Crystalfontz America, Inc.

SPECIFICATION

CUSTOMER : _____

MODULE NO.: **CFAX12864CP1-TFH**

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
ISSUED DATE:			

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Contents

1.Module Classification Information

CFA X 1 2 8 6 4 C P1 T F H
① ② ③ ④ ⑤⑥⑦

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 Variant: C (P1 ZIF tail)		
⑤	Backlight Type	N→Without backlight B→EL, Blue green D→EL, Green W→EL, White F→CCFL, White Y→LED, Yellow Green	**T→LED, White** A→LED, Amber R→LED, Red O→LED, Orange G→LED, Green
⑥	LCD Mode	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**	
⑦	LCD Polarizer Type/ Temperature range/ View direction	A→Reflective, N.T, 6:00 D→Reflective, N.T, 12:00 G→Reflective, W. T, 6:00 J→Reflective, W. T, 12:00 B→Transflective, N.T,6:00 E→Transflective, N.T.12:00	**H→Transflective, W.T,6:00** K→Transflective, W.T,12:00 C→Transmissive, N.T,6:00 F→Transmissive, N.T,12:00 I→Transmissive, W. T, 6:00 L→Transmissive, W.T,12:00

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	58.2*83.9*5.5(MAX)	mm
View area	52.0*33.5	mm
Active area	47.34*26.86	mm
Dot size	0.35 *0.4	mm
Dot pitch	0.37 x 0.42	mm
LCD type	FSTN Positive, Transflective,	
Duty	1/64	
View direction	6 o'clock	
Backlight Type	LED white	

4.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-20	—	+70	℃
Storage Temperature	T_{ST}	-30	—	+80	℃
Input Voltage	V_I	V_{SS}	—	V_{DD}	V
Supply Voltage For Logic	V_{DD}-V_{SS}	2.4	—	3.0	V
Supply Voltage For LCD	V_O-V_{SS}	4.0	—	15.0	V

5.Electrical Characteristics

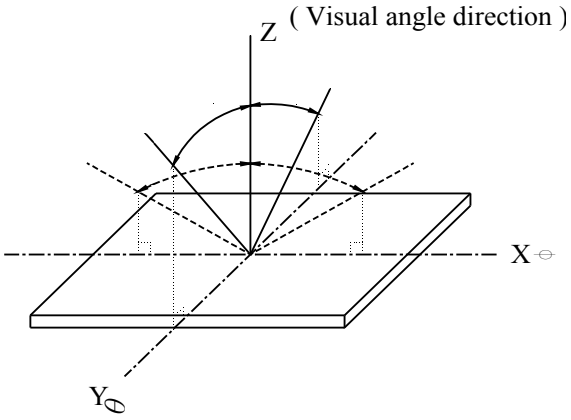
Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	V_{DD}-V_{SS}		2.4	2.7	3.0	V
Supply Voltage For LCD	V_{DD}-V_0	Ta=-20°C			10.5	V
		Ta=25°C		8.4		V
		Ta=+70°C	6.8			V
Input High Volt.	V_{IH}		0.8 V_{DD}		V_{DD}	V
Input Low Volt.	V_{IL}				0.2V_{DD}	V
Output High Volt.	V_{OH}		V_{DD} -0.4			V
Output Low Volt.	V_{OL}				0.4	V
Supply Current	I_{DD}	V_{DD}=3.3	0.8	1.0	1.2	mA

6.Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	(V)θ	CR≥3	36		60	deg
	(H)φ	CR≥3	-45		45	deg
Contrast Ratio	CR			5		
Response Time	T rise			150	200	ms
	T fall			150	200	ms

