

Crystalfontz America, Inc.

CUSTOMER : _____

MODULE NO.: **CFAX12864CP1-WGH**

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
ISSUED DATE:			

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1.Module Classification Information

CFA X 1 2 8 6 4 CP1 - WGH

① ② ③ ④⑧ ⑤⑥⑦

①	Brand : CRYSTALFONTZ AMERICA, INCORPORATED													
②	Display Type : H→Character Type, G→Graphic Type, X→TAB Type													
③	Display's logical dimensions: 128 pixels by 64 pixels													
④	Model serials no.: C													
⑤	Backlight Type :	<table border="0"> <tr> <td>N→Without backlight</td> <td>P→LED, Bule</td> </tr> <tr> <td>B→EL, Blue green</td> <td>A→LED, Amber</td> </tr> <tr> <td>D→EL, Green</td> <td>R→LED, Red</td> </tr> <tr> <td>W→EL, White</td> <td>O→LED, Orange</td> </tr> <tr> <td>F→CCFL, White</td> <td>G→LED, Green</td> </tr> <tr> <td>Y→LED, Yellow Green</td> <td>T→LED, White</td> </tr> </table>	N→Without backlight	P→LED, Bule	B→EL, Blue green	A→LED, Amber	D→EL, Green	R→LED, Red	W→EL, White	O→LED, Orange	F→CCFL, White	G→LED, Green	Y→LED, Yellow Green	T→LED, White
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⑥	LCD Mode :	<table border="0"> <tr> <td>B→TN Positive, Gray</td> <td>T→FSTN Negative</td> </tr> <tr> <td>N→TN Negative,</td> <td></td> </tr> <tr> <td>G→STN Positive, Gray</td> <td></td> </tr> <tr> <td>Y→STN Positive, Yellow Green</td> <td></td> </tr> <tr> <td>M→STN Negative, Blue</td> <td></td> </tr> <tr> <td>F→FSTN Positive</td> <td></td> </tr> </table>	B→TN Positive, Gray	T→FSTN Negative	N→TN Negative,		G→STN Positive, Gray		Y→STN Positive, Yellow Green		M→STN Negative, Blue		F→FSTN Positive	
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⑦	LCD Polarizer Type/ Temperature range/ View direction	<table border="0"> <tr> <td>A→Reflective, N.T, 6:00</td> <td>H→Transflective, W.T,6:00</td> </tr> <tr> <td>D→Reflective, N.T, 12:00</td> <td>K→Transflective, W.T,12:00</td> </tr> <tr> <td>G→Reflective, W. T, 6:00</td> <td>C→Transmissive, N.T,6:00</td> </tr> <tr> <td>J→Reflective, W. T, 12:00</td> <td>F→Transmissive, N.T,12:00</td> </tr> <tr> <td>B→Transflective, N.T,6:00</td> <td>I→Transmissive, W. T, 6:00</td> </tr> <tr> <td>E→Transflective, N.T,12:00</td> <td>L→Transmissive, W.T,12:00</td> </tr> </table>	A→Reflective, N.T, 6:00	H→Transflective, W.T,6:00	D→Reflective, N.T, 12:00	K→Transflective, W.T,12:00	G→Reflective, W. T, 6:00	C→Transmissive, N.T,6:00	J→Reflective, W. T, 12:00	F→Transmissive, N.T,12:00	B→Transflective, N.T,6:00	I→Transmissive, W. T, 6:00	E→Transflective, N.T,12:00	L→Transmissive, W.T,12:00
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⑧	Special Code	P1/P : "A" module with ZIF tail												

2.Precautions in use of LCD Modules

- (1) Avoid applying excessive shocks to the module or making any alterations or modifications to it.
- (2) Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.
- (3) Don't disassemble the LCM.
- (4) Don't operate it above the absolute maximum rating.
- (5) Don't drop, bend or twist LCM.
- (6) Soldering: only to the I/O terminals.
- (7) Storage: please storage in anti-static electricity container and clean environment.

