Crystalfontz

OLED DISPLAY MODULE DATASHEET

Datasheet Release Date 2025-02-06
for
CFAL64128B0-0096WC-E1

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1. General Information

Datasheet Revision History
Datasheet Release: 2025-02-06 Datasheet for the CFAL64128B0-0096WC-E1 OLED graphic display module.

Product Change Notifications
You can check for or subscribe to Part Change Notices for this display module on our website.

Variations
Slight variations between lots are normal (e.g., contrast, color, or intensity).

Volatility
This display module has volatile memory.

Disclaimer
Certain applications using Crystalfontz America, Inc. products may involve potential risks of death, personal injury, or severe property or environmental damage (“Critical Applications”). CRYSTALFONTZ AMERICA, INC. PRODUCTS ARE NOT DESIGNED, INTENDED, AUTHORIZED, OR WARRANTED TO BE SUITABLE FOR USE IN LIFE-SUPPORT APPLICATIONS, DEVICES OR SYSTEMS OR OTHER CRITICAL APPLICATIONS. Inclusion of Crystalfontz America, Inc. products in such applications is understood to be fully at the risk of the customer. In order to minimize risks associated with customer applications, adequate design and operating safeguards should be provided by the customer to minimize inherent or procedural hazard. Please contact us if you have any questions concerning potential risk applications. Crystalfontz America, Inc. assumes no liability for applications assistance, customer product design, software performance, or infringements of patents or services described herein. Nor does Crystalfontz America, Inc. warrant or represent that any license, either express or implied, is granted under any patent right, copyright, or other intellectual property right of Crystalfontz America, Inc. covering or relating to any combination, machine, or process in which our products or services might be or are used. All specifications in datasheets on our website are, to the best of our knowledge, accurate but not guaranteed. Corrections to specifications are made as any inaccuracies are discovered. Company and product names mentioned in this publication are trademarks or registered trademarks of their respective owners. Copyright © 2025 by Crystalfontz America, Inc.,12412 East Saltese Avenue, Spokane Valley, WA 99216 U.S.A.

2. Module Description

This is a white monochrome OLED display module that supports 4-key touch plus up and down swipe detection mounted on a PCB breakout board. This display module includes in-cell capacitive touch detection. This display has a built in Solomon Systech SSD7317 controller. Please see the Solomon Systech SSD7317 LCD Controller Datasheet for further reference.

Additional resources including 3D models, the most up-to-date datasheet, and sample code can be found on the product page for this part: https://crystalfontz.com/product/CFAL64128B0-0096WC-E1

