Crystalfontz America, Inc.

SPECIFICATION

CUSTOMER : _____

MODULE NO.: __CFAG320240K-TMI-TZTS__

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

ISSUED DATE:

Contents

1.Module Classification Information

CFA G 3 2 0 2 4 0 K T M I   TZ-TS
 ① ②   ③   ④ ⑤ ⑥⑦   ⑧

①	Brand: **CRYSTALFONTZ AMERICA, INC**		
②	Display Type: H→Character Type, **G→Graphic Type**		
③	Displays Logical Dimensions: **320 Pixels x 240 Pixels**		
④	Model PCB Variant: **K**		
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
⑧	Special Code	**T→Built in negative voltage & Temperature Compensation ;** **Z→IC S1D13700 ; TS→ 4 wire analog touch screen**	

2.Precautions in Use of LCD Module

(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	STANDARD VALUE	UNIT
Number of dots	320x240	dots
Outline dimension	142.0 (W)x 96.0(H)x 17.0max(T)	mm
View area	104.0(W)x 79.3(H)	mm
Active area	95.97(W)x 71.97 (H)	mm
Dot size	0.27 (W)x 0.27(H)	mm
Dot pitch	0.3(W)x 0.3(H)	mm
LCD type	STN ,Negative, Transmissive, Blue	
View direction	6 o'clock	
Backlight	LED, 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	0		V_{DD}	V
Supply Voltage For Logic	V_{DD}	0		6.5	V
Supply Voltage For LCD	$V_{DD}-V_{EE}$	0		32	V

5.Electrical Characteristics

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Logic Voltage	$V_{DD}-V_{SS}$			5.0	5.5	V
Supply Voltage For LCD	$V_{DD}-V_O$	Ta=-20°C			--	V
		Ta=25°C		21.8		V
		Ta=+70°C	--			V
Input High Volt.	V_{IH}		$0.8V_{DD}$		V_{DD}	V
Input Low Volt.	V_{IL}		0		$0.2V_{DD}$	V
Output High Volt.	V_{OH}		$V_{DD}-0.4$			V
Output Low Volt.	V_{OL}				0.4	V
Supply Current	I_{DD}		45	55	65	mA

6.Optical Characteristics

ITEM	SYMBAL	CONDITION	MIN	TYP	MAX	UNIT
View Angle	(V)θ	CR□3	20	□	40	deg.
	(H)φ	CR□3	-30	□	30	deg.
Contrast Ratio	CR	□	□	3	□	□
Response Time	T rise	□	□	200	300	ms
	T fall	□	□	150	200	ms

6.1□Definitions

■View Angles

■Contrast Ratio

(Visual angle direction)

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

Z

X φ

Y θ

Selected state

Non-selected state

Brightness (%)