3.General Specification

Item	Dimension	Unit
Number of Characters	128 x 64	-
Module dimension	83.9 x 56.0 x 1.9(MAX)	mm
View area	52.0x 33.5	mm
Active area	47.34x 26.86	mm
Dot size	0.35 x 0.4	mm
Dot pitch	0.37 x 0.42	mm
LCD type	STN Positive, Transflective, Gray	
Duty	1/64	
View direction	6 o'clock	
Backlight Type	EL White	

4. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-20	-	+70	°C
Storage Temperature	T_{ST}	-30	-	+80	°C
Input Voltage	V_I	V_{SS}	-	V_{DD}	V
Supply Voltage For Logic	$V_{DD}-V_{SS}$	2.4	-	3.6	V
Supply Voltage For LCD	V_O-V_{SS}	4.0	-	15.0	V

5. Electrical Characteristics

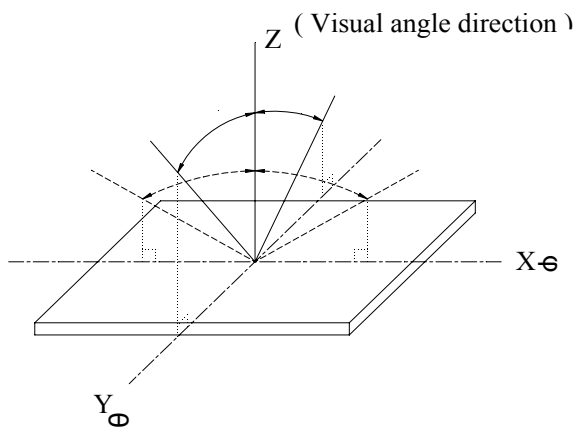
Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	$V_{DD}-V_{SS}$	-	2.4	-	3.6	V
Supply Voltage For LCD	$V_{DD}-V_0$	$T_a=-20^{\circ}\text{C}$	-	-	9.2	V
		$T_a=25^{\circ}\text{C}$	-	8.2	-	V
		$T_a=+70^{\circ}\text{C}$	7.2	-	-	V
Input High Volt.	V_{IH}	-	$0.8 V_{DD}$	-	V_{DD}	V
Input Low Volt.	V_{IL}	-	-	-	$0.2V_{DD}$	V
Output High Volt.	V_{OH}	-	$V_{DD}-0.4$	-	-	V
Output Low Volt.	V_{OL}	-	-	-	0.4	V
Supply Current	I_{DD}	$V_{DD}=3.6$	-	80	-	mA

6. Optical Characteristics

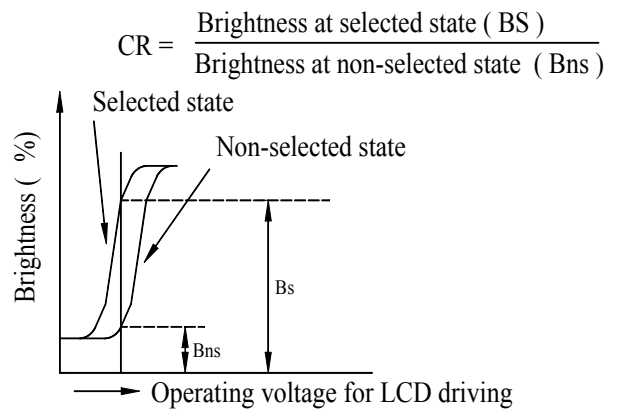
Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	(V) θ	$CR \geq 3$	15	-	105	deg
	(H) ϕ	$CR \geq 3$	-30	-	30	deg
Contrast Ratio	CR	-	-	3	-	-
Response Time	T rise	-	-	110	220	ms
	T fall	-	-	260	520	ms

