R/120R))$                    |
| VGAMMAP219 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (24R/120R))$                    |
| VGAMMAP220 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (18R/120R))$                    |
| VGAMMAP221 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (12R/120R))$                    |
| VGAMMAP222 | 6R  | $VGAMMAP223 + ((VGAMMAP203 - VGAMMAP223) * (6R/120R))$                     |
| VGAMMAP223 | 6R  | $VGAMMAP247 + (VGAMMAP203 - VGAMMAP247) * ((19R + 1R * VP223[4:0]) / 51R)$ |
| VGAMMAP224 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (90R/96R))$                     |
| VGAMMAP225 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (84R/96R))$                     |
| VGAMMAP226 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (78R/96R))$                     |
| VGAMMAP227 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (72R/96R))$                     |
| VGAMMAP228 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (66R/96R))$                     |
| VGAMMAP229 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (60R/96R))$                     |
| VGAMMAP230 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (54R/96R))$                     |
| VGAMMAP231 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (48R/96R))$                     |
| VGAMMAP232 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (42R/96R))$                     |
| VGAMMAP233 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (36R/96R))$                     |
| VGAMMAP234 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (30R/96R))$                     |
| VGAMMAP235 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (24R/96R))$                     |
| VGAMMAP236 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (18R/96R))$                     |
| VGAMMAP237 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (12R/96R))$                     |
| VGAMMAP238 | 6R  | $VGAMMAP239 + ((VGAMMAP223 - VGAMMAP239) * (6R/96R))$                      |
| VGAMMAP239 | 15R | $VGAMMAP247 + (VGAMMAP203 - VGAMMAP247) * ((1R + 1R * VP239[4:0]) / 51R)$  |
| VGAMMAP240 | 15R | $VGAMMAP247 + ((VGAMMAP239 - VGAMMAP247) * (105R/120R))$                   |
| VGAMMAP241 | 15R | $VGAMMAP247 + ((VGAMMAP239 - VGAMMAP247) * (90R/120R))$                    |
| VGAMMAP242 | 15R | $VGAMMAP247 + ((VGAMMAP239 - VGAMMAP247) * (75R/120R))$                    |
| VGAMMAP243 | 15R | $VGAMMAP247 + ((VGAMMAP239 - VGAMMAP247) * (60R/120R))$                    |
| VGAMMAP244 | 15R | $VGAMMAP247 + ((VGAMMAP239 - VGAMMAP247) * (45R/120R))$                    |
| VGAMMAP245 | 15R | $VGAMMAP247 + ((VGAMMAP239 - VGAMMAP247) * (30R/120R))$                    |
| VGAMMAP246 | 15R | $VGAMMAP247 + ((VGAMMAP239 - VGAMMAP247) * (15R/120R))$                    |
| VGAMMAP247 | 30R | $VGSP + \Delta VDHP (3R * VP247[5:0]) / 322R, \Delta VDHP = (VGMP - VGSP)$ |
| VGAMMAP248 | 30R | $VGAMMAP251 + ((VGAMMAP247 - VGAMMAP251) * (90R/120R))$                    |

|            |     |                                                                               |
|------------|-----|-------------------------------------------------------------------------------|
| VGAMMAP249 | 30R | $VGAMMAP251 + ((VGAMMAP247 - VGAMMAP251) * (60R / 120R))$                     |
| VGAMMAP250 | 30R | $VGAMMAP251 + ((VGAMMAP247 - VGAMMAP251) * (30R / 120R))$                     |
| VGAMMAP251 | 6R  | $VGSP + \Delta VDHP (3R * VP251[5:0]) / 322R$ , $\Delta VDHP = (VGMP - VGSP)$ |
| VGAMMAP252 | 12R | $VGAMMAP255 + (VGAMMAP251 - VGAMMAP255) * (RCGPL + 6R + 12R) / (42R + RCGNH)$ |
| VGAMMAP253 | 24R | $VGAMMAP255 + (VGAMMAP251 - VGAMMAP255) * (RCGPL + 6R) / (42R + RCGNH)$       |
| VGAMMAP254 | 24R | $VGAMMAP255 + (VGAMMAP251 - VGAMMAP255) * (RCGPL) / (42R + RCGPL)$            |
| VGAMMAP255 | 0R  | $VGSP + \Delta VDHP (3R * VP255[5:0]) / 322R$ , $\Delta VDHP = (VGMP - VGSP)$ |

| Negative polarity | Resister stream | Gamma 256 grayscale voltage calculation formula                                                        |
|-------------------|-----------------|--------------------------------------------------------------------------------------------------------|
| VGAMMAN255        | 24R             | $VG_{MN} + \Delta V_{DHN} (322R - 2R * VN_{255}[5:0]) / 322R$ , $\Delta V_{DHN} = (V_{GSN} - V_{GMN})$ |
| VGAMMAN254        | 24R             | $VGAMMAN_{251} + (VGAMMAN_{255} - VGAMMAN_{251}) * (6R + 12R + 24R) / (42R + R_{CGNL} + 24R)$          |
| VGAMMAN253        | 12R             | $VGAMMAN_{251} + (VGAMMAN_{255} - VGAMMAN_{251}) * (6R + 12R) / (42R + R_{CGNL} + 24R)$                |
| VGAMMAN252        | 6R              | $VGAMMAN_{251} + (VGAMMAN_{255} - VGAMMAN_{251}) * (6R) / (42R + R_{CGNL} + 24R)$                      |
| VGAMMAN251        | 30R             | $VG_{MN} + \Delta V_{DHN} (322R - 2R * VN_{251}[5:0]) / 322R$ , $\Delta V_{DHN} = (V_{GSN} - V_{GMN})$ |
| VGAMMAN250        | 30R             | $VGAMMAN_{247} + (VGAMMAN_{251} - VGAMMAN_{247}) * (90R / 120R)$                                       |
| VGAMMAN249        | 30R             | $VGAMMAN_{247} + (VGAMMAN_{251} - VGAMMAN_{247}) * (60R / 120R)$                                       |
| VGAMMAN248        | 30R             | $VGAMMAN_{247} + (VGAMMAN_{251} - VGAMMAN_{247}) * (30R / 120R)$                                       |
| VGAMMAN247        | 15R             | $VG_{MN} + \Delta V_{DHN} (322R - 2R * VN_{247}[5:0]) / 322R$ , $\Delta V_{DHN} = (V_{GSN} - V_{GMN})$ |
| VGAMMAN246        | 15R             | $VGAMMAN_{239} + (VGAMMAN_{247} - VGAMMAN_{239}) * (105R / 120R)$                                      |
| VGAMMAN245        | 15R             | $VGAMMAN_{239} + (VGAMMAN_{247} - VGAMMAN_{239}) * (90R / 120R)$                                       |
| VGAMMAN244        | 15R             | $VGAMMAN_{239} + (VGAMMAN_{247} - VGAMMAN_{239}) * (75R / 120R)$                                       |
| VGAMMAN243        | 15R             | $VGAMMAN_{239} + (VGAMMAN_{247} - VGAMMAN_{239}) * (60R / 120R)$                                       |
| VGAMMAN242        | 15R             | $VGAMMAN_{239} + (VGAMMAN_{247} - VGAMMAN_{239}) * (45R / 120R)$                                       |
| VGAMMAN241        | 15R             | $VGAMMAN_{239} + (VGAMMAN_{247} - VGAMMAN_{239}) * (30R / 120R)$                                       |
| VGAMMAN240        | 15R             | $VGAMMAN_{239} + (VGAMMAN_{247} - VGAMMAN_{239}) * (15R / 120R)$                                       |
| VGAMMAN239        | 6R              | $VGAMMAN_{203} + (VGAMMAN_{247} - VGAMMAN_{203}) * (50R - 1R * VN_{239}[4:0]) / 51R$                   |
| VGAMMAN238        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (90R / 96R)$                                        |
| VGAMMAN237        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (84R / 96R)$                                        |
| VGAMMAN236        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (78R / 96R)$                                        |
| VGAMMAN235        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (72R / 96R)$                                        |
| VGAMMAN234        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (66R / 96R)$                                        |
| VGAMMAN233        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (60R / 96R)$                                        |
| VGAMMAN232        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (54R / 96R)$                                        |
| VGAMMAN231        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (48R / 96R)$                                        |
| VGAMMAN230        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (42R / 96R)$                                        |
| VGAMMAN229        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (36R / 96R)$                                        |
| VGAMMAN228        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (30R / 96R)$                                        |
| VGAMMAN227        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (24R / 96R)$                                        |
| VGAMMAN226        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (18R / 96R)$                                        |
| VGAMMAN225        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (12R / 96R)$                                        |
| VGAMMAN224        | 6R              | $VGAMMAN_{232} + (VGAMMAN_{239} - VGAMMAN_{232}) * (6R / 96R)$                                         |
| VGAMMAN223        | 6R              | $VGAMMAN_{203} + (VGAMMAN_{247} - VGAMMAN_{203}) * ((32R - 1R * VN_{223}[4:0]) / 51R)$                 |
| VGAMMAN222        | 6R              | $VGAMMAN_{203} + (VGAMMAN_{223} - VGAMMAN_{203}) * (114R / 120R)$                                      |
| VGAMMAN221        | 6R              | $VGAMMAN_{203} + (VGAMMAN_{223} - VGAMMAN_{203}) * (108R / 120R)$                                      |

|            |    |                                                                                                                                                                                                                                                                                       |
|------------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VGAMMAN220 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(102R/120R)                                                                                                                                                                                                                                       |
| VGAMMAN219 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(96R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN218 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(90R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN217 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(84R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN216 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(78R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN215 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(72R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN214 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(66R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN213 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(60R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN212 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(54R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN211 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(48R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN210 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(42R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN209 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(36R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN208 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(30R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN207 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(24R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN206 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(18R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN205 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(12R/120R)                                                                                                                                                                                                                                        |
| VGAMMAN204 | 6R | VGAMMAN203+((VGAMMAN223-VGAMMAN203)*(6R/120R)                                                                                                                                                                                                                                         |
| VGAMMAN203 | 3R | VGAMMAN8+(VGAMMAN247-VGAMMAN8)*((77R-0R)/90R) , VP203[4:0] =0 (Dec)<br>VGAMMAN8+(VGAMMAN247-VGAMMAN8)*((77R-2R)/90R) , VP203[4:0] =1 (Dec)<br>VGAMMAN8+(VGAMMAN247-VGAMMAN8)*((77R-4R)/90R) , VP203[4:0] =2 (Dec)<br>VGAMMAN8+(VGAMMAN247-VGAMMAN8)*((74R-1R*VN203[4:0])/90R)) , else |
| VGAMMAN202 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(81R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN201 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(78R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN200 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(75R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN199 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(72R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN198 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(69R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN197 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(66R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN196 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(63R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN195 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(60R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN194 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(57R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN193 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(54R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN192 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(51R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN191 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(48R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN190 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(45R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN189 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(42R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN188 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(39R/84R)                                                                                                                                                                                                                                         |
| VGAMMAN187 | 3R | VGAMMAN175+((VGAMMAN203-VGAMMAN175)*(36R/84R)                                                                                                                                                                                                                                         |