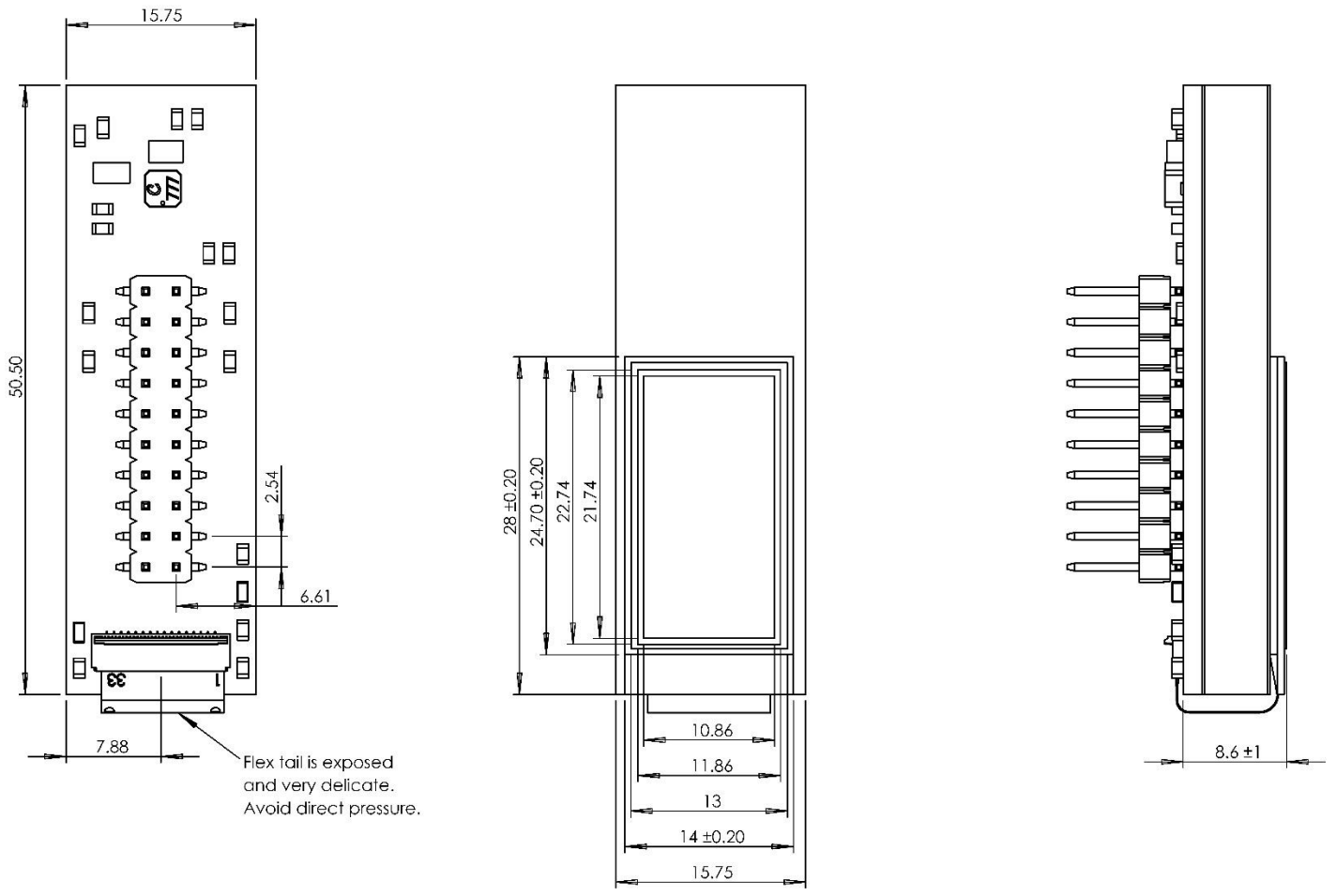
3. Features

- 64*128 Dot Matrix
- Mounted on PCB with 20-pin tenth inch header
- 5mm spacer included between PCB and display to protect from noise
- Built-in Controller: SSD7317 (or equivalent)
- +3V Power Supply (Panel voltage boosted on board)
- 1/32 Duty
- 4 key touch, plus 2 out-cell
- Interface: SPI, I2C

4. Mechanical Data

Item	Specification (mm)	Specification (inch, reference)
Module Size	15.75 (W) x 50.5 (H) x 8.6 (D)	0.62 (W) x 1.99 (H) x 0.34 (D)
Active Area	10.86 (W) x 21.74 (H)	0.43 (W) x 0.86 (H)
Pixel Size	0.15 (W) x 0.15 (H)	0.006 (W) x 0.006 (H)
Pixel Pitch	0.17 (W) x 0.17 (H)	0.007 (W) x 0.007 (H)
Weight (Typical)	9.8 grams	0.35 ounces