6.1 Definitions

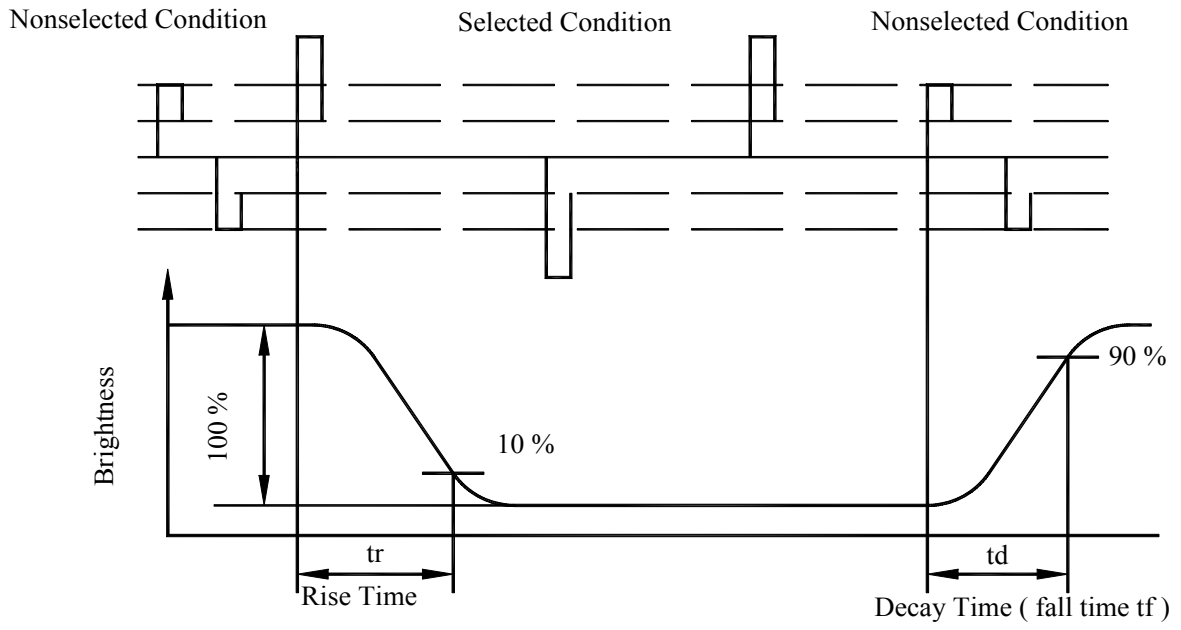
■ View Angles



■ Contrast Ratio



■ Response Time

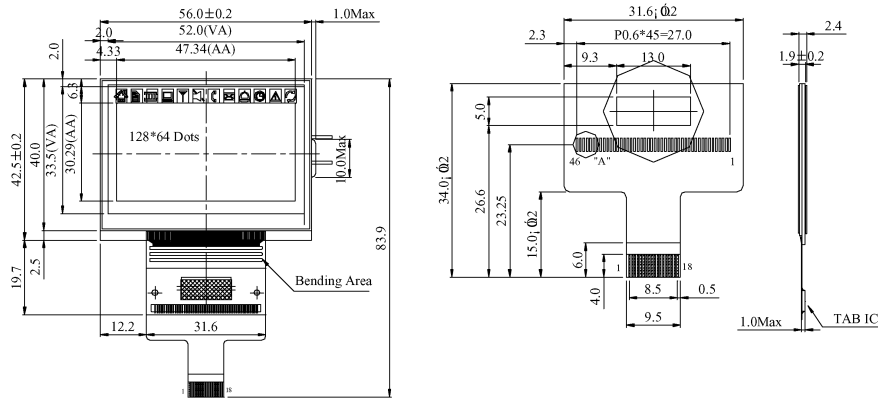


7. Interface Description

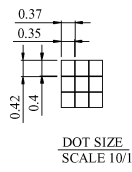
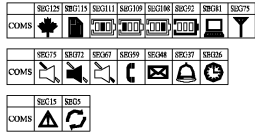
Pin No.	Symbol	I/O	Description
1	VDD	-	Power supply pin for logic.
2	VSS	-	Ground pin, connected to 0V
3	CS1B	I	Chip select input pins Data/instruction i/o is enabled only when CS1Bis”L”and CS2”H”. When chip select is non-active,DB0 TO DB7 may be high impedance.
4	CS2	I	Chip select input pins Data/instruction i/o is enabled only when CS1Bis”L”and CS2”H”. When chip select is non-active,DB0 TO DB7 may be high impedance.
5	RES	I	Reset input pin When RESETB is “L”, initialization is executed.
6	RS	I	Register select input pin -RS = “H”:DB0 to DB7 are display data -RS = “L” :DB0 to DB7 are control data
7	R/W	I	When connected to 80-family MPU: Write enable clock input pin. The data ON DB0~DB7 are latched at the rising edge of the /WR signal. When connected to 68-family MPU: RW = ”H”: read RW = “L”: write
8	E	I	When connected to 80-family MPU: Read enable clock input pin. When /RD is “L”, DB0~DB7 are in an output status When connected to 68-family MPU: RW = ”H”: When E is “H”, DB0~DB7 are in an output status RW = “L”: The data on DB0~DB7 are latched at the falling edge of the E signal