|            |    |                                                                                                                                                                                                                                                                                                                                        |
|------------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VGAMMAN186 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (33R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN185 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (30R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN184 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (27R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN183 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (24R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN182 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (21R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN181 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (18R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN180 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (15R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN179 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (12R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN178 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (9R/84R))$                                                                                                                                                                                                                                                                                  |
| VGAMMAN177 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (6R/84R))$                                                                                                                                                                                                                                                                                  |
| VGAMMAN176 | 3R | $VGAMMAN175 + ((VGAMMAN203 - VGAMMAN175) * (3R/84R))$                                                                                                                                                                                                                                                                                  |
| VGAMMAN175 | 3R | $VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((68R - 0R)/76R)$ , VP175[3:0] =0 (Dec)<br>$VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((68R - 2R)/76R)$ , VP175[3:0] =1 (Dec)<br>$VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((68R - 4R)/76R)$ , VP175[3:0] =2 (Dec)<br>$VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((65R - 1R * VN175[3:0])/76R)$ , else |
| VGAMMAN174 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (81R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN173 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (78R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN172 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (75R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN171 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (72R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN170 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (69R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN169 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (66R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN168 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (63R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN167 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (60R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN166 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (57R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN165 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (54R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN164 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (51R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN163 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (48R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN162 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (45R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN161 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (42R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN160 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (39R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN159 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (36R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN158 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (33R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN157 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (30R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN156 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (27R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN155 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (24R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN154 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (21R/84R))$                                                                                                                                                                                                                                                                                 |
| VGAMMAN153 | 3R | $VGAMMAN147 + ((VGAMMAN175 - VGAMMAN147) * (18R/84R))$                                                                                                                                                                                                                                                                                 |

|            |    |                                                                                                                                                                                                                                                                                              |
|------------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VGAMMAN152 | 3R | VGAMMAN147+((VGAMMAN175-VGAMMAN147)*(15R/84R)                                                                                                                                                                                                                                                |
| VGAMMAN151 | 3R | VGAMMAN147+((VGAMMAN175-VGAMMAN147)*(12R/84R)                                                                                                                                                                                                                                                |
| VGAMMAN150 | 3R | VGAMMAN147+((VGAMMAN175-VGAMMAN147)*(9R/84R)                                                                                                                                                                                                                                                 |
| VGAMMAN149 | 3R | VGAMMAN147+((VGAMMAN175-VGAMMAN147)*(6R/84R)                                                                                                                                                                                                                                                 |
| VGAMMAN148 | 3R | VGAMMAN147+((VGAMMAN175-VGAMMAN147)*(3R/84R)                                                                                                                                                                                                                                                 |
| VGAMMAN147 | 3R | VGAMMAN52+(VGAMMAN203-VGAMMAN52)*((52R-0R)/76R) , VP147[3:0] =0 (Dec)<br>VGAMMAN52+(VGAMMAN203-VGAMMAN52)*((52R-2R)/76R) , VP147[3:0] =1 (Dec)<br>VGAMMAN52+(VGAMMAN203-VGAMMAN52)*((52R-4R)/76R) , VP147[3:0] =2 (Dec)<br>VGAMMAN52+(VGAMMAN203-VGAMMAN52)*((49R-1R*VN147[3:0])/76R) , else |
| VGAMMAN146 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(114R/117R)                                                                                                                                                                                                                                              |
| VGAMMAN145 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(111R/117R)                                                                                                                                                                                                                                              |
| VGAMMAN144 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(108R/117R)                                                                                                                                                                                                                                              |
| VGAMMAN143 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(105R/117R)                                                                                                                                                                                                                                              |
| VGAMMAN142 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(102R/117R)                                                                                                                                                                                                                                              |
| VGAMMAN141 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(99R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN140 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(96R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN139 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(93R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN138 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(90R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN137 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(87R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN136 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(84R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN135 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(81R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN134 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(78R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN133 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(75R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN132 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(72R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN131 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(69R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN130 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(66R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN129 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(63R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN128 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(60R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN127 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(57R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN126 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(54R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN125 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(51R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN124 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(48R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN123 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(45R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN122 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(42R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN121 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(39R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN120 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(36R/117R)                                                                                                                                                                                                                                               |
| VGAMMAN119 | 3R | VGAMMAN108+((VGAMMAN147-VGAMMAN108)*(33R/117R)                                                                                                                                                                                                                                               |



|            |    |                                                                                                                                                                                                                                                                                                                                                      |
|------------|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VGAMMAN118 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (30R/117R))$                                                                                                                                                                                                                                                                                              |
| VGAMMAN117 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (27R/117R))$                                                                                                                                                                                                                                                                                              |
| VGAMMAN116 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (24R/117R))$                                                                                                                                                                                                                                                                                              |
| VGAMMAN115 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (21R/117R))$                                                                                                                                                                                                                                                                                              |
| VGAMMAN114 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (18R/117R))$                                                                                                                                                                                                                                                                                              |
| VGAMMAN113 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (15R/117R))$                                                                                                                                                                                                                                                                                              |
| VGAMMAN112 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (12R/117R))$                                                                                                                                                                                                                                                                                              |
| VGAMMAN111 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (9R/117R))$                                                                                                                                                                                                                                                                                               |
| VGAMMAN110 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (6R/117R))$                                                                                                                                                                                                                                                                                               |
| VGAMMAN109 | 3R | $VGAMMAN108 + ((VGAMMAN147 - VGAMMAN108) * (3R/117R))$                                                                                                                                                                                                                                                                                               |
| VGAMMAN108 | 3R | $VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((17R + 1R * VN108[3:0]) / 76R)$ , else<br>$VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((17R + 31R) / 76R)$ , VP108[3:0] =13 (Dec)<br>$VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((17R + 33R) / 76R)$ , VP108[3:0] =14 (Dec)<br>$VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((17R + 35R) / 76R)$ , VP108[3:0] =15 (Dec) |
| VGAMMAN107 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (81R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN106 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (78R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN105 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (75R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN104 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (72R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN103 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (69R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN102 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (66R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN101 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (63R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN100 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (60R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN99  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (57R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN98  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (54R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN97  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (51R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN96  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (48R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN95  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (45R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN94  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (42R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN93  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (39R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN92  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (36R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN91  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (33R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN90  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (30R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN89  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (27R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN88  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (24R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN87  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (21R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN86  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (18R/84R))$                                                                                                                                                                                                                                                                                                 |
| VGAMMAN85  | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (15R/84R))$                                                                                                                                                                                                                                                                                                 |

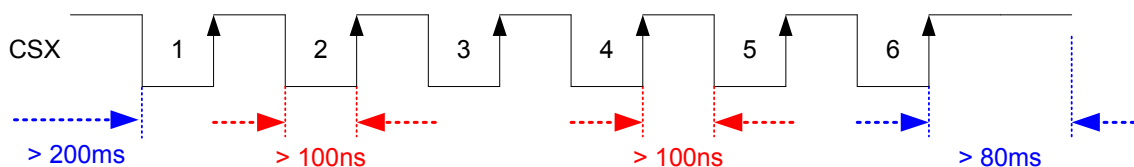
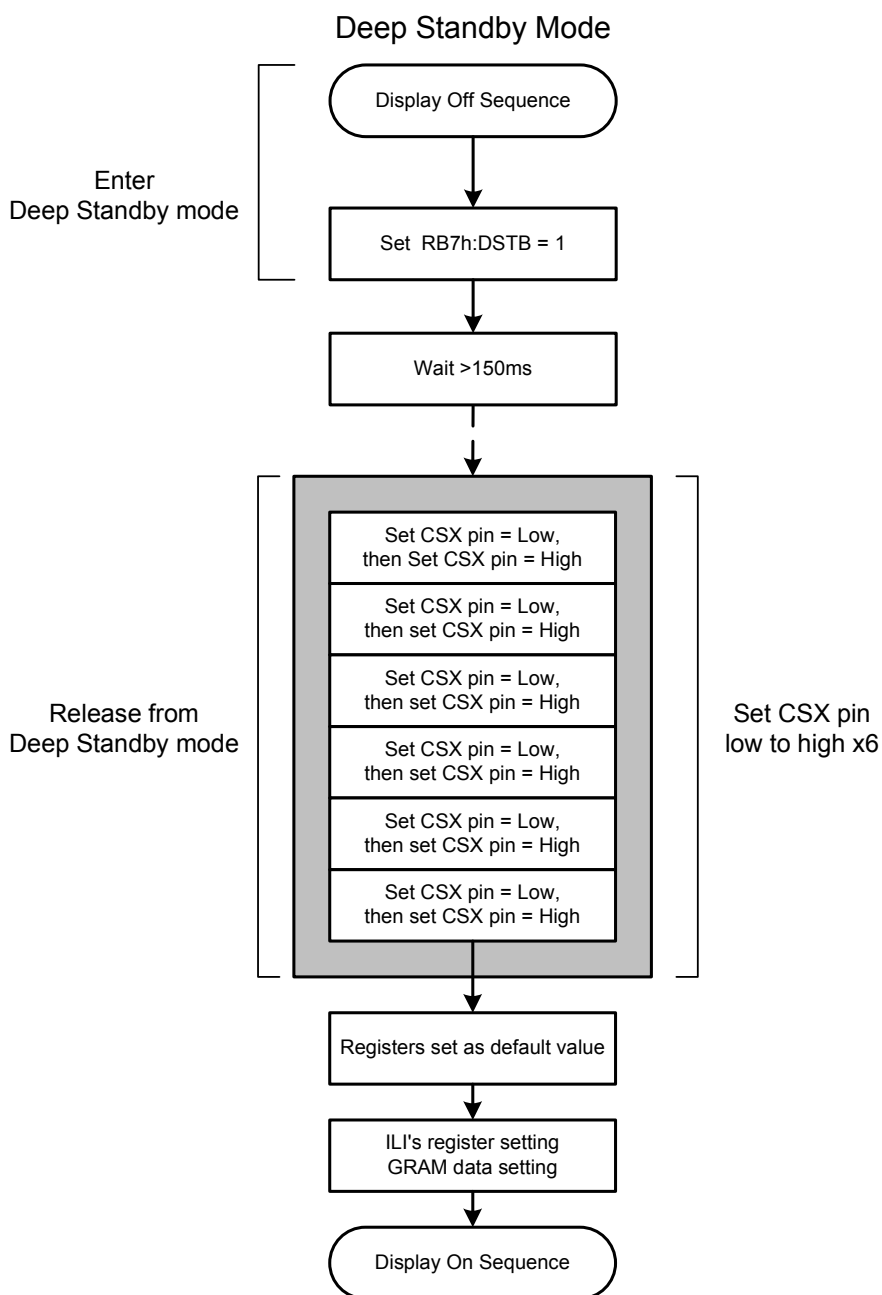


|           |    |                                                                                                                                                                                                                                                                                                                                              |
|-----------|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VGAMMAN84 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (12R/84R))$                                                                                                                                                                                                                                                                                         |
| VGAMMAN83 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (9R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN82 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (6R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN81 | 3R | $VGAMMAN80 + ((VGAMMAN108 - VGAMMAN80) * (3R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN80 | 3R | $VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((1R + 1R * VN80[3:0]) / 76R)$ , else<br>$VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((1R + 15R) / 76R)$ , VP80[3:0] =13 (Dec)<br>$VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((1R + 17R) / 76R)$ , VP80[3:0] =14 (Dec)<br>$VGAMMAN52 + (VGAMMAN203 - VGAMMAN52) * ((1R + 19R) / 76R)$ , VP80[3:0] =15 (Dec) |
| VGAMMAN79 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (81R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN78 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (78R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN77 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (75R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN76 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (72R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN75 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (69R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN74 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (66R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN73 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (63R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN72 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (60R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN71 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (57R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN70 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (54R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN69 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (51R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN68 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (48R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN67 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (45R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN66 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (42R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN65 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (39R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN64 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (36R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN63 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (33R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN62 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (30R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN61 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (27R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN60 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (24R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN59 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (21R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN58 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (18R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN57 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (15R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN56 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (12R/84R))$                                                                                                                                                                                                                                                                                          |
| VGAMMAN55 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (9R/84R))$                                                                                                                                                                                                                                                                                           |
| VGAMMAN54 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (6R/84R))$                                                                                                                                                                                                                                                                                           |
| VGAMMAN53 | 3R | $VGAMMAN52 + ((VGAMMAN80 - VGAMMAN52) * (3R/84R))$                                                                                                                                                                                                                                                                                           |
| VGAMMAN52 | 6R | $VGAMMAN8 + (VGAMMAN247 - VGAMMAN8) * ((8R + 1R * VN52[4:0]) / 90R)$ , else<br>$VGAMMAN8 + (VGAMMAN247 - VGAMMAN8) * ((8R + 38R) / 90R)$ , VP52[4:0] =29 (Dec)                                                                                                                                                                               |