Bs

Bns

Operating voltage for LCD driving

□■Response time

Nonselected Condition

Selected Condition

Nonselected Condition

Brightness

100 %

10 %

90 %

tr

Rise Time

td

Decay Time (fall time tf)
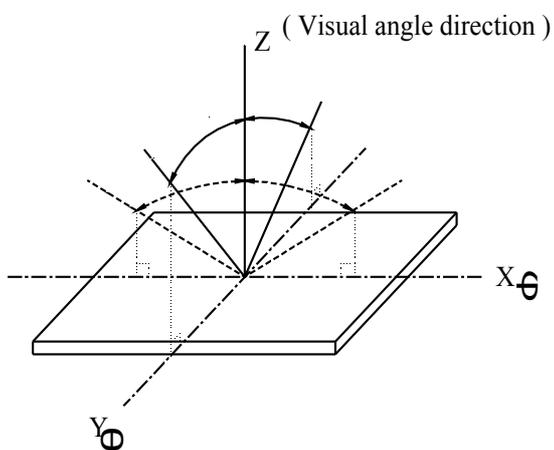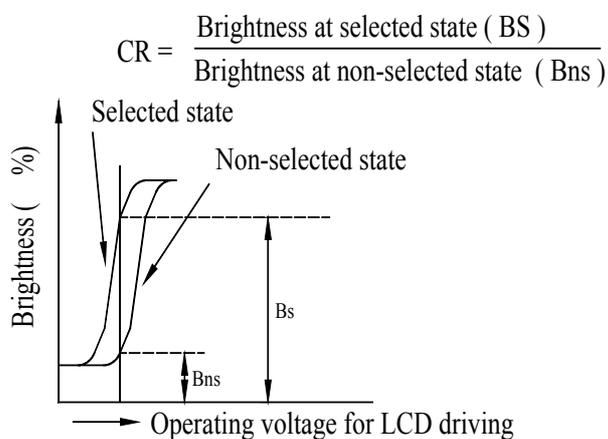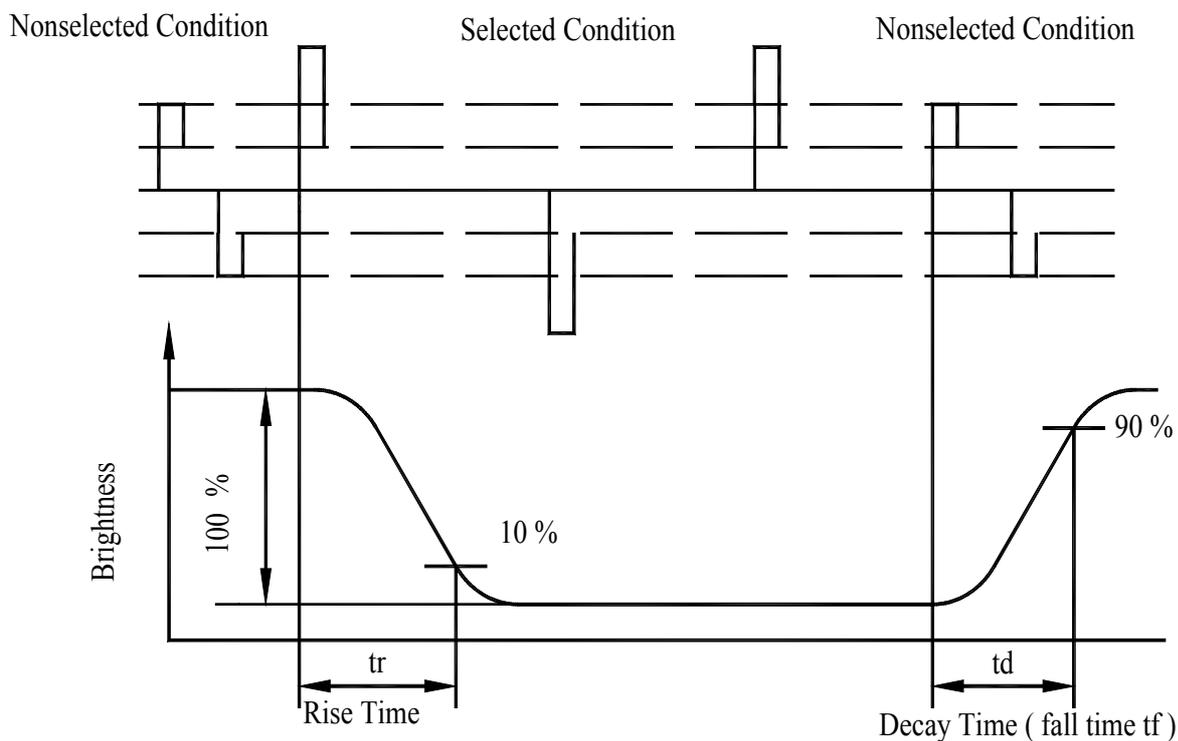
7.Interface Description

`	Symbol	Level	Description
1	V$_{SS}$	0V	Ground
2	V$_{DD}$	5.0V	Power supply for Logic
3	V$_O$	(Variable)	Driving voltage for LCD
4	A0	H/L	RD=L WR=H ,A0=L :Data Read AO=H :Status read RD=H WR=L ,A0=L :Data Write AO=H :Command write
5	$\overline{WR}$	H/L	8080 family: Write signal, 6800 family: R/W signal
6	$\overline{RD}$	H/L	8080 family: Read signal, 6800 family: Enable clock
7~14	DB0~DB7	H/L	Data bus line
15	$\overline{CS}$	H/L	Chip select ,Active L
16	$\overline{RES}$	H/L	Controller reset signal, Active L
17	V$_{ee}$		Negative Voltage Output
18	SEL		68/80
19	BUSY		Check Busy
20	WAIT		