Pin No.	Symbol	I/O	Description												
9~16	DB0~DB7	I/O	<p>8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus.</p> <p>When the serial interface selected(PS="L")</p> <p>DB0~DB5: high impedance</p> <p>DB6: serial input clock (SCLK)</p> <p>DB7: serial input data (SID)</p> <p>When chip select is not active, DB0~DB7 may be high impedance.</p>												
17	MI	I	<p>Microprocessor interface selects pin.</p> <p>MI="H": 6800-series MPU interface</p> <p>MI="L": 8080-series MPU interface</p>												
18	PS	I	<p>Parallel/Serial data input select pin.</p> <table border="0" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 0 10px;">Interface</td> <td style="padding: 0 10px;">Data</td> <td style="padding: 0 10px;">Read/Write</td> <td style="padding: 0 10px;">Serial clock</td> </tr> <tr> <td>PS="H": Parallel</td> <td>DB0~DB7</td> <td>E_RD,RW_WR</td> <td>-</td> </tr> <tr> <td>PS="L": Serial</td> <td>SID(DB7)</td> <td>Write only</td> <td>SCLK(DB6)</td> </tr> </table> <p>In serial mode, it is impossible to read data from the on-chip RAM. And DB0 to DB5 are high impedance and E_RD and RW_WR must be fixed to either "H" or "L".</p>	Interface	Data	Read/Write	Serial clock	PS="H": Parallel	DB0~DB7	E_RD,RW_WR	-	PS="L": Serial	SID(DB7)	Write only	SCLK(DB6)
Interface	Data	Read/Write	Serial clock												
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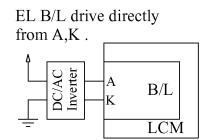
8. Contour Drawing & Block Diagram



PIN NO.	SYMBOL
1	VCC
2	GND
3	CS1B
4	CS2
5	RESET
6	RS
7	R/W
8	ERD
9	DB0
10	DB1
11	DB2
12	DB3
13	DB4
14	DB5
15	DB6
16	DB7
17	MI
18	P/S



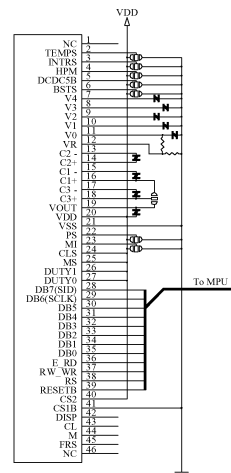
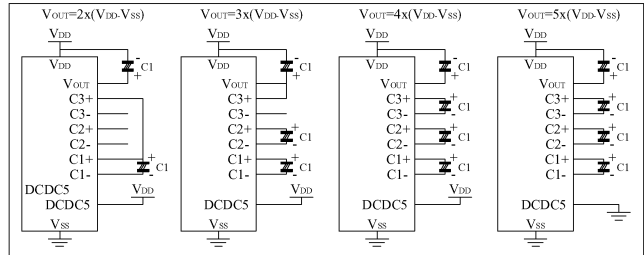
The non-specified tolerance of dimension is ± 0.15 mm .



Display Data RAM

Page Address	Data	RAM address	Line Address (HEX)	Com Output
0,0,0,0	DB0	[RAM Address Grid]	00	COM1
	DB1		01	COM2
	DB2		02	COM3
	DB3		03	COM4
	DB4		04	COM5
	DB5		05	COM6
	DB6		06	COM7
	DB7		07	COM8
?			?	?
0,1,1,1	DB0	[RAM Address Grid]	38	COM57
	DB1		39	COM58
	DB2		3A	COM59
	DB3		3B	COM60
	DB4		3C	COM61
	DB5		3D	COM62
	DB6		3E	COM63
	DB7		3F	COM64
0,1,1,1	DB0		40	COM65
Column Address	ADC=0	83 82 81 80 7F 7E 7D 7C 7B 7A	~	5 4 3 2 1 0
Address	ADC=1	0 1 2 3 4 5 6 7 8 9	7F 7E 7D 7C 7B 7A	8 7 6 5 4 3 2 1
Segment Output		132 131 130 129 128 127 126 125 124 123	~	6 5 4 3 2 1

Boosting Circuit



Application Circuit

9.Display Control Instruction

PLEASE CONSULT KS0713 DATA SHEET

10.Backlight Information

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Drive Voltage	Vmax	78	—	85	Vrms	25□C
Drive Wave	Fmax	400	—	1000	Hz	25□C
Brightness		65	-	-	cd/m ²	78~85Vrms/400~1000 Hz
Power Consumption		-	43.55	-	mW	78~85Vrms/400~1000 Hz
Chromatism	X	-	0.330	-	-	78~85Vrms/400~1000 Hz
	Y	-	0.365	-	-	78~85Vrms/400~1000 Hz
Life time		5000			hour	78~85Vrms/400~1000 Hz
Color		white			-	-