|           |    |                                                                                                                                                                                                              |
|-----------|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|           |    | $\text{VGAMMAN8} + (\text{VGAMMAN247} - \text{VGAMMAN8}) * ((8R + 40R) / 90R)$ , VP52[4:0] =30 (Dec)<br>$\text{VGAMMAN8} + (\text{VGAMMAN247} - \text{VGAMMAN8}) * ((8R + 42R) / 90R)$ , VP52[4:0] =31 (Dec) |
| VGAMMAN51 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (114R / 120R))$                                                                                                                                 |
| VGAMMAN50 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (108R / 120R))$                                                                                                                                 |
| VGAMMAN49 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (102R / 120R))$                                                                                                                                 |
| VGAMMAN48 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (96R / 120R))$                                                                                                                                  |
| VGAMMAN47 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (90R / 120R))$                                                                                                                                  |
| VGAMMAN46 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (84R / 120R))$                                                                                                                                  |
| VGAMMAN45 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (78R / 120R))$                                                                                                                                  |
| VGAMMAN44 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (72R / 120R))$                                                                                                                                  |
| VGAMMAN43 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (66R / 120R))$                                                                                                                                  |
| VGAMMAN42 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (60R / 120R))$                                                                                                                                  |
| VGAMMAN41 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (54R / 120R))$                                                                                                                                  |
| VGAMMAN40 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (48R / 120R))$                                                                                                                                  |
| VGAMMAN39 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (42R / 120R))$                                                                                                                                  |
| VGAMMAN38 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (36R / 120R))$                                                                                                                                  |
| VGAMMAN37 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (30R / 120R))$                                                                                                                                  |
| VGAMMAN36 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (24R / 120R))$                                                                                                                                  |
| VGAMMAN35 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (18R / 120R))$                                                                                                                                  |
| VGAMMAN34 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (12R / 120R))$                                                                                                                                  |
| VGAMMAN33 | 6R | $\text{VGAMMAN32} + ((\text{VGAMMAN52} - \text{VGAMMAN32}) * (6R / 120R))$                                                                                                                                   |
| VGAMMAN32 | 6R | $\text{VGAMMAN8} + (\text{VGAMMAN52} - \text{VGAMMAN8}) * ((19R + 1R * \text{VN32}[4:0]) / 51R)$                                                                                                             |
| VGAMMAN31 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (90R / 96R))$                                                                                                                                   |
| VGAMMAN30 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (84R / 96R))$                                                                                                                                   |
| VGAMMAN29 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (78R / 96R))$                                                                                                                                   |
| VGAMMAN28 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (72R / 96R))$                                                                                                                                   |
| VGAMMAN27 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (66R / 96R))$                                                                                                                                   |
| VGAMMAN26 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (60R / 96R))$                                                                                                                                   |
| VGAMMAN25 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (54R / 96R))$                                                                                                                                   |
| VGAMMAN24 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (48R / 96R))$                                                                                                                                   |
| VGAMMAN23 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (42R / 96R))$                                                                                                                                   |
| VGAMMAN22 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (36R / 96R))$                                                                                                                                   |
| VGAMMAN21 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (30R / 96R))$                                                                                                                                   |
| VGAMMAN20 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (24R / 96R))$                                                                                                                                   |
| VGAMMAN19 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (18R / 96R))$                                                                                                                                   |
| VGAMMAN18 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (12R / 96R))$                                                                                                                                   |
| VGAMMAN17 | 6R | $\text{VGAMMAN16} + ((\text{VGAMMAN32} - \text{VGAMMAN16}) * (6R / 96R))$                                                                                                                                    |

|           |     |                                                                         |
|-----------|-----|-------------------------------------------------------------------------|
| VGAMMAN16 | 15R | $VGAMMAN8 + (VGAMMAN52 - VGAMMAN8) * ((1R + 1R * VN16[4:0]) / 51R)$     |
| VGAMMAN15 | 15R | $VGAMMAN8 + ((VGAMMAN16 - VGAMMAN8) * (105R / 120R))$                   |
| VGAMMAN14 | 15R | $VGAMMAN8 + ((VGAMMAN16 - VGAMMAN8) * (90R / 120R))$                    |
| VGAMMAN13 | 15R | $VGAMMAN8 + ((VGAMMAN16 - VGAMMAN8) * (75R / 120R))$                    |
| VGAMMAN12 | 15R | $VGAMMAN8 + ((VGAMMAN16 - VGAMMAN8) * (60R / 120R))$                    |
| VGAMMAN11 | 15R | $VGAMMAN8 + ((VGAMMAN16 - VGAMMAN8) * (45R / 120R))$                    |
| VGAMMAN10 | 15R | $VGAMMAN8 + ((VGAMMAN16 - VGAMMAN8) * (30R / 120R))$                    |
| VGAMMAN9  | 15R | $VGAMMAN8 + ((VGAMMAN16 - VGAMMAN8) * (15R / 120R))$                    |
| VGAMMAN8  | 30R | $VGMN + \Delta VDHN(3R * VN8[5:0]) / 322R, \Delta VDHN = (VGSN - VGMN)$ |
| VGAMMAN7  | 30R | $VGAMMAN4 + ((VGAMMAN8 - VGAMMAN4) * (90R / 120R))$                     |
| VGAMMAN6  | 30R | $VGAMMAN4 + ((VGAMMAN8 - VGAMMAN4) * (60R / 120R))$                     |
| VGAMMAN5  | 30R | $VGAMMAN4 + ((VGAMMAN8 - VGAMMAN4) * (30R / 120R))$                     |
| VGAMMAN4  | 6R  | $VGMN + \Delta VDHN(3R * VN4[5:0]) / 322R, \Delta VDHN = (VGSN - VGMN)$ |
| VGAMMAN3  | 12R | $VGAMMAN0 + (VGAMMAN4 - VGAMMAN0) * (RCGNH + 6R + 12R) / (42R + RCGNH)$ |
| VGAMMAN2  | 24R | $VGAMMAN0 + (VGAMMAN4 - VGAMMAN0) * (RCGNH + 6R) / (42R + RCGNH)$       |
| VGAMMAN1  | 24R | $VGAMMAN0 + (VGAMMAN4 - VGAMMAN0) * RCGNH / (42R + RCGNH)$              |
| VGAMMAN0  |     | $VGMN + \Delta VDHN(3R * VN0[5:0]) / 322R, \Delta VDHN = (VGSN - VGMN)$ |

## 14. Deep Standby Mode Setting



**Figure 168: Deep Standby Mode Entry/Exit**

## 15. Electrical Characteristics

### 15.1. Absolute Maximum Ratings

The absolute maximum rating is listed in Table 46. When the ILI9806H is used beyond the absolute maximum ratings, it may be permanently damaged. It is strongly recommended that use the ILI9806H within the following electrical characteristics limit for normal operation. If these electrical characteristic conditions are exceeded during normal operation, the ILI9806H will malfunction and cause poor reliability.

**Table 46: Absolute Maximum Ratings**

| Item                                                                                                                                                                                                                                                    | Symbol            | Unit | Value             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------|-------------------|
| Supply voltage(Analog)                                                                                                                                                                                                                                  | VDDA ~ VSSA       | V    | -0.3 ~ +4.6       |
| Supply voltage (I/O)                                                                                                                                                                                                                                    | VDDI ~ VSSI       | V    | -0.3 ~ +4.6       |
| Supply voltage (DSI I/O)                                                                                                                                                                                                                                | VDDAM ~ VSSAM     | V    | -0.3 ~ +4.6       |
| OTP Supply voltage                                                                                                                                                                                                                                      | OTP_PWR ~ VSSA    | V    | 8.25              |
| Supply voltage                                                                                                                                                                                                                                          | AVDD ~ DSSA       | V    | -0.3 ~ +6.6       |
| Supply voltage                                                                                                                                                                                                                                          | AVEE ~ DSSA       | V    | 0.3 ~ -6.6        |
| Supply voltage                                                                                                                                                                                                                                          | VGH ~ DSSA        | V    | -0.3 ~ +25        |
| Supply voltage                                                                                                                                                                                                                                          | VGL ~ DSSA        | V    | 0.3 ~ -16         |
| Driver supply voltage                                                                                                                                                                                                                                   | VDDA – VCL        | V    | ≤ 6.0V            |
| Driver supply voltage                                                                                                                                                                                                                                   | VGH-VGL           | V    | ≤ 32.0V           |
| Input voltage                                                                                                                                                                                                                                           | V <sub>IN</sub>   | V    | -0.3 ~ VDDI + 0.3 |
| HS Input voltage                                                                                                                                                                                                                                        | V <sub>HSIN</sub> | V    | -0.3 ~ + 2        |
| Operating temperature                                                                                                                                                                                                                                   | T <sub>opr</sub>  | °C   | -30 ~ +70         |
| Storage temperature                                                                                                                                                                                                                                     | T <sub>stg</sub>  | °C   | -55 ~ +110        |
| Note:<br><br>Even if the absolute maximum rating of one of the above parameters is exceeded only for a short while, the quality of the product may be degraded. Therefore, be sure to use the product within the range of the absolute maximum ratings. |                   |      |                   |