8.Contour Drawing & Block diagram
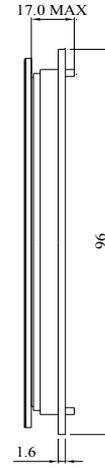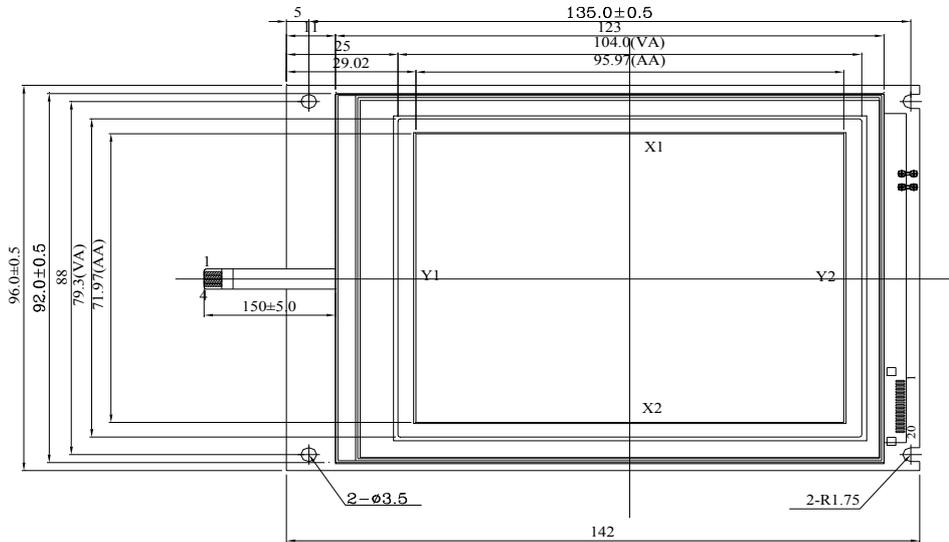
PIN NO.	SYMBOL
1	Vss
2	Vdd
3	Vo
4	A0
5	$\overline{WR}$
6	$\overline{RD}$
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	$\overline{CS}$
16	$\overline{RES}$
17	Vee
18	SEL
19	BUSY
20	WAIT
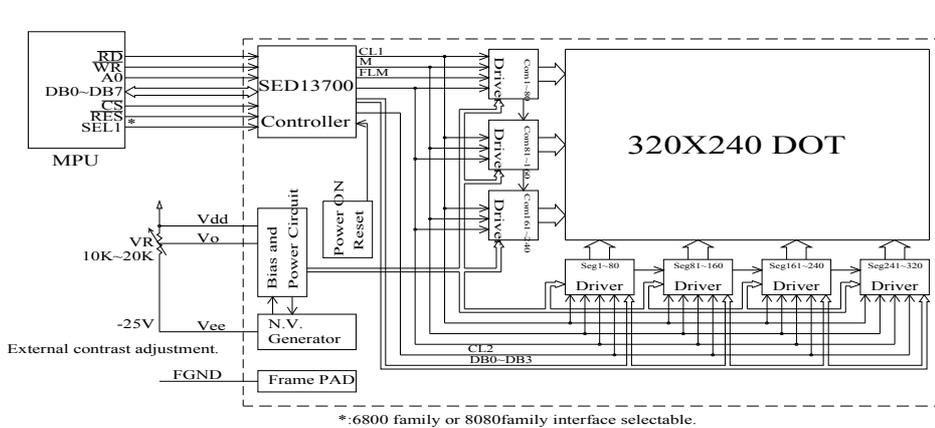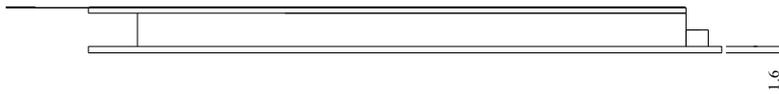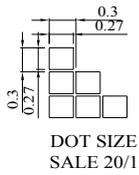
DOT SIZE
SALE 20/1
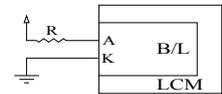
9.Timing Characteristics

The relative timing diagram please see the spec of S1D13700.
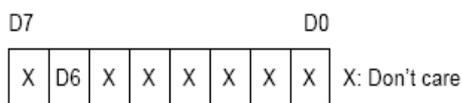
9.1 Differences Between SED1335 and S1D13700

S1D13700 almost can replace SED1335，and it can drive 240*160 dots in 16 gray level,or 320*240

dots in 4 gray level.