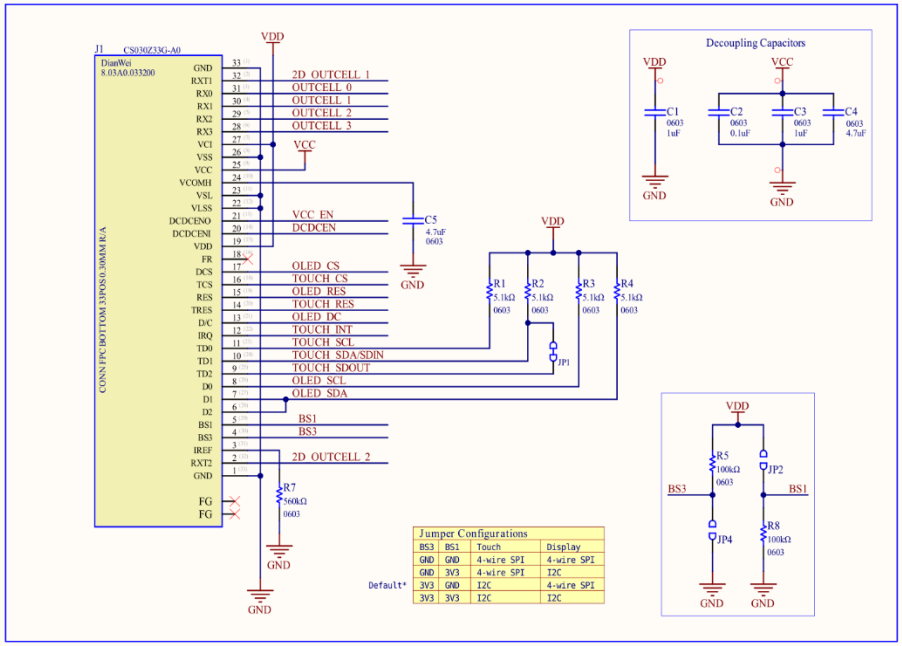
5. Mechanical Drawing

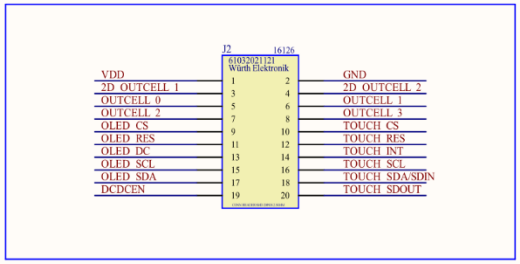


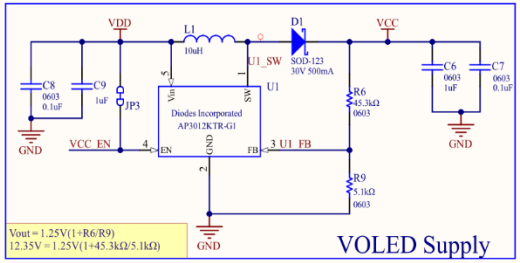
Units: millimeters
Tolerance: ±0.3

Crystalfontz	Part Number:	Date:	Filename:	Revision:
© 2025 Crystalfontz America, Inc.	CFAL64128B0-0096WC-E1	2025-02-05	CFAL64128B0-0096WC-E1 mm.pdf	v1.1
		Web: www.crystalfontz.com/product/CFAL64128B0-0096WC-E1		Sheet: 1 of 1

6. Schematic







Crystalfontz America, Inc.

CFA-10111: OLED In-Cell Adapter Board

Page 1 / 1 : Full Schematic

PCB NUMBER: CFA10111 | PCB REVISION: h0v1 | Size: B

File: cfa_10111.SchDoc

7. Headers

7.1. J1 – 33-pin ZIF connector

This connector comes pre-connected to the ZIF tail of the OLED display.

7.2. J2 0.1” (2.54mm) header

T_SDO – Touch Data Out In **SPI mode** this pin is serial data out. In **I2C mode** tie this pin, T_SDO, together with T_SDA to serve as SDA by closing JP1 (jumper ships closed). Internal 5.1kΩ pull-up resistors are included.	**DCDCENI** Enable input pin for external DCDC circuit. Tie low if not used.
T_SDA – Touch Data In **SPI mode** this pin is serial data in. In **I2C mode** tie this pin, T_SDA, together with T_SDO to serve as SDA by closing JP1 (jumper ships closed). Internal 5.1kΩ pull-up resistors are included.	**D_SDA – Display Data** In **SPI mode** this pin is serial data in. In **I2C mode** this pin is SDA. Internal 5.1kΩ pull-up resistors are included.
T_SCK – Clock This pin serves as the serial clock for touch communication.	**D_SCL – Display Clock** This pin serves as the serial clock for display communication.
T_INT – Touch Interrupt This pin signals a touch has occurred.	**D_DC – Display Data/Command** In **SPI mode** when this pin is high, the data at SDI will be interpreted as data; when the pin is low, data will be interpreted as a command. In **I2C mode** this pin acts as SA0 for slave address selection.
T_RES - Touch power reset When the pin is low, the chip is initialized.	**D_RES – Display power reset** When the pin is low, the chip is initialized.
T_CS Touch chip select The chip is enabled for MCU communication when TCS# is pulled low	**D_CS – Display chip select** The chip is enabled for MCU communication when DCS# is pulled low
OUT3 Connect to external touch key for out-cell touch	**OUT2** Connect to external touch key for out-cell touch
OUT1 Connect to external touch key for out-cell touch	**OUT0** Connect to external touch key for out-cell touch
2OUT1 2D Out-cell 1	**2OUT1** 2D Out-cell 2
GND Ground pin. Connect to an external source.	**VDD** Power supply for Logic. Connect to external source.