## 15.2. DC Characteristics for Panel Driving

| Item                                                      | Symbol              | Condition                   | Min.     | Typ. | Max.     | Unit | Note    |
|-----------------------------------------------------------|---------------------|-----------------------------|----------|------|----------|------|---------|
| <b>Power &amp; Operation Voltage</b>                      |                     |                             |          |      |          |      |         |
| Analog operating voltage                                  | VDDA                | -                           | 2.6      | 2.8  | 3.3      | V    |         |
| Logic operating voltage                                   | VDDAM               | -                           | 2.6      | 2.8  | 3.3      | V    |         |
| Logic operating voltage                                   | VDDI                | -                           | 1.65     | 1.8  | 3.3      | V    | Note1,2 |
| OTP Supply voltage                                        | VPP                 | -                           |          | 8.25 |          | V    | Note1   |
| Logic High level input voltage                            | V <sub>IH</sub>     | -                           | 0.7*VDDI |      | VDDI     | V    | Note1   |
| Logic Low level input voltage                             | V <sub>IL</sub>     | -                           | -0.3     |      | 0.3*VDDI | V    | Note1   |
| Logic High level output voltage<br>TE, SDO (SDA) , LEDPWM | V <sub>OH</sub>     | IOH = -1.0mA                | 0.8*VDDI |      | VDDI     | V    | Note1   |
| Logic Low level output voltage<br>TE, SDO (SDA) , LEDPWM  | V <sub>OL</sub>     | IOL = +1.0mA                | 0        |      | 0.2*VDDI | V    | Note1   |
| Gate Driver High Voltage                                  | VGH                 | -                           | 7.0      | -    | 18       | V    |         |
| Gate Driver Low Voltage                                   | VGL                 | -                           | -18.0    | -    | -7.0     | V    |         |
| Driver Supply Voltage                                     | -                   | VGH-VGL                     | 14.0     | -    | 25.0     | V    |         |
| <b>VCOM Operation</b>                                     |                     |                             |          |      |          |      |         |
| DC VCOM Amplitude Voltage                                 | VCOM                | -                           | -4.0     | -    | 0        | V    | Note3   |
| <b>Source Driver</b>                                      |                     |                             |          |      |          |      |         |
| Source Output Range                                       | V <sub>SOUT</sub>   | -                           | 0.1      | -    | VGMP-0.1 | V    | Note4   |
| Positive Gamma Reference Voltage                          | VGMP                | -                           | 3.0      | -    | 6.1875   | V    |         |
| Negative Gamma Reference Voltage                          | VGMN                | -                           | -6.1875  | -    | -3.0     | V    |         |
| Source Output Setting Time                                | T <sub>r</sub>      | Below with 99%<br>precision | -        | 15   | 20       | us   | Note3.4 |
| Output Deviation Voltage<br>(Source Output channel)       | V <sub>dev</sub>    | Sout>=4.2V                  | -        | -    | 20       | mV   | Note3   |
|                                                           |                     | 4.2V>Sout>0.8V              | -        | -    | 15       | mV   | -       |
| Output Offset Voltage                                     | V <sub>OFFSET</sub> | -                           | -        | -    | 35       | mV   | Note3   |
| <b>Booster Operation</b>                                  |                     |                             |          |      |          |      |         |
| Booster Voltage                                           | AVDD                | -                           |          |      | 6.5      | V    |         |
| Booster Voltage                                           | AVEE                | -                           | -6.5     |      |          | V    |         |
| Gate Driver High Voltage                                  | VGH                 | -                           | 7.0      | -    | 18.0     | V    |         |
| Gate Driver Low Voltage                                   | VGL                 | -                           | -18.0    | -    | -7.0     | V    |         |
| <b>Power saving mode</b>                                  |                     |                             |          |      |          |      |         |
| Sleep in mode<br>(MIPI DSI & SPI+MIPI DSI)                | I_VDDA              | -                           |          |      | 130      | uA   |         |
| Sleep in mode<br>(Other interface)                        | I_VDDA              | -                           |          |      | 100      | uA   |         |

### Notes:

1. Ta = -30 to 70 °C (no damage up to 85 °C), VDDI=1.65V to 3.3V, VDDA=2.6V to 3.3V, VSSAM=DVSS=0V.
2. Supply the digital VDDI voltage equal to or less than the analog VDDA voltage.
3. Source channel loading = 10pF/channel, Gate channel loading = 50pF/channel
4. The Max. Value is between with Note 3 measure point and the Gamma setting value

### 15.3. DSI DC Characteristics

The DSI uses different state codes which depend on DC voltage levels of the clock and data lanes. The meaning of the state codes is defined on the following table.

| State Code | Line DC Voltage Levels |                   |
|------------|------------------------|-------------------|
|            | CLOCK_P or DATA_P      | CLOCK_N or DATA_N |
| HS-0       | Low (HS)               | High (HS)         |
| HS-1       | High (HS)              | Low (HS)          |
| LP-00      | Low (LP)               | Low (LP)          |
| LP-01      | Low (LP)               | High (LP)         |
| LP-10      | High (LP)              | Low (LP)          |
| LP-11      | High (LP)              | Low (LP)          |

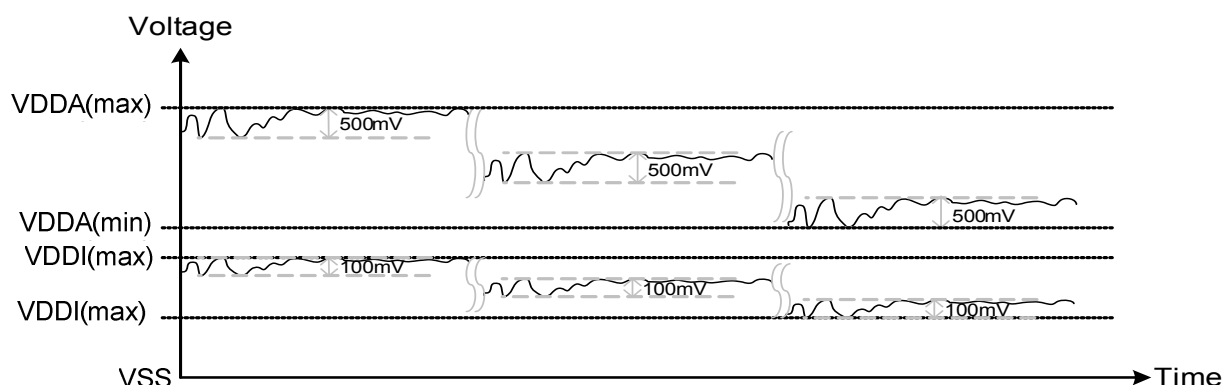
Note: Ta = -30°C to 70°C (no damage up to 85°C)

### DC characteristics for Power Lines

| Parameter                         | Symbol      | Condition                                                        | Specification |      |      | Unit |
|-----------------------------------|-------------|------------------------------------------------------------------|---------------|------|------|------|
|                                   |             |                                                                  | Min.          | Typ. | Max. |      |
| Analog power supply voltage       | VDDA        | Operating voltage                                                | 2.6           | 2.8  | 3.3  | V    |
| Digital power supply voltage      | VDDI        | I/O supply voltage                                               | 1.65          | 1.8  | 3.3  | V    |
| Analog power supply voltage noise | VVDDA_NOISE | Noise Range, 0 to 100MHz,<br>Sinusoidal Wave (peak-to-peak)      | -             | -    | 100  | mV   |
|                                   |             | Noise Range, 0 to 30kHz,<br>Pulse Wave with Duty Cycle (50%/50%) | -             | -    | 500  | mV   |
| I/O power supply voltage noise    | VVDDI_NOISE | Noise Range, 0 to 100MHz,<br>Sinusoidal Wave (peak-to-peak)      | -             | -    | 100  | mV   |

Notes:

1. Ta = -30°C to 70°C (no damage up to 85°C)
2. These values are not symmetric amplitude, which center points are VDDI or VDDA. See examples, when VVDDA\_NOISE and VVDDI\_NOISE are maximums, below for reference.



**Figure 169: Noise on Power Supply Lines**

## DC Characteristics for DSI LP Mode

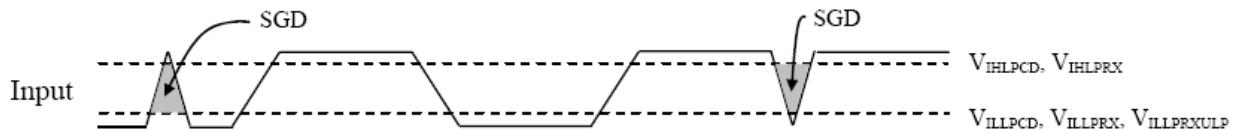
DC levels of the LP-00, LP-01, LP-10, and LP-11 are defined in the table below: DC Characteristics for DSI LP mode when LP-RX, LP-CD, or LP-TX is mentioned in the condition column. Other logical levels of the table are for the MPU interface.

| Parameter                       | Symbol          | Condition                    | Specification  |      |               | Unit |
|---------------------------------|-----------------|------------------------------|----------------|------|---------------|------|
|                                 |                 |                              | Min.           | Typ. | Max.          |      |
| Logic High level output voltage | $V_{OH}$        | $I_{OUT} = -1mA$ , Note 2    | $0.8 V_{DDAM}$ | -    | $V_{DDAM}$    | V    |
| Logic Low level output voltage  | $V_{OL}$        | $I_{OUT} = 1Ma$ , Note 2     | 0.0            | -    | $0.2V_{DDAM}$ | V    |
| Logic High level input voltage  | $V_{IHLPD}$     | LP-CD, Note 3                | 450            | -    | 1350          | mV   |
| Logic Low level input voltage   | $V_{ILLPCD}$    | LP-CD, Note 3                | 0.0            | -    | 200           | mV   |
| Logic High level input voltage  | $V_{IHLPRX}$    | LP-RX (CLK, D0 ,D1), Note 3  | 880            | -    | 1350          | mV   |
| Logic Low level input voltage   | $V_{ILLPRX}$    | LP-RX (CLK, D0 ,D1), Note 3  | 0.0            | -    | 550           | mV   |
| Logic Low level input voltage   | $V_{ILLPRXULP}$ | LP-RX (CLK ULP mode), Note 3 | 0.0            | -    | 300           | mV   |
| Logic high level output voltage | $V_{OHLPTX}$    | LP-TX (D0), Note 3           | 1.1            | -    | 1.3           | V    |
| Logic Low level output voltage  | $V_{OLLPTX}$    | LP-TX (D0), Note 3           | -50            | -    | 50            | mV   |
| Logic High level input current  | $I_{IH}$        | LP-CD, LP-RX, Note 3         | -              | -    | 10            | uA   |
| Logic Low level input current   | $I_{IL}$        | LP-CD, LP-RX, Note 3         | -10            | -    | -             | uA   |

Notes:

1.  $T_a = -30^{\circ}C$  to  $70^{\circ}C$  (no damage up to  $85^{\circ}C$ )
2. LEDPWM, TE\_ENABLE
3. The DSI High Speed mode is Off.

## Spike/Glitch Rejection



**Figure 170: Spike/Glitch Rejection**

Notes:

1. A spike/glitch can be rejected when the Peak Interference Amplitude is 200mV (at maximum) and the Interference Frequency is 450 MHz (at the very least).
2.  $n = 0$  and 1.

**Table 47: Spike/Glitch Rejection**

| Spike/Glitch Rejection – DSI |        |                               |     |     |      |
|------------------------------|--------|-------------------------------|-----|-----|------|
| Signal                       | Symbol | Parameter                     | Min | Max | Unit |
| DSI-CLK+/-, DSI-Dn+/-        | SGD    | Input pulse rejection for DSI | -   | 300 | Vps  |