There are 2 Main differences and being described as below:

(1)The Check Busy method of SED1335 is reading the D6 of **STATUS resister.**

Please

The SED1335 series has a single bit status flag.
D6: X line standby

The D6 status flag is HIGH for the TC/R-C/R cycles at the end of each line where the SED1335 series is not reading the display memory. The microprocessor may use this period to update display memory without affecting the display, however it is recommended that the display be turned off when refreshing the whole display.
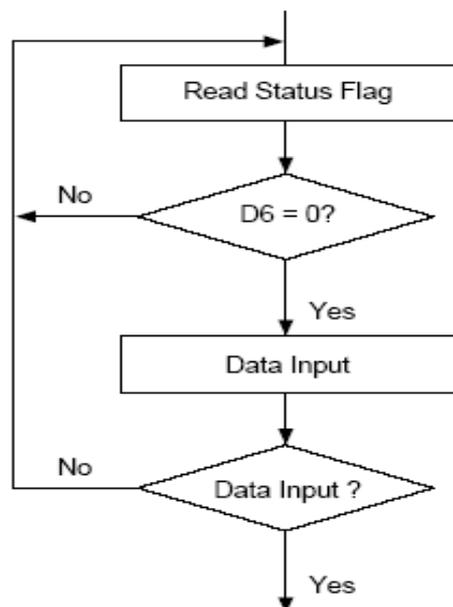
Figure 53. Status flag

Figure 55. Flowchart for busy flag checking

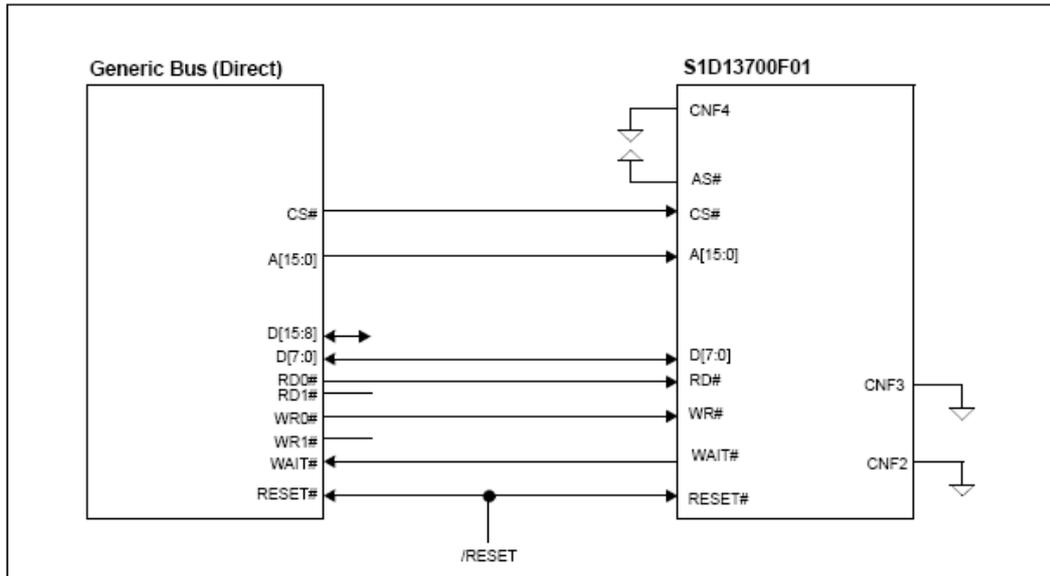The Check Busy method of S1D13700 is checking the "WAIT" pin directly.

Figure 3-2 Direct Generic to S1D13700F01 Interface Example

(2) Owing to S1D13700 having 32K*8 SRAM inside,so It doesn't need to set the bit "M1" in "SYSTEM SET". For S1D13700, we doesn't set M1(bit1) the setting for SED 1335 is shown as below:

8.2.1.1. C

This control byte performs the following:
1. Resets the internal timing generator
2. Disables the display
3. Cancels sleep mode

Parameters following P1 are not needed if only canceling sleep mode.

8.2.1.2. M0

Selects the internal or external character generator ROM. The internal character generator ROM contains 160, 5 × 7 pixel characters, as shown in figure 70. These characters are fixed at fabrication by the metallization mask. The external character generator ROM, on the other hand, can contain up to 256 user-defined characters.
M0 = 0: Internal CG ROM
M0 = 1: External CG ROM

Note that if the CG ROM address space overlaps the display memory address space, that portion of the display memory cannot be written to.