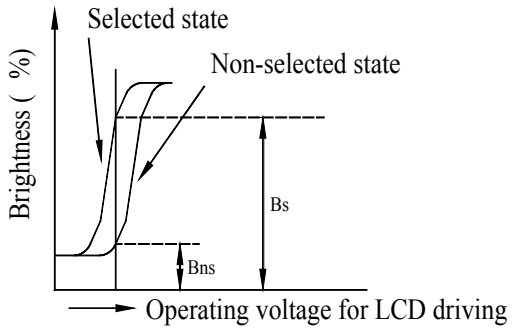
6.1 Definitions

■View Angles

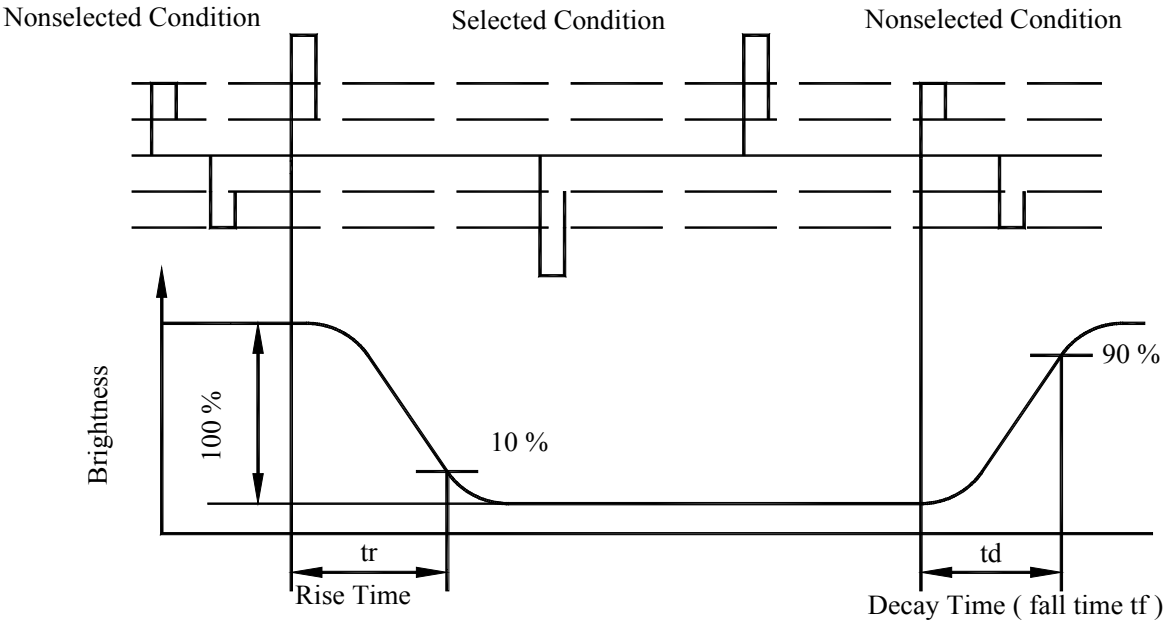


■Contrast Ratio

$$CR = \frac{\text{Brightness at selected state (BS)}}{\text{Brightness at non-selected state (Bns)}}$$