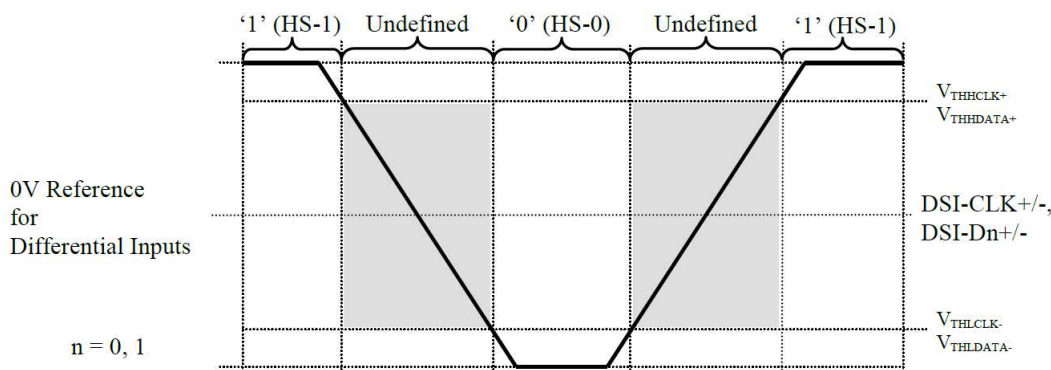
## DC Characteristics for DSI HS Mode

| Parameter                                                      | Symbol            | Condition                               | Specification |     |     | Unit     |
|----------------------------------------------------------------|-------------------|-----------------------------------------|---------------|-----|-----|----------|
| Input Common Mode Voltage for Clock                            | $V_{CMCLK}$       | DSI-CLK+/-<br>Note 2, Note 3            | 70            | -   | 330 | mV       |
| Input Common Mode Voltage for Data                             | $V_{CMDATA}$      | DSI-Dn+/-<br>Note 2, Note 3, Note 5     | 70            | -   | 330 | mV       |
| Common Mode Ripple for Clock Equal or Less than 450MHz         | $V_{CMRCLKL450}$  | DSI-CLK+/-<br>Note 4                    | -50           | -   | 50  | mV       |
| Common Mode Ripple for Data Equal or Less than 450MHz          | $V_{CMRDATAL450}$ | DSI-Dn+/-<br>Note 4, Note 5             | -50           | -   | 50  | mV       |
| Common Mode Ripple for Clock More than 450MHz (peak sine wave) | $V_{CMRCLKM450}$  | DSI-CLK+/-                              | -             | -   | 100 | mV       |
| Common Mode Ripple for Data More than 450MHz (peak sine wave)  | $V_{CMRDATAM450}$ | DSI-Dn+/-<br>Note 5                     | -             | -   | 100 | mV       |
| Differential Input Low Level Threshold Voltage for Clock       | $V_{THLCLK-}$     | DSI-CLK+/-                              | -70           | -   | -   | mV       |
| Differential Input Low Level Threshold Voltage for Data        | $V_{THLDATA-}$    | DSI-Dn+/-<br>Note 5                     | -70           | -   | -   | mV       |
| Differential Input High Level Threshold Voltage for Clock      | $V_{THHCLK+}$     | DSI-CLK+/-                              | -             | -   | 70  | mV       |
| Differential Input High Level Threshold Voltage for Data       | $V_{THHDATA+}$    | DSI-Dn+/-<br>Note 5                     | -             | -   | 70  | mV       |
| Single-ended Input Low Voltage                                 | $V_{ILHS}$        | DSI-CLK+/-, DSI-Dn+/-<br>Note 3, Note 5 | -40           | -   | -   | mV       |
| Single-ended Input High Voltage                                | $V_{IHHS}$        | DSI-CLK+/-, DSI-Dn+/-<br>Note 3, Note 5 | -             | -   | 460 | mV       |
| Differential Termination Resistor                              | $R_{TERM}$        | DSI-CLK+/-, DSI-Dn+/-<br>Note 5         | 80            | 100 | 125 | $\Omega$ |
| Single-ended Threshold Voltage for Termination Enable          | $V_{TERM-EN}$     | DSI-CLK+/-, DSI-Dn+/-<br>Note 5         | -             | -   | 450 | mV       |
| Termination Capacitor                                          | $C_{TERM}$        | DSI-CLK+/-, DSI-Dn+/-<br>Note 5, Note 6 | -             | -   | 60  | pF       |

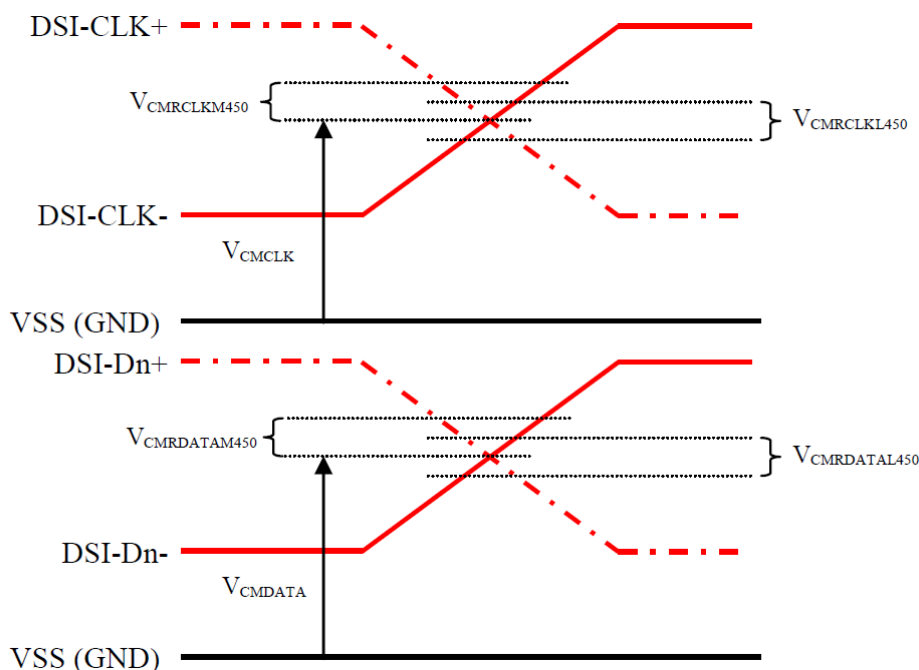
### Notes:

1.  $T_a = -30^{\circ}\text{C}$  to  $70^{\circ}\text{C}$  (no damage up to  $85^{\circ}\text{C}$ ),  $V_{DDI} = 1.65$  to  $1.95\text{V}$ ,  $DVSS = 0\text{V}$ .
2. Includes 50mV (-50mV to 50mV) ground difference
3. Without  $V_{CMRCLKM450}/V_{CMRDATAM450}$
4. Without 50mV (-50mV to 50mV) ground difference
5.  $n = 0$  or  $1$
6. For higher bit rates, a 14pF capacitor will be needed to meet the common-mode return loss specification.

The DSI receiver (HS mode) understands that there is logical 1 (HS-1) when a differential voltage is more than  $V_{THH}$  (CLK+/DATA+). The DSI receiver (HS mode) understands that there is logical 0 (HS-0) when a differential voltage is more than  $V_{THL}$  (CLK-/DATA-). There is undefined state if the differential voltage is less than  $V_{THH}$  (CLK+/DATA+) and less than  $V_{THL}$  (CLK-/DATA-). A reference figure is below.



**Figure 171: Differential Inputs Logical 0 and 1, Threshold High/Low, Differential Voltage Range**



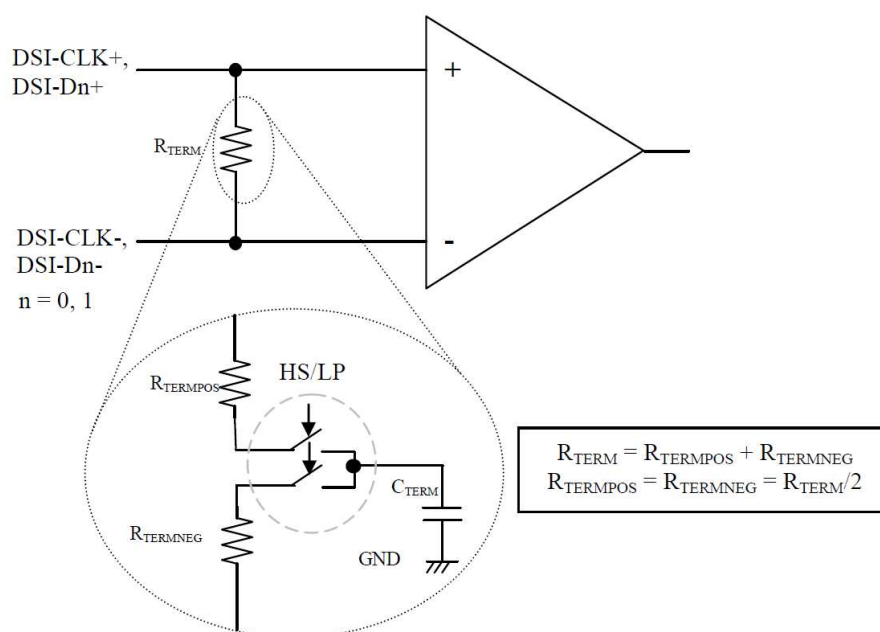
Note:  $n = 0$  or  $1$

**Figure 172: Common Mode Voltage on Clock and Data Channels**

The termination resistor ( $R_{TERM}$ ) of the differential DSI receiver can be driven to two different states by the receiver:

- Low Power (LP) mode when the termination resistor is not connected between differential inputs (DSI-CLK+  $\Leftrightarrow$  DSI-CLK- or DSI-D0+  $\Leftrightarrow$  DSI-D0- or DSI-D1+  $\Leftrightarrow$  DSI-D1-)
- High Speed (HS) mode when the termination resistor is connected between differential inputs (DSI-CLK+  $\Leftrightarrow$  DSI-CLK- or DSI-D0+  $\Leftrightarrow$  DSI-D0- or DSI-D1+  $\Leftrightarrow$  DSI-D1-)

The termination switch (HS/LP), when the termination resistor is not connected, is illustrated below.

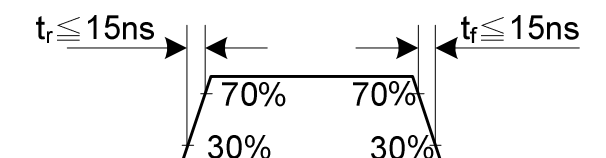


**Figure 173: Differential Pair Termination Resistor on the Receiver Side**

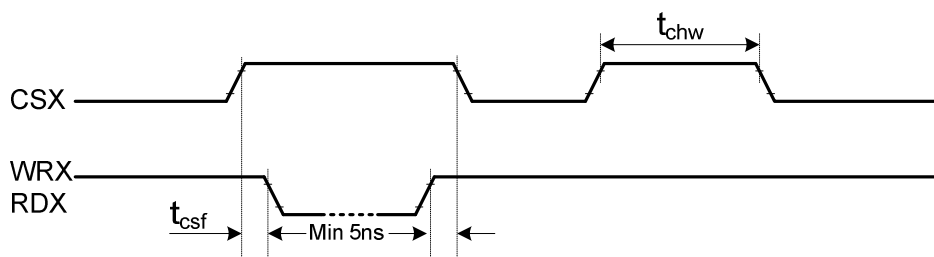


Notes:

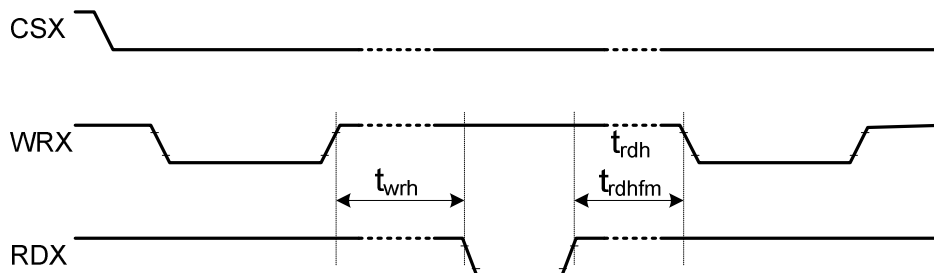
1.  $T_a = -30$  to  $70^{\circ}\text{C}$ ,  $V_{DDI} = 1.65\text{V}$  to  $3.3\text{V}$ ,  $V_{DDA} = 2.6\text{V}$  to  $3.3\text{V}$ ,  $V_{SSAM} = DVSS = 0\text{V}$
2. Logic high and low levels are specified as 30% and 70% of  $V_{DDI}$  for input signals.
3. Input signal rising and falling time:



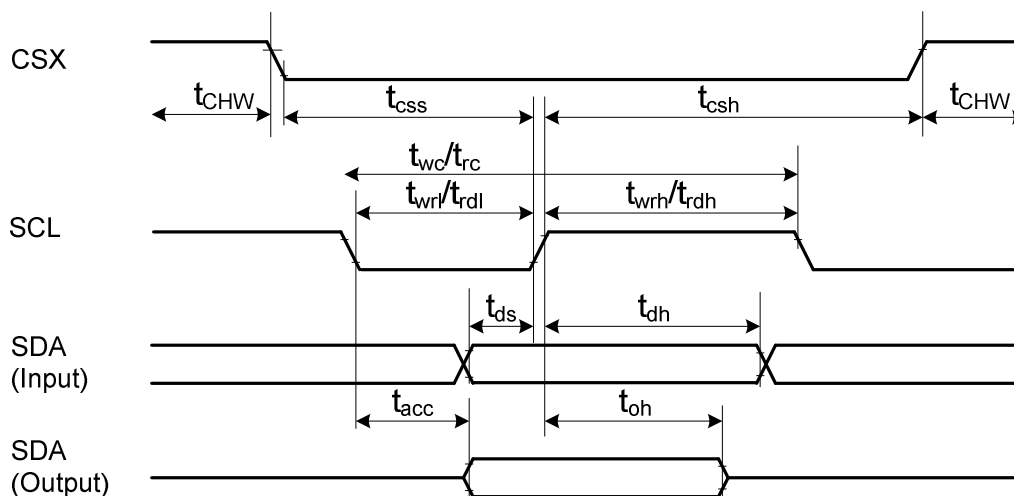
4. The CSX timing:



5. The Write-to-Read or the Read-to-Write timing:



## Display Serial Interface Timing Characteristics (3-line SPI system)

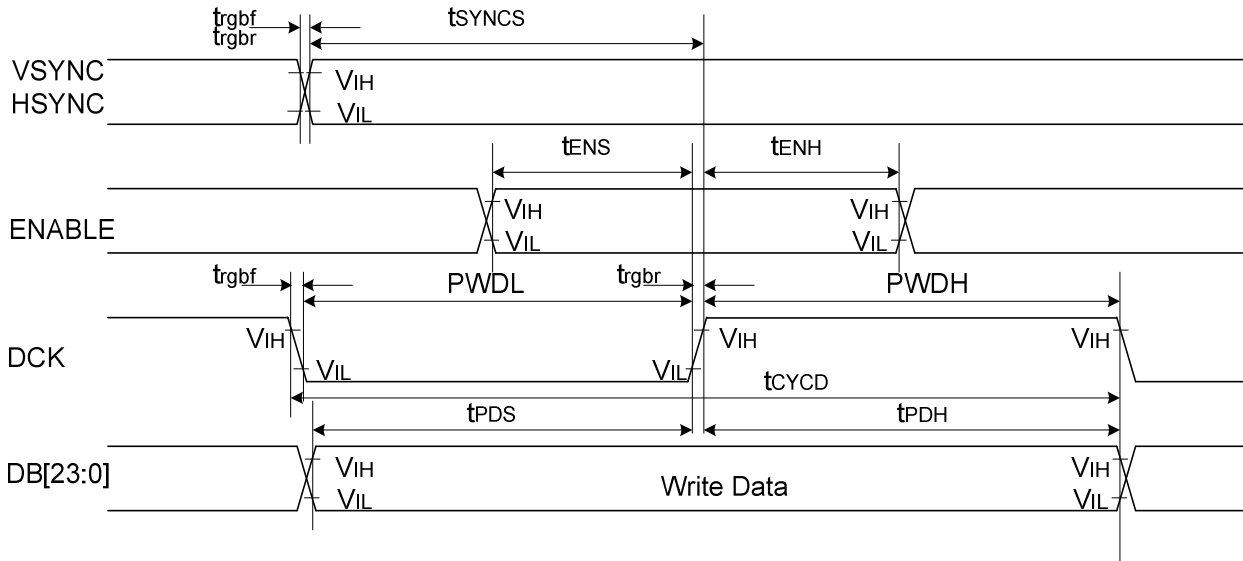


| Signal       | Symbol           | Parameter                    | min | max | Unit | Description                               |
|--------------|------------------|------------------------------|-----|-----|------|-------------------------------------------|
| CSX          | t <sub>css</sub> | Chip select time (Write)     | 15  | -   | ns   |                                           |
|              | t <sub>csH</sub> | Chip select hold time (Read) | 15  | -   | ns   |                                           |
|              | t <sub>CHW</sub> | CS "H" pulse width           | 40  | -   | ns   |                                           |
| SCL          | t <sub>wc</sub>  | Serial clock cycle (Write)   | 30  | -   | ns   |                                           |
|              | t <sub>wrh</sub> | SCL "H" pulse width (Write)  | 10  | -   | ns   |                                           |
|              | t <sub>wrl</sub> | SCL "L" pulse width (Write)  | 10  | -   | ns   |                                           |
|              | t <sub>rc</sub>  | Serial clock cycle (Read)    | 150 | -   | ns   |                                           |
|              | t <sub>rdh</sub> | SCL "H" pulse width (Read)   | 60  | -   | ns   |                                           |
|              | t <sub>rdl</sub> | SCL "L" pulse width (Read)   | 60  | -   | ns   |                                           |
| SDA (Input)  | t <sub>ds</sub>  | Data setup time (Write)      | 10  | -   | ns   |                                           |
|              | t <sub>dh</sub>  | Data hold time (Write)       | 10  | -   | ns   |                                           |
| SDA (Output) | t <sub>acc</sub> | Access time (Read)           | 10  | 50  | ns   | CL = 30pF (maximum)<br>CL = 8pF (minimum) |
|              | t <sub>oh</sub>  | Output disable time (Read)   | 15  | 50  | ns   |                                           |

### Notes:

1. Ta = -30 to 70°C, VDDI = 1.65V to 3.3V, VDDA = 2.6V to 3.3V, VSSAM = DVSS = 0V, T = 10+/-0.5ns.
2. Does not include signal rising and falling times.
3. In Read mode ,the SCL timing of write command is the same as the SCL timing of read

## Parallel 24/18/16-bit RGB Interface Timing Characteristics



| Signal    | Symbol              | Parameter                   | min | max | Unit | Description                            |
|-----------|---------------------|-----------------------------|-----|-----|------|----------------------------------------|
| VS/<br>HS | $t_{SYNCS}$         | VS/HS setup time            | 5   | -   | ns   | 24/18/16-bit bus RGB<br>interface mode |
|           | $t_{SYNCH}$         | VS/HS hold time             | 5   | -   | ns   |                                        |
| DE        | $t_{ENS}$           | ENABLE setup time           | 5   | -   | ns   |                                        |
|           | $t_{ENH}$           | ENABLE hold time            | 5   | -   | ns   |                                        |
| DB [23:0] | $t_{POS}$           | Data setup time             | 5   | -   | ns   |                                        |
|           | $t_{PDH}$           | Data hold time              | 5   | -   | ns   |                                        |
| PCLK      | $PWDH$              | PCLK high-level period      | 16  | -   | ns   |                                        |
|           | $PWDL$              | PCLK low-level period       | 16  | -   | ns   |                                        |
|           | $t_{CYCD}$          | PCLK cycle time             | 32  | -   | ns   |                                        |
|           | $t_{rgb}, t_{grbf}$ | PCLK, HS, VS rise/fall time | -   | 15  | ns   |                                        |

Note:  $T_a = -30$  to  $70^{\circ}\text{C}$ ,  $V_{DDI} = 1.65\text{V}$  to  $3.3\text{V}$ ,  $V_{DDA} = 2.6\text{V}$  to  $3.3\text{V}$ ,  $V_{SSAM} = DVSS = 0\text{V}$

## DSI Timing Characteristics

### High Speed Mode – Clock Channel Timing

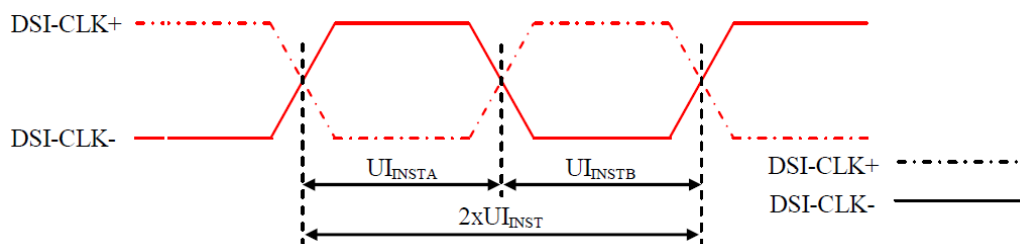


Figure 174: DSI Clock Channel Timing

Table 48: DSI Clock Channel Timing

| Signal     | Symbol                   | Parameter               | Min | Max  | Unit |
|------------|--------------------------|-------------------------|-----|------|------|
| DSI-CLK+/- | $2xUI_{INST}$            | Double UI instantaneous | 4   | 25   | ns   |
| DSI-CLK+/- | $UI_{INSTA}, UI_{INSTB}$ | UI instantaneous Half   | 2   | 12.5 | ns   |

Note:  $UI = UI_{INSTA} = UI_{INSTB}$

### High Speed Mode – Data Clock Channel Timing

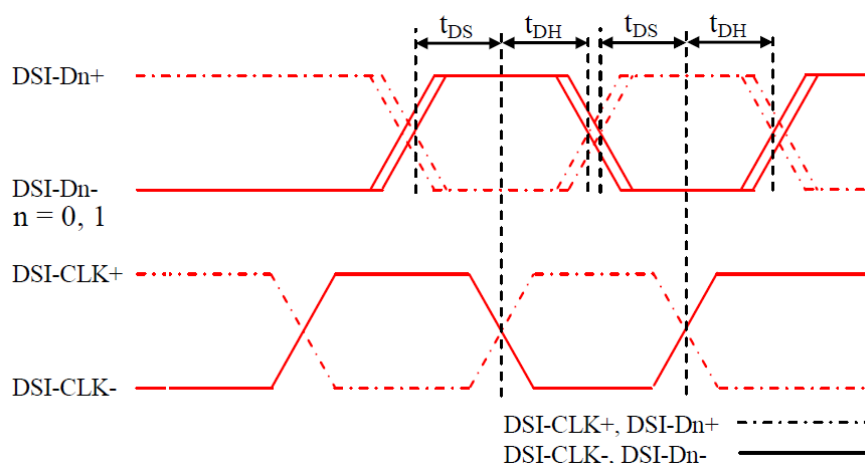


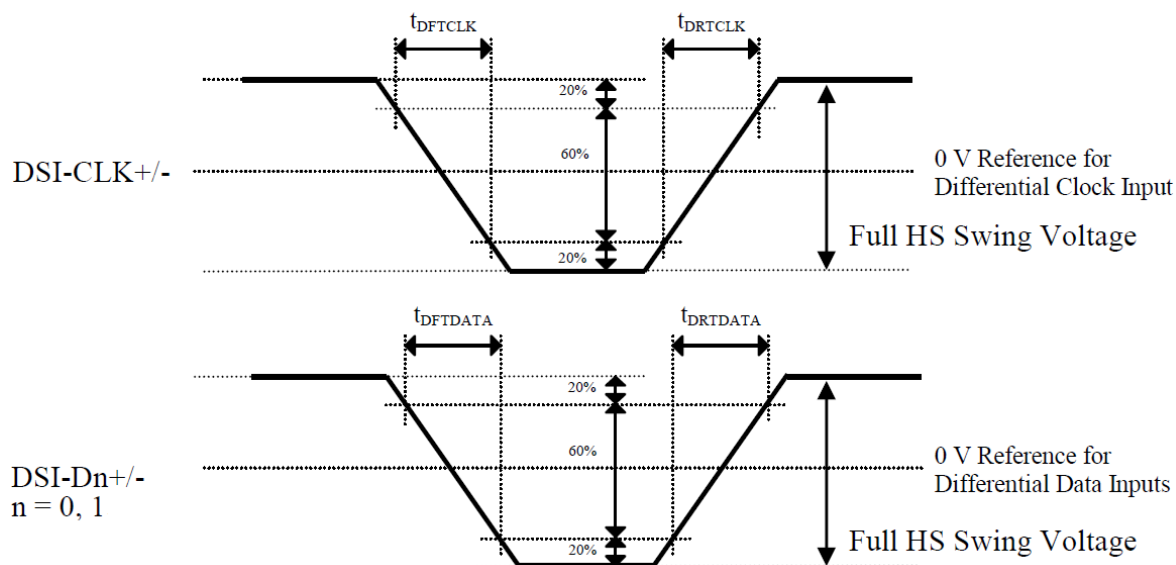
Figure 175: DSI Data to Clock Channel Timings