8. Jumpers

8.1. JP1 – Tie T_SDA and T_SDO together

This jumper ships closed by default. Open this jumper to use the display touch with SPI communication.

8.2. JP2 – Controls BS1 (OLED interface)

When JP2 is open (as shipped), BS1 is pulled low for 4-wire SPI interface mode for the OLED display.

When JP2 is closed, BS1 is pulled high for I2C interface mode for the OLED display.

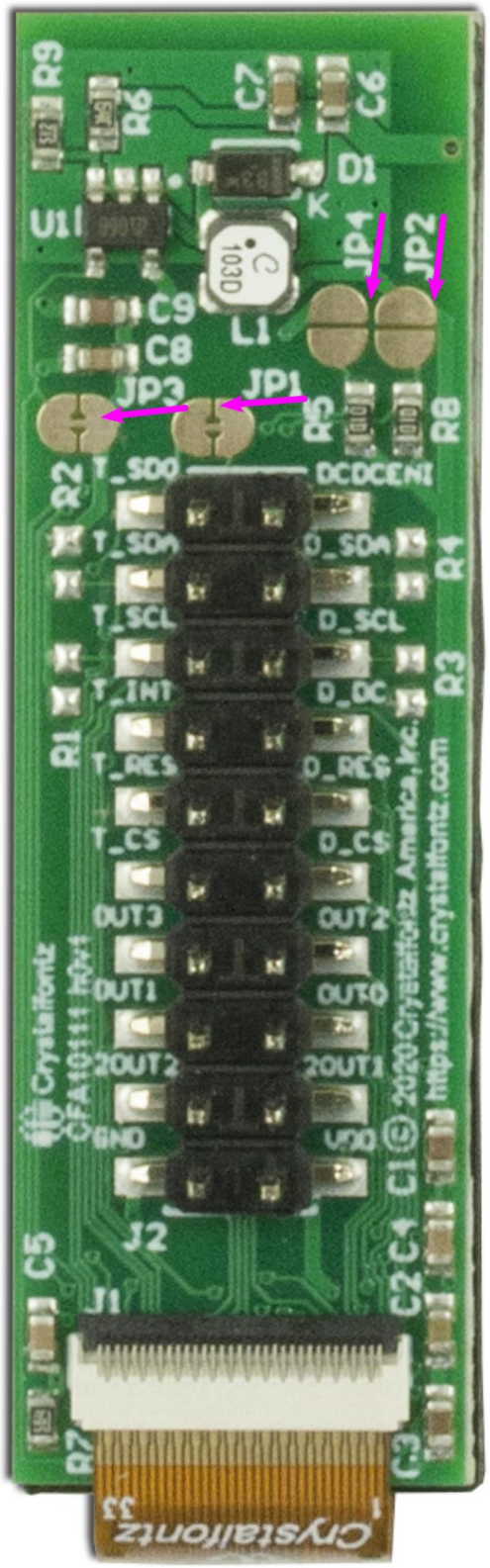
8.3. JP3 – VCC Enable

JP3 ships closed and enables the VOLED Supply voltage booster for the panel voltage (boosts to ~12v).

8.4. JP4 – Controls BS3 (Touch interface)

When JP4 is open (as shipped), BS3 is pulled high for I2C interface mode for the touch communication.

When JP4 is closed, BS3 is pulled low and the touch communication is set up for SPI.



9. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage for Logic	V_{DD}	-0.3	4.0	V
Operating Temperature	T_{OP}	-40	+70	°C
Storage Temperature	T_{STG}	-40	+85	°C
Lifetime (250 cd/m^2)		5,000		hours

Note: These are stress ratings only. Extended exposure to the absolute maximum ratings listed above may affect device reliability or cause permanent damage. Functional operation should be restricted to the limits in the Electrical Characteristics table.