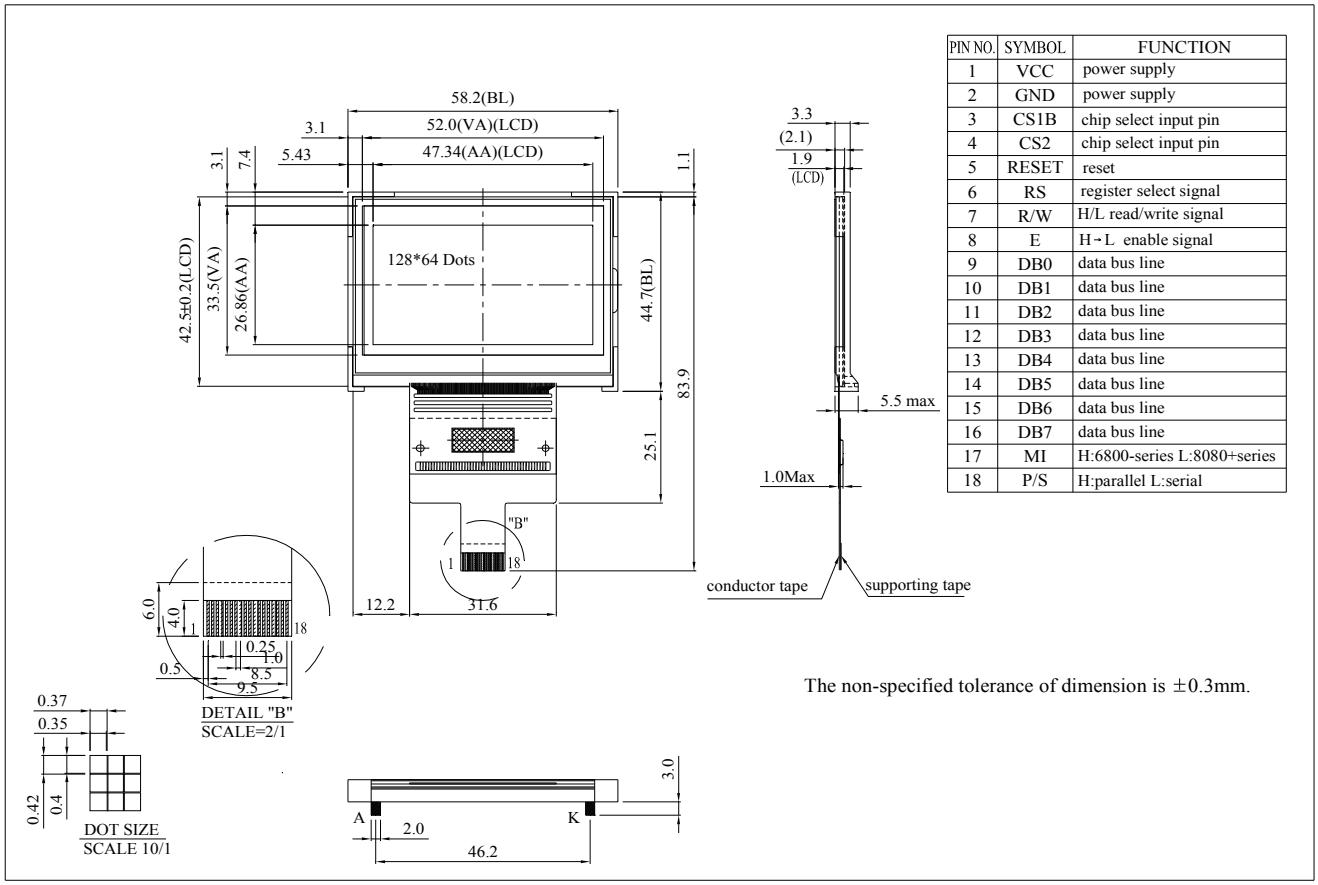
■ Response Time



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
9~16	DB0~DB7	I/O	8-bit bi-directional data bus that is connected to the standard 8-bit microprocessor data bus. When the serial interface selected(PS="L") DB0~DB5: high impedance DB6: serial input clock (SCLK) DB7: serial input data (SID) When chip select is not active, DB0~DB7 may be high impedance.
17	MI	I	Microprocessor interface selects pin. MI="H": 6800-series MPU interface MI="L": 8080-series MPU interface
18	PS	I	Parallel/Serial data input select pin. Interface Data Read/Write Serial clock PS="H": Parallel DB0~DB7 E_RD,RW_WR - PS="L": Serial SID(DB7) Write only SCLK(DB6) In serial mode, it is not possible 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".

8.Contour Drawing & Block Diagram



PIN NO.	SYMBOL	FUNCTION
1	VCC	power supply
2	GND	power supply
3	CS1B	chip select input pin
4	CS2	chip select input pin
5	RESET	reset
6	RS	register select signal
7	R/W	H/L read/write signal
8	E	H→L enable signal
9	DB0	data bus line
10	DB1	data bus line
11	DB2	data bus line
12	DB3	data bus line
13	DB4	data bus line
14	DB5	data bus line
15	DB6	data bus line
16	DB7	data bus line
17	MI	H:6800-series L:8080+series
18	P/S	H:parallel L:serial

9.Display Control Instruction

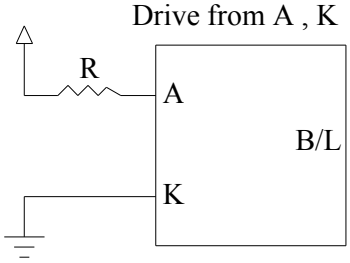
PLEASE CONSULT KS0713 Datasheet

10. Backlight Information

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	**ILED**	**48**	**60**	**90**	**mA**	**V=3.5V**
Supply Voltage	**V**	**3.4**	**3.5**	**3.6**	**V**	
Reverse Voltage	**VR**			**5**	**V**	
Luminous Intensity	**IV**	**120**	**150**		**CD/M^2**	**ILED=60mA**
Life Time			**10000**		**Hr.**	**ILED=60mA**
Color	**White**					

Note: The LED of B/L is drive by current only, drive voltage is for reference only. drive voltage can make driving current under safety area (current between minimum and maximum).

LED B\L Drive Method
Drive from A , K



13. Material List of Components for RoHs

13.1 Process for WEEE and RoHS requirement

(1) We are now in the process of evaluating/converting to lead-free components/products.
(2) We use **Sn/Ag/Cu** soldering surface. The surface of Pb-free solder is more **rough** than we used before.
(3) Heat-resistance temp.:
Reflow : 250°C,30 seconds Max.;
Connector soldering wave or hand soldering: 320°C, 10 seconds max.
(4) Temp. curve of reflow, max. Temp.: 235±5°C;
Recommended customer's soldering temp. of connector: 280°C, 3 seconds.
(5) The LCD controller T6963c is not available now, Toshiba lead –free version will be in mass production in August.
(6) How to differentiate pb-free LCM from 2005/Apr to 2005/June, we will add a symbol "#" at the end of module's part number. The symbol "#" will be removed from 2005/7/1.