Table 49: DSI Data to Clock Channel Timings

| Signal               | Symbol   | Parameter                | Min       | Max |
|----------------------|----------|--------------------------|-----------|-----|
| DSI-Dn+/- , n=0 or 1 | $t_{DS}$ | Data to Clock Setup time | $0.15xUI$ | -   |
|                      | $t_{DH}$ | Clock to Data Hold Time  | $0.15xUI$ | -   |



## High Speed Mode – Rising and Falling Timings



**Figure 176: Rising and Falling Timings on Clock and Data Channels**

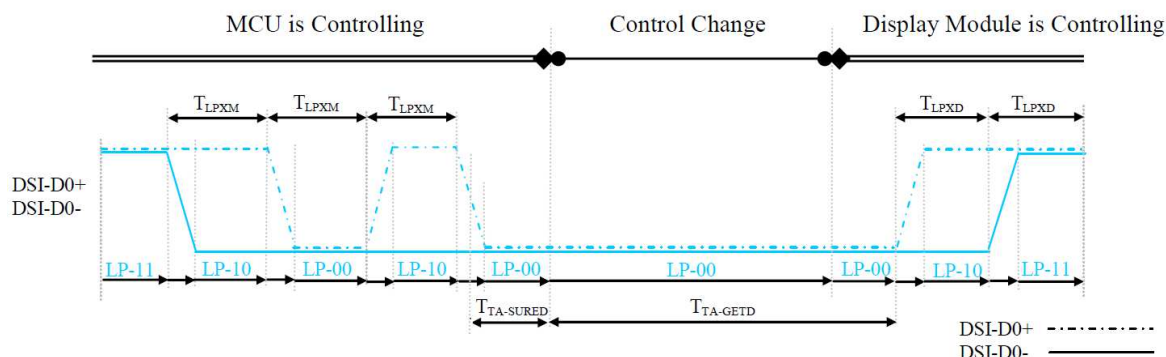
**Table 50: Rising and Falling Timings on Clock and Data Channels**

| Parameter                           | Symbol        | Condition              | Specification |     |                 | Unit |
|-------------------------------------|---------------|------------------------|---------------|-----|-----------------|------|
|                                     |               |                        | Min           | Typ | Max             |      |
| Differential Rising Time for Clock  | $t_{DRTCLK}$  | DSI-CLK+/-             | -             | -   | 150<br>(Note 1) | ps   |
| Differential Rising Time for Data   | $t_{DRTDATA}$ | DSI-Dn+/-<br>n=0 and 1 | -             | -   | 150<br>(Note 1) | ps   |
| Differential Falling Time for Clock | $t_{DFTCLK}$  | DSI-CLK+/-             | -             | -   | 150<br>(Note 1) | ps   |
| Differential Falling Time for Data  | $t_{DFTDATA}$ | DSI-Dn+/-<br>n=0 and 1 | -             | -   | 150<br>(Note 1) | ps   |

Note: The display module has to meet timing requirements, what are defined for the transmitter (MPU) on MIPI D-Phy standard.

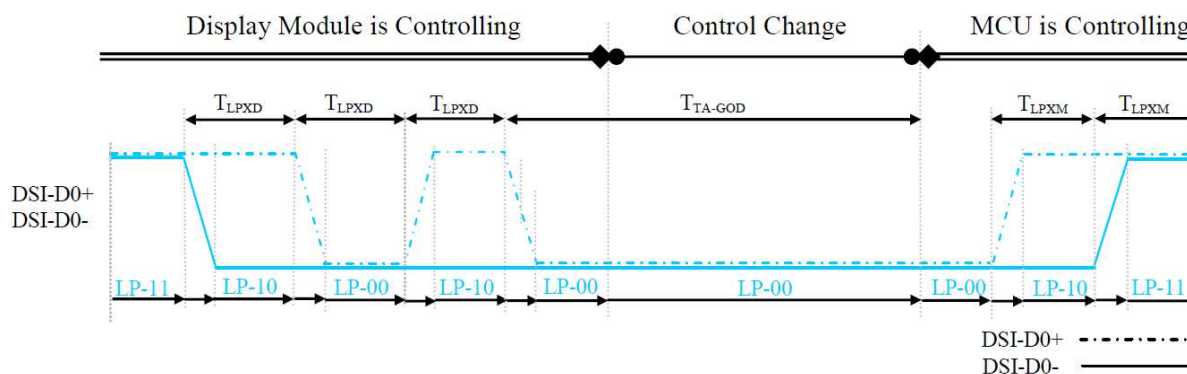
## Low Speed Mode – Bus Turn Around

Lower Power Mode and its State Periods on the Bus Turnaround (BTA) from the MPU to the Display Module (ILI9806H) sequence are illustrated below for reference purposes.



**Figure 177: BTA from the MPU to the Display Module**

Lower Power Mode and its State Periods on the Bus Turnaround (BTA) from the Display Module (ILI9806H) to the MPU sequence are illustrated below for reference purposes.



**Figure 178: BTA from the Display Module to the MPU**

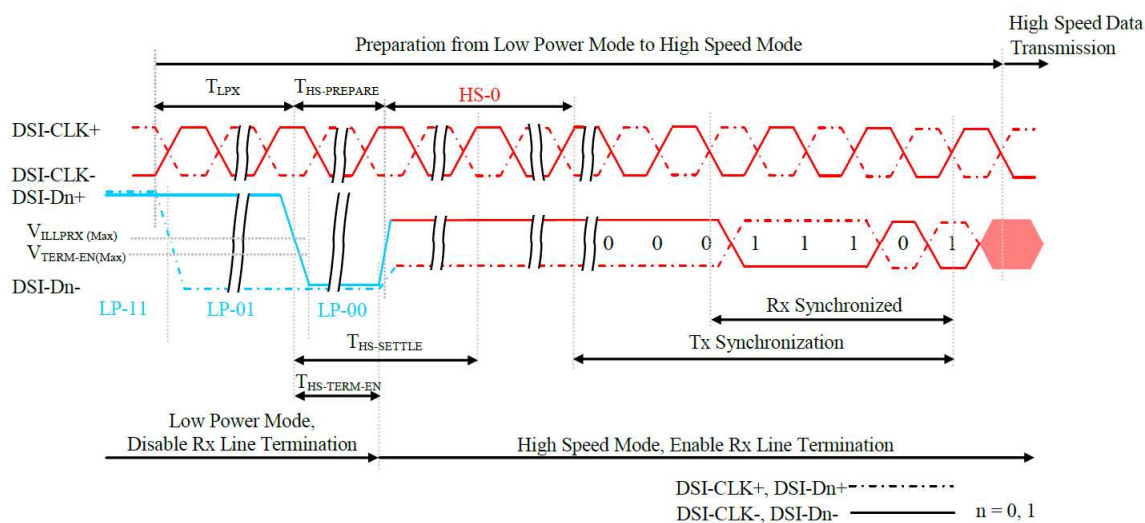
**Table 51: Low Power State Period Timings – A**

| Signal    | Symbol         | Description                                                                       | Min        | Max                 | Unit |
|-----------|----------------|-----------------------------------------------------------------------------------|------------|---------------------|------|
| DSI-D0+/- | $T_{LPXM}$     | Length of LP-00, LP-01, LP-10 or LP-11 periods<br>MPU → Display Module (ILI9806H) | 50         | 75                  | ns   |
| DSI-D0+/- | $T_{LPXD}$     | Length of LP-00, LP-01, LP-10 or LP-11 periods<br>Display Module (ILI9806H) → MPU | 50         | 75                  | ns   |
| DSI-D0+/- | $T_{TA-SURED}$ | Time-out before the Display Module (ILI9806H) starts driving                      | $T_{LPXD}$ | $2 \times T_{LPXD}$ | ns   |

**Table 52: Low Power State Period Timings – B**

| Signal    | Symbol        | Description                                        | Time                | Unit |
|-----------|---------------|----------------------------------------------------|---------------------|------|
| DSI-D0+/- | $T_{TA-GETD}$ | Time to drive LP-00 by Display Module (ILI9806H)   | $5 \times T_{LPXD}$ | ns   |
| DSI-D0+/- | $T_{TA-GOD}$  | Time to drive LP-00 after turnaround request - MPU | $4 \times T_{LPXD}$ | ns   |

## Data Lanes from Low Power Mode to High Speed Mode

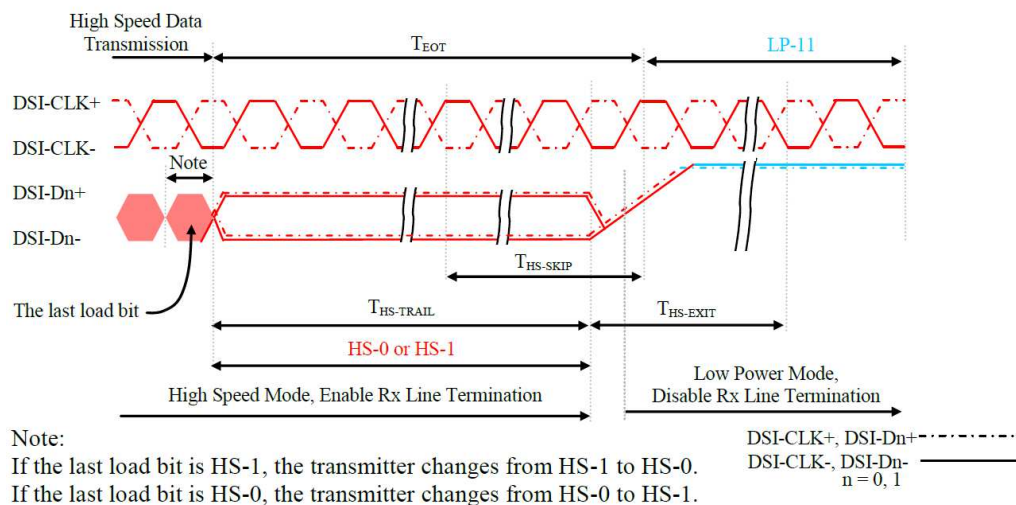


**Figure 179: Data Lanes - Low Power Mode to High Speed Mode Timings**

**Table 53: Data Lanes - Low Power Mode to High Speed Mode Timings**

| Signal              | Symbol                  | Description                                                                             | Min     | Max     | Unit |
|---------------------|-------------------------|-----------------------------------------------------------------------------------------|---------|---------|------|
| DSI-Dn+/-, n=0 or 1 | T <sub>LPX</sub>        | Length of any Low Power State Period                                                    | 50      | -       | ns   |
| DSI-Dn+/-, n=0 or 1 | T <sub>HS-PREPARE</sub> | Time to drive LP-00 to prepare for HS Transmission                                      | 40+4xUI | 85+6xUI | ns   |
| DSI-Dn+/-, n=0 or 1 | T <sub>HS-TERM-EN</sub> | Time to enable Data Lane Receiver line termination measured from when Dn crosses VILMAX | -       | 35+4xUI | ns   |