10. Optical Characteristics

Item	Symbol	Min	Typ	Max	Unit
Brightness	L_{br}	200	250	-	Cd/m^2
C.I.E. 1931 (White)	(x) (y)	0.25 0.27	0.29 0.31	0.33 0.35	
Dark Room Contrast	CR		>10,000:1		
Viewing Angle			Free		

11. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage	V_{DD}		3.0	3.3	3.5	V
High-level Input	V_{IH}		0.8*V_{DD}	-	V_{DD}	V
Low-level Input	V_{IL}		0	-	0.2*V_{DD}	V
High-level Output	V_{OH}	I_{OUT}=100µA, 3.3MHz	0.8*V_{DD}	-	V_{DD}	V
Low-level Output	V_{OL}	I_{OUT}=100µA, 3.3MHz	0	-	0.2*V_{DD}	V
Operating Current for V_{CC}	I_{CC}	30% display on	-	9.0	11.3	mA
		50% display on	-	14.5	18.1	mA
		100% display on	-	27.7	34.6	mA
Sleep Mode Current for V_{CI}+V_{DD}	$I_{CIDD,sleep}$		-	35	55	µA
Sleep Mode Current for V_{CC}	$I_{CC,sleep}$		-	2	10	µA

12. Touch Implementation Notes

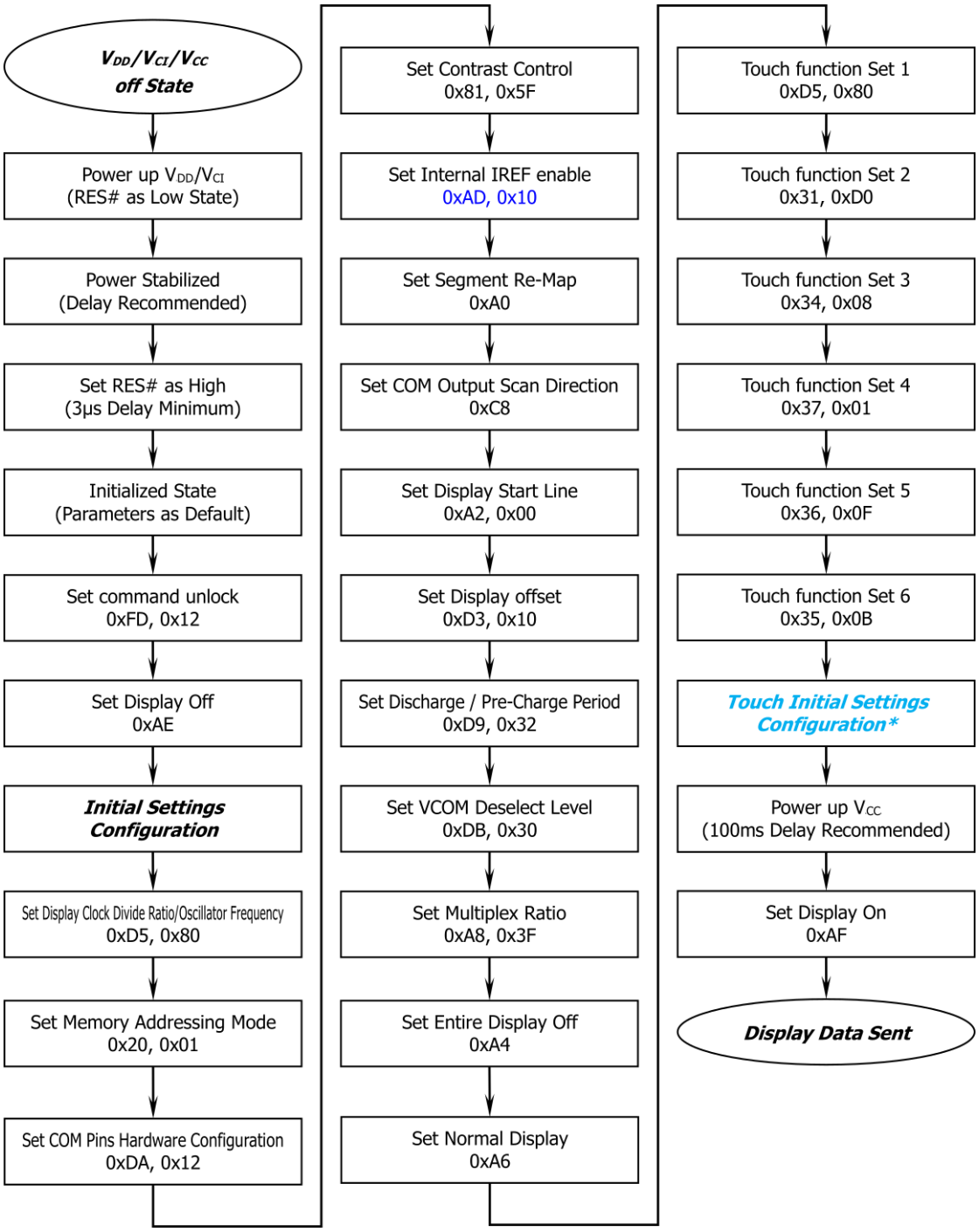
The in-cell touch sensing is extremely sensitive to noise including even the slightest movement of the panel or materials within 3mm of the panel in any direction. As such, this module includes a 5mm spacer between the display and the PCB. However, the panel is still susceptible to noise from the sides of the panel.