13.2 Consisting material of LCM

Please refer to the summarization and supplement of test report as follows:

- PAGE 1/2: Item 1 ~ 12 are Common parts list of current LCM, basically used in standard reflective LCM products.

- PAGE 2/2: Item 13 ~ 23 are optional parts list according to customer's requirement, ex.: backlight components such as CCFL B\L , LED B\L, EL .., etc., or cable connector. Please present this list to customer if these materials are used.

- Each test report is provided by notarization organization, authorized by material suppliers; the none-verified components had sent to notarization organization by Crystalfontz America, Inc. Quality and manufacturing process of all materials will be kept improving to achieve the requirement of decreasing/totally prohibiting the usage of toxic chemical substances.

LCM COMMON PARTS LIST							
NO.	Material Item	Pb	Cd	Hg	Cr(6+)	PBDEs & PBBs	Controlled Material
1	PCB-FR4	N.D.	N.D.	N.D.	N.D.	N.D.<0.0005%	F<50.0ppm CL <1386.ppm Br<50.0ppm I<50.0abbr
2	PCB-GREEN Ink	N.D.	N.D.	N.D.	N.D.	—	Sb<5.0ppm As<10.0ppm Ba<10.0ppm Se<5.0ppm
3	PCB-Plate	N.D.	N.D.	N.D.	N.D.	—	As<12.9ppm Ba<14.5ppm Sb<5.0ppm Se<2.0ppm
4	Bezel Frame	77.3ppm	N.D.	N.D.	N.D.	—	
5	Plastic Frame	24.0ppm	4.8ppm	N.D.	N.D.	N.D.	
6	LCD-Glass	N.D.	N.D.	N.D.	N.D.	N.D.	
7	LCD-Polarizer	N.D.	N.D.	N.D.	N.D.	N.D.	
8	Zebra Connector	N.D.	N.D.	N.D.	N.D.	N.D.	
9	Assembly Tape	N.D.	N.D.	N.D.	N.D.	N.D.	
10	Assembly Type Mylar	N.D.	N.D.	N.D.	N.D.	N.D.	
11	Solder Paste	66.7ppm	ND	N.D.	N.D.	—	
12	Packing	ND<90.0ppm	ND<75.0ppm	ND<60.0ppm	ND<60.0ppm	—	Sb<60ppm As<25ppm Ba<1000ppm Se<500ppm

Note: 1. N.D. for Pb , Cd , Hg and Cr means under 2.0ppm.

2. N.D. for PBDEs and PBBs means under 0.0005%.

LCM COMMON PARTS LIST							
NO.	Material Item	Pb	Cd	Hg	Cr(6+)	PBDEs & PBBs	Controlled Material
13	CCFL-Tube (with inside material)	131ppm	N.D.	3069ppm	N.D.	ND<0.0005%	PBDE N.D. PBB N.D.
14	CCFL-Wire	256ppm	N.D.	N.D.	N.D.	N.D.	
15	CCFL B/L-Diffusion sheet	N.D.	N.D.	N.D.	N.D.	N.D.	As<0.001 Cr<0.012 Cu<0.02 Se<0.006
16	CCFL B/L-Light Guid	N.D.	N.D.	N.D.	N.D.	N.D.	
17	CCFL Tube Cover	N.D.	N.D.	N.D.	N.D.	N.D.	
18	LED B/L-Diffusion sheet	N.D.	N.D.	N.D.	N.D.	N.D.	As<2.0ppm Cr<0.007 Cu<0.31 Se<0.003
19	LED B/L-Light Guide	N.D.	N.D.	N.D.	N.D.	N.D.	
20	LED Lamp	149ppm	N.D.	N.D.	N.D.	N.D.	
21	LED B/L Reflector	N.D.	N.D.	N.D.	N.D.	N.D.	
22	EL B/L	N.D.	N.D.	N.D.	N.D.	N.D.	
23	FFC Cable Wire	N.D.	N.D.	N.D.	N.D.	—	

Note: 1. N.D. for Pb , Cd , Hg and Cr means under 2.0ppm.

2. N.D. for PBDEs and PBBs means under 0.0005%.