8.2.1.3. M1

Selects the memory configuration for user-definable characters. The CG RAM codes select one of the 64 codes shown in figure 46.
M1 = 0: No D6 correction.
The CG RAM1 and CG RAM2 address spaces are not contiguous, the CG RAM1 address space is treated as character generator RAM, and the CG RAM2 address space is treated as character generator ROM.
M1 = 1: D6 correction.
The CG RAM1 and CG RAM2 address spaces are contiguout and are both treated as character generator RAM

The setting of S1D13700 will show as follow:

bit 1	Reserved The default value for this bit is 0.
bit 0	Character Generator Select (M0) This bit determines whether characters are generated by the internal character generator ROM (CGROM) or character generator RAM (CGRAM). The CGROM contains 160, 5x7 pixel characters which are fixed at fabrication. The CGRAM can contain up to 256 user-defined characters which are mapped at the CG Start Address (REG[1Ah] - REG[19h]). However, when the CGROM is used, the CGRAM can only contain up to 64, 8x8 pixel characters. When this bit = 0, the internal CGROM is selected. When this bit = 1, the internal CGRAM is selected.

Note
   If the CGRAM is used (includes CGRAM1 and CGRAM2), only 1 bpp is supported.
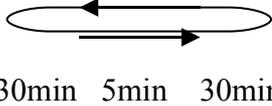
10. Quality Assurance

☐ Screen Cosmetic Criteria

No.	Defect	Judgement Criterion	Partition

1	Spots	A)Clear
		  Size: d mm Acceptable Qty in active area
		  d ≤0.1 Disregard
		  0.1<d≤0.2 6
		  0.2<d≤0.3 2
		  0.3<d 0
		Note: Including pin holes and defective dots which must be within one pixel size.
		B)Unclear
		  Size: d mm Acceptable Qty in active area
		  d ≤0.2 Disregard
		  0.2<d≤0.5 6
		  0.5<d≤0.7 2
		  0.7<d 0
			Minor

2	Bubbles in Polarize	Size: d mm Acceptable Qty in active area
		  d≤0.3 Disregard
		  0.3<d≤1.0 3
		  1.0<d≤1.5 1
		  1.5<d 0
			Minor

3	Scratch	In accordance with spots cosmetic criteria. When the light reflects on the panel surface, the scratches are not to be remarkable.	Minor
4	Allowable Density	Above defects should be separated more than 30mm each other.	Minor
5	Coloration	Not to be noticeable coloration in the viewing area of the LCD panels. Back-light type should be judged with back-light on state only.	Minor

11.Reliability

**Content of Reliability Test (wide temperature, -20°C~70°C)**

Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	____
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60□,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20°C 25°C 70°C 30min 5min 30min 1 cycle	-20°C/70°C 10 cycles	____
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V,RS=1.5kΩ CS=100pF 1 time	____

Note1: No dew condensation to be observed.
Note2: The function test shall be conducted after 4 hours storage at the normal
    Temperature and humidity after remove from the test chamber.

Note3: Vibration test will be conducted to the product itself without putting it in a container.

12. Touch panel Information
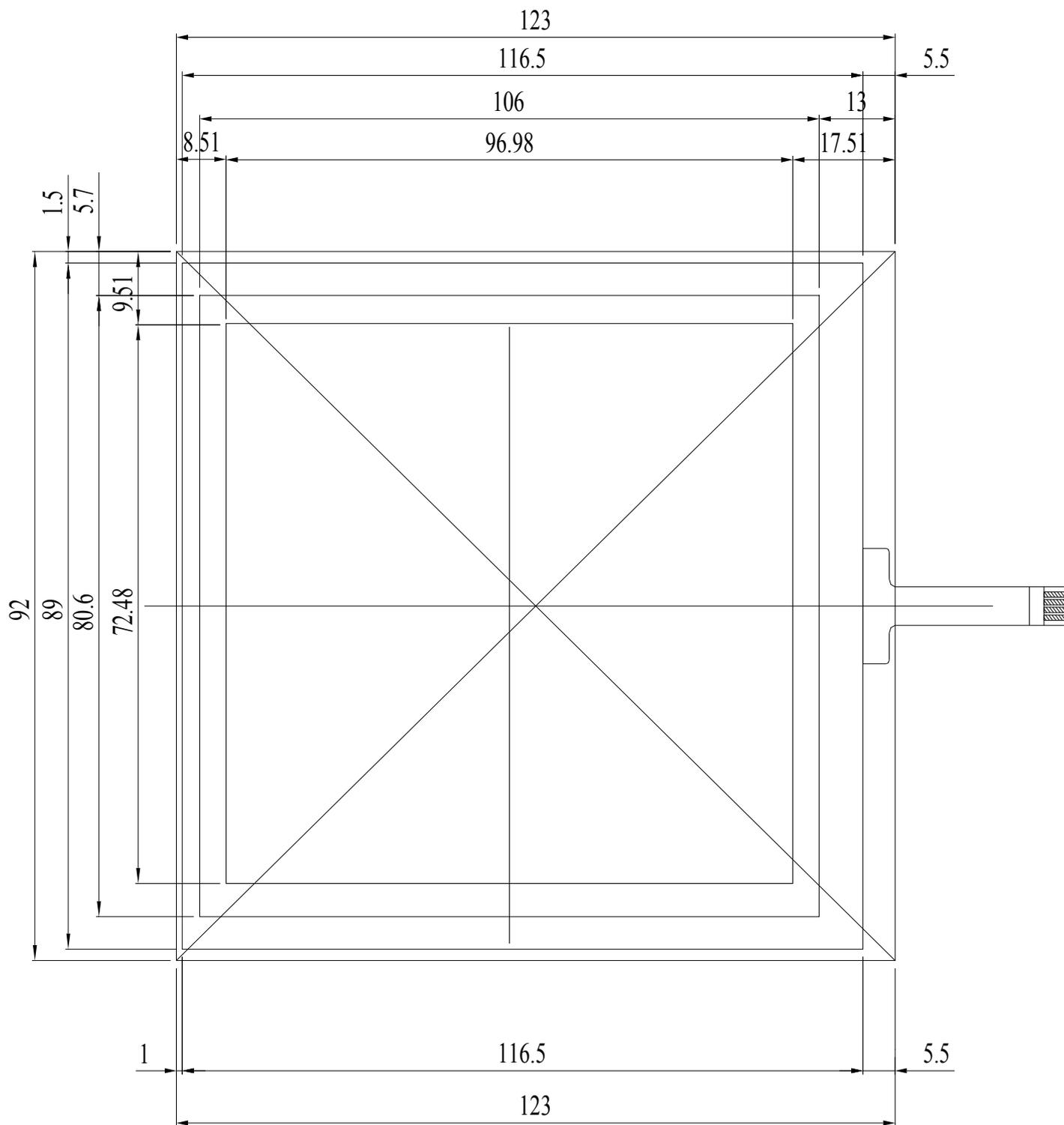
13. Backlight Information

Specification

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST□CONDITION
Supply Current	ILED	—	85	—	mA	V=5V
Supply Voltage	V	□	5	5.5	V	□
Reverse Voltage	VR	□	□	5	V	□
Luminous Intensity	IV	□	130	□	CD/M^2	ILED=85mA
Wave Length	λp	—		□	nm	
Life Time	□	□	50K	□	Hr.	
Color	White EDGE B/L					

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).

Drive from Vdd , Vss
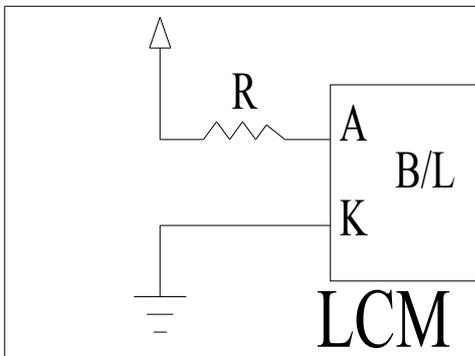
(Contrast perfromance may go down)

14. Material List of Components for RoHS

1. Crystalfontz America, Inc. hereby declares that all of or part of products (with the mark "#"in code), including, but not limited to, the LCM, accessories or packages, manufactured and/or delivered to your company (including your subsidiaries and affiliated company) directly or indirectly by our company (including our subsidiaries or affiliated companies) do not intentionally contain any of the substances listed in all applicable EU directives and regulations, including the following substances.

Exhibit A:The Harmful Material List

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Material	(Cd)	(Pb)	(Hg)	(Cr6+)	PBBs	PBDEs
Limited Value	100 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm
Above limited value is set up according to RoHS.						

2.Process for RoHS requirement:
(1) Use the Sn/Ag/Cu soldering surface，the surface of Pb-free solder is rougher than we used before.
(2) Heat-resistance temp.
Reflow: 250°C,30 seconds Max.
Connector soldering wave or hand soldering: 320°C, 10 seconds max.
(3) Temp. curve of reflow, max. Temp.: 235±5°C
Recommended customer's soldering temp. of connector: 280°C, 3 seconds.