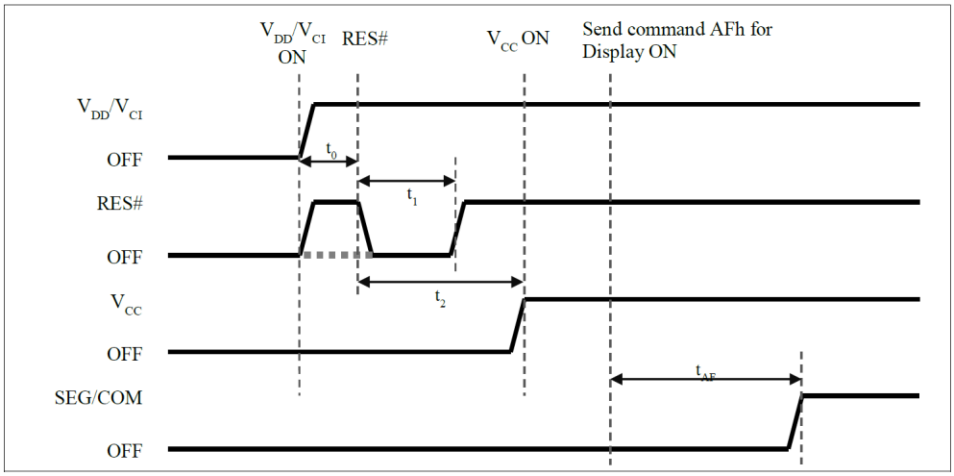
The OLED panel must be firmly fixed in place relative to any conductive items before the touch controller is initialized. Any movement of the panel in relation to these conductive items, even a fraction of a millimeter, can interfere with touch sensing and require the touch controller be reinitialized.

If the out-cell inputs are not being used, disable them following the touch controller initialization to prevent false touch reports. More information is available in the SSD7317 controller datasheet appendices and shown in the demo code available on Crystalfontz's Github. The demo code also includes examples on touch sensing feature enabling, touch sensitivity configuration, low power modes and more.