## Data Lanes from High Speed Mode to Low Power Mode

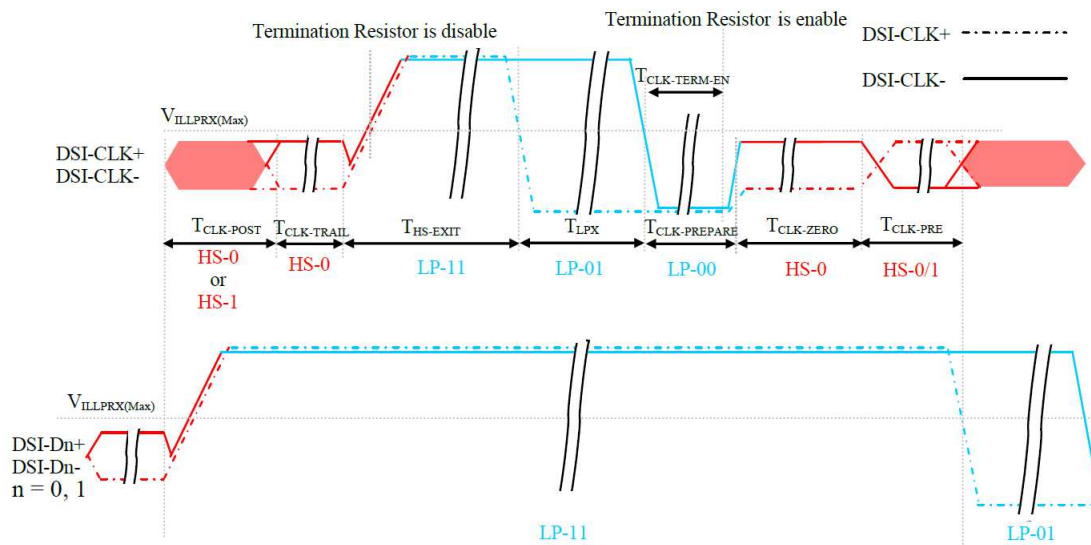


**Figure 180: Data Lanes - High Speed Mode to Low Power Mode Timings**

**Table 54: Data Lanes - High Speed Mode to Low Power Mode Timings**

| Signal              | Symbol        | Description                                                              | Min | Max              | Unit |
|---------------------|---------------|--------------------------------------------------------------------------|-----|------------------|------|
| DSI-Dn+/-, n=0 or 1 | $T_{HS-SKIP}$ | Time-Out at Display Module (ILI9806H) to ignore transition period of EoT | 40  | $55+4 \times UI$ | ns   |
| DSI-Dn+/-, n=0 or 1 | $T_{HS-EXIT}$ | Time to driver LP-11 after HS burst                                      | 100 | -                | ns   |

## DSI Clock Burst – High Speed Mode to/from Low Power Mode



**Figure 181: Clock Lanes - High Speed Mode to/from Low Power Mode Timings**

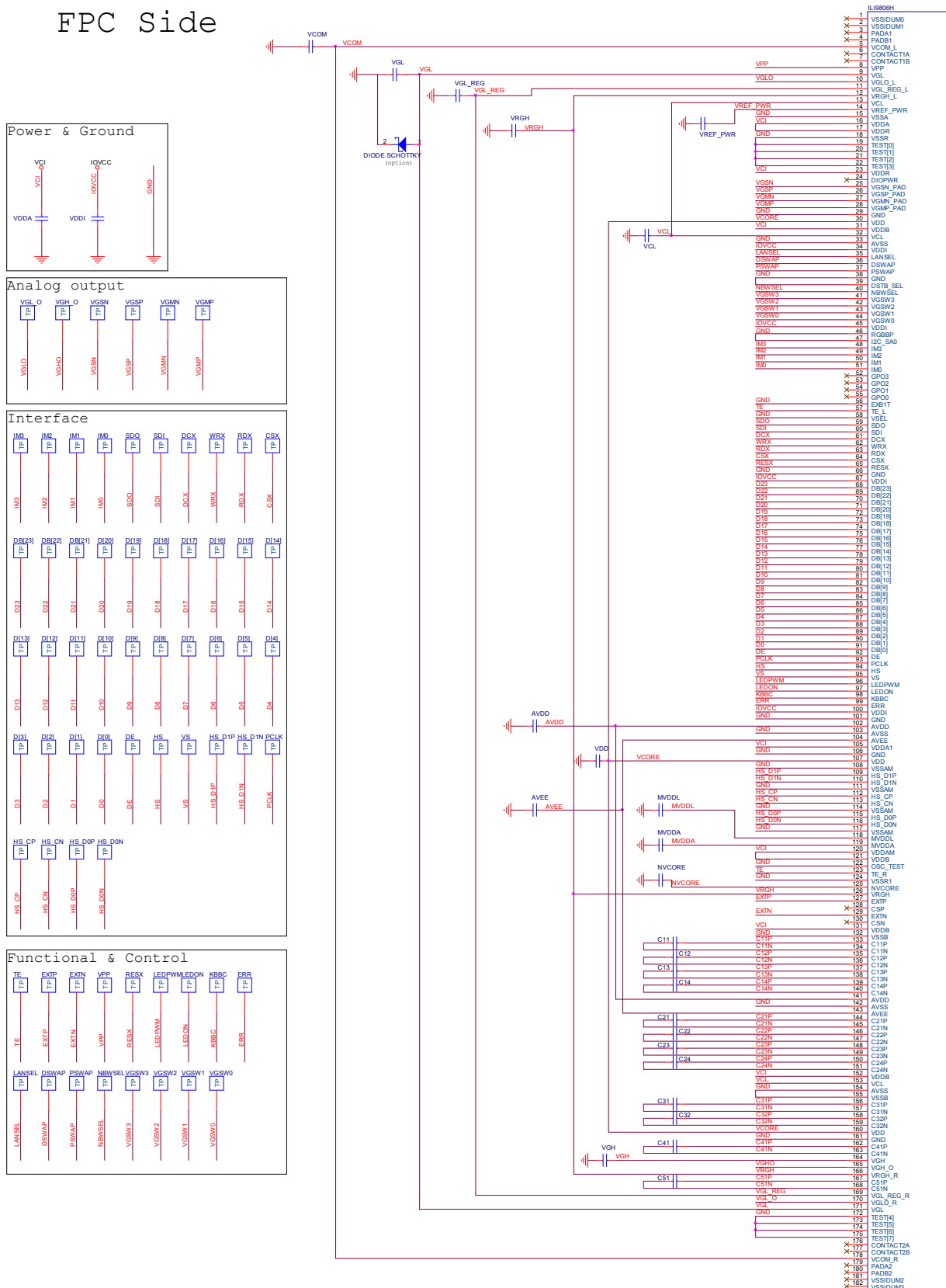
**Table 55: Clock Lanes - High Speed Mode to/from Low Power Mode Timings**

| Signal     | Symbol                   | Description                                                                                                          | Min      | Max | Unit |
|------------|--------------------------|----------------------------------------------------------------------------------------------------------------------|----------|-----|------|
| DSI-CLK+/- | T <sub>CLK-POST</sub>    | Time that the MPU shall continue sending HS clock after the last associated Data Lanes has transitioned to LP mode   | 60+52xUI | -   | ns   |
| DSI-CLK+/- | T <sub>CLK-TRAIL</sub>   | Time to drive HS differential state after last payload clock bit of a HS transmission burst                          | 60       | -   | ns   |
| DSI-CLK+/- | T <sub>HS-EXIT</sub>     | Time to drive LP-11 after HS burst                                                                                   | 100      | -   | ns   |
| DSI-CLK+/- | T <sub>CLK-PREPARE</sub> | Time to drive LP-00 to prepare for HS transmission                                                                   | 38       | 95  | ns   |
| DSI-CLK+/- | T <sub>CLK-TERM-EN</sub> | Time-out at Clock Lane to enable HS termination                                                                      | -        | 38  | ns   |
| DSI-CLK+/- | T <sub>CLK-PREPARE</sub> | Minimum lead HS-0 drive period before starting Clock                                                                 | 300      | -   | ns   |
| DSI-CLK+/- | T <sub>CLK-PRE</sub>     | Time that the HS clock shall be driven prior to any associated Data Lane beginning the transition from LP to HS mode | 8xUI     | -   | ns   |

## 16. Application Circuit

### 16.1. Reference Circuit

FPC Side



### Figure 182: Reference Circuit

*The information contained herein is the exclusive property of ILI Technology Corp. and shall not be distributed, reproduced, or disclosed in whole or in part without prior written permission of ILI Technology Corp.*

## 16.2. External Component

Table 56 shows specifications of external elements connected to the power supply circuit of the ILI9806H.

**Table 56: External Component Table**

| Pad Name                | Connection              | Typical Value                                 |
|-------------------------|-------------------------|-----------------------------------------------|
| VDDI                    | Stable Capacitor to GND | 1.0 $\mu$ F (Max 4.0V)                        |
| VDDA, VDDR, Vddb, VDDAM | Stable Capacitor to GND | 1.0 $\mu$ F (Max 6.3V)                        |
| VDD                     | Stable Capacitor to GND | 2.2 $\mu$ F (Max 4.0V)                        |
| NVCORE                  | Stable Capacitor to GND | 1.0 $\mu$ F (Max 4.0V)                        |
| MVDDA                   | Stable Capacitor to GND | 1.0 $\mu$ F (Max 4.0V)                        |
| MVDDL                   | Stable Capacitor to GND | 1.0 $\mu$ F (Max 4.0V)                        |
| C11P, C11N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C12P, C12N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C13P, C13N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C14P, C14N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C21P, C21N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C22P, C22N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C23P, C23N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C24P, C24N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C31P, C31N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C32P, C32N              | Flying Capacitor        | 1.0 $\mu$ F (Max 6.3V)                        |
| C41P, C41N              | Flying Capacitor        | 1.0 $\mu$ F (Max 16V)                         |
| C51P, C51N              | Flying Capacitor        | 1.0 $\mu$ F (Max 16V)                         |
| AVDD                    | Stable Capacitor to GND | 2.2 $\mu$ F (Max 10V)                         |
| AVEE                    | Stable Capacitor to GND | 2.2 $\mu$ F (Max 10V)                         |
| VCL                     | Stable Capacitor to GND | 2.2 $\mu$ F (Max 6.3V)                        |
| VGH                     | Stable Capacitor to GND | 1.0 $\mu$ F (Max 25V)                         |
| VGL                     | Stable Capacitor to GND | 1.0 $\mu$ F (Max 20V)                         |
|                         | Schottky Diode to GND   | $V_F < 0.4V @ 100mA$ , $V_R > 30V$ (optional) |
| VGL_REG                 | Stable Capacitor to GND | 1.0 $\mu$ F (Max 20V)                         |
| VRGH                    | Stable Capacitor to GND | 1.0 $\mu$ F (Max 20V)                         |
| VCOM                    | Stable Capacitor to GND | 2.2 $\mu$ F (Max 6.3V)                        |
| VREF_PWR                | Stable Capacitor to GND | 1.0 $\mu$ F (Max 4.0V)                        |

## 17. Revision History

[illegible]