13. Power ON and OFF Sequences

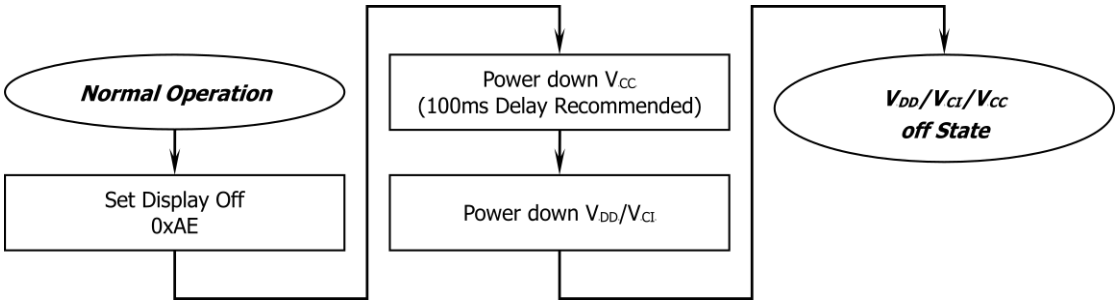
13.1. Power ON

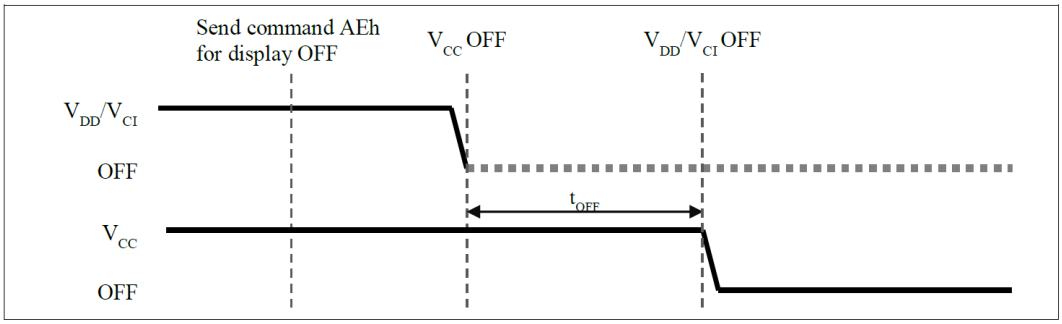




Note: Register values are reset after t_1.

13.2. Power OFF

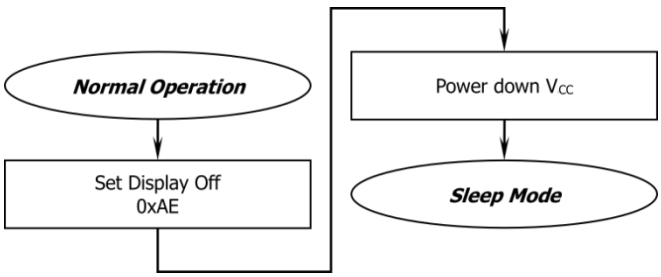




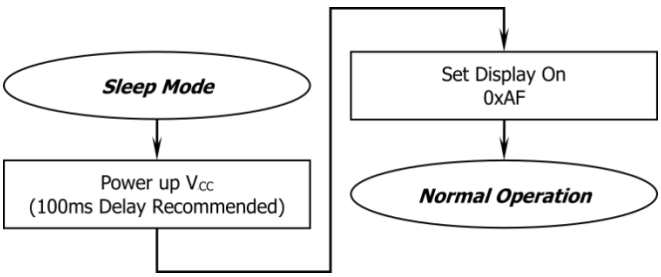
Note: V_{CC} should be floated when OFF.

13.3. Low Power Mode

Enter



Exit



14. OLED Module Precautions

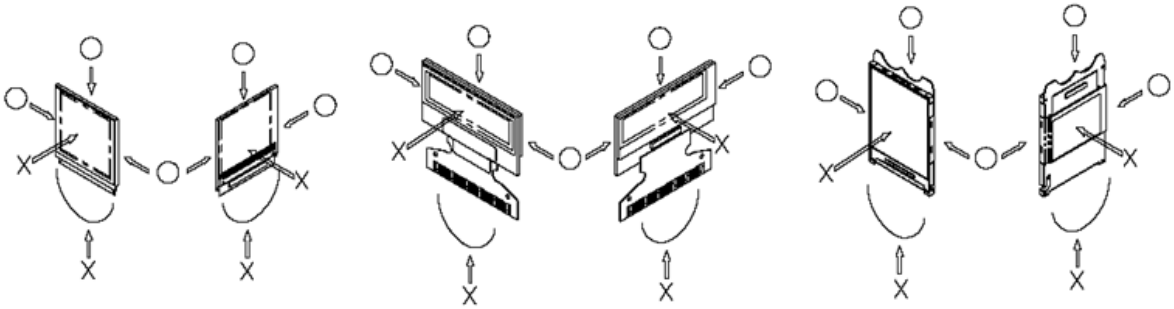
These precautions help ensure personal safety, module performance, and compliance of environmental regulations when using an LCD module.

14.1. Modules

- Avoid excessive physical and electrical shocks to module.
- Do not drop, bend, or twist the LCD display module.
- Do not make extra holes, modify the shape, or change the components of the printed circuit board.
- Do not disassemble the LCD display module.
- Do not operate the LCD display module outside the absolute maximum rating.
- Only solder to the I/O terminals.
- Store in an anti-static electricity container and clean environment.
- Do not display static information for long periods of time to avoid burn in.
- Crystalfontz has the right to change passive components on the display module. Resistors, capacitors and other passive components may have different appearance and color.
- Crystalfontz has the right to change the PCB revision/version in order to satisfy the supply stability, management optimization, the best product performance, etc., under the premise of not affecting the electrical characteristics and external dimensions.

14.2. Handling Precautions

- The display panel is made of glass. Do not apply mechanical impacts, stress or pressure to the LCD display module.
- Pressure applied to or near the display surface may damage the cell structure.
- If the display panel is accidently broken and the internal organic substance leaks out, do not inhale or touch the organic substance.
- The polarizer covering the surface of the LCD display module is soft and can be easily scratched. Cover the polarizer in the final design.
- Clean the surface of the polarizer using Scotch Mending Tape No. 810 or an equivalent
  - Never breathe on the surface or wipe the surface using a cloth containing solvent such as ethyl alcohol, as the surface of the polarizer will become cloudy.
  - Water, ketone, and aromatic solvents may ruin the polarizer.
- Do not over bend the film with electrode pattern layouts. This can effect the display performance.



- Do not apply stress to the LSI chips and the surrounding molded sections.
- Do not apply input signals while the logic power is off.
- Prevent damage by electrostatic discharge (ESD) when handling the LCD display module:
  - Ground personnel handling LCD display modules.
  - Ground tools used for assembly such as soldering irons.
  - To suppress generation of ESD, avoid carrying out assembly work under dry environments.
  - Remove the protective film applied to the display panel slowly as ESD may be generated when removing the film.
- Protective film is applied to the surface of the display panel. Remove the film before assembly. If the LCD display module has been stored for a long period of time, residue adhesive material of the protection film may remain on the surface of the display panel after the film has been removed. In such a case, remove the residue material as discussed above.

14.3. Storing Precautions

- Store the LCD display modules in ESD preventative bags. Avoid exposure to direct sunlight and fluorescent lamps. Avoid high temperature and high humidity environments and low temperature (less

than 0°C) environments. We recommend storing these modules in the packaged state in which they were shipped from Crystalfontz.

- Do not let water drops or dew adhere to the packages or bags.
- If electric current is applied when water is on the surface of the LCD display module, the module may become dewed. If a dewed LCD display module is placed under high humidity environments the electrodes may become corroded.

14.4. Designing Precautions

- The absolute maximum ratings cannot be exceeded for LCD display module. If these values are exceeded, panel damage may happen.
- Satisfy the VIL and VIH specifications and, ensure the signal line cable is as short as possible to avoid signal noise.
- Install excess current preventative unit (fuses, etc.) to the power circuit. Recommend value: 0.5A
- Avoid occurrence of mutual noise interference with the neighboring devices.
- When fastening the LCD display module, fasten the external plastic housing section.
  If the power supply to the LCD display module is forcibly shut down, by such errors as taking out the main battery while the LCD display panel is in operation, we cannot guarantee the quality of this LCD display module.
- Connection (contact) to any other potential than the above may lead to rupture of the IC.

14.5. Disposing Precautions

- Request qualified companies handle the industrial waste when disposing of the LCD display modules. Observe all relevant laws and regulations.

14.6. Other Precautions

- When an LCD display module is operated for a long period of time with a fixed pattern, the fixed pattern may remain as an after image or a slight contrast deviation may occur.
  - If the operation is interrupted and left unused for a while, normal state can be restored.
  - This will not cause a problem in the reliability of the module.
- To protect the LCD display module from performance drops by static electricity rapture, etc., do not touch the following sections whenever possible while handling the LCD display modules.
  - Pins and electrodes
  - Pattern layouts such as the TCP & FPC
- With this LCD display module, the LCD driver is exposed. If this LCD driver is exposed to light, malfunctioning may occur. Design the product and installation method so that the LCD driver may be shielded from light in actual usage and during the inspection processes.
- Although this LCD display module stores the operation state data by the commands and the indication data, when excessive external noise, etc. enters into the module, the internal status may be changed. Therefore, it is necessary to take appropriate measures to suppress noise generation or to protect from influences of noise on the system design.
- Periodically refresh the operation statuses in the software (reset the commands and retransfer the display data), to cope with catastrophic noise.
- Resistors, capacitors, and other passive components will have different appearance and color caused by the different supplier.
- Crystalfontz has the right to upgrade and modify the product function.
- The limitation of FPC bending: