Reshine Display (HK) Technology Co., Limited

瑞翔顯示（香港）科技有限公司

SPECIFICATION

FOR

LCM Module

MODULE No:	RXL043022-F
CUSTOMER:	

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

Revision History

Date	Rev. No.	Page	Summary
2021.09.23	V1.0	ALL	FIRST ISSUE
2022.03.08	V1.1	17	Correct the LCM Luminance

Contents

1. Block Diagram 5
2. Outline dimension 6
3. Input terminal Pin Assignment 7
4. LCD Optical Characteristics 9
   4.1 Optical specification 9
5. Electrical Characteristics 12
   5.1 Absolute Maximum Rating 12
   5.2 DC Electrical Characteristics 12
   5.3 LED Backlight Characteristics 13
6. LVDS Interface 15
   6.1 4 Lane VESA Data Format Color Bit Map 15
   6.2 LVDS Input Timing Table 15
   6.3 Timing Table 17
7. POWER ON/OFF SEQUENCE 18
   7.1 Power On Sequence 18
   7.2 Power Off Sequence 18
8. LCD Module Out-Going Quality Level 19
   8.1 VISUAL & FUNCTION INSPECTION STANDARD 19
      8.1.1 Inspection conditions 19
      8.1.2 Definition 19
      8.1.3 Sampling Plan 20
      8.1.4 Criteria (Visual) 21
9. Reliability Test Result 25
10. Cautions and Handling Precautions 26
   10.1 Handling and Operating the Module 26
   10.2 Storage and Transportation. 26
11. Packing 27

* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorpho us silicon TFT as a switching device. This model is composed of a Transmissive type TFT-LCD Panel, driver circuit,back-light unit. The resolution of a 4.3'TFT-LCD contains 800x480 pixels, and can display up to 16.7M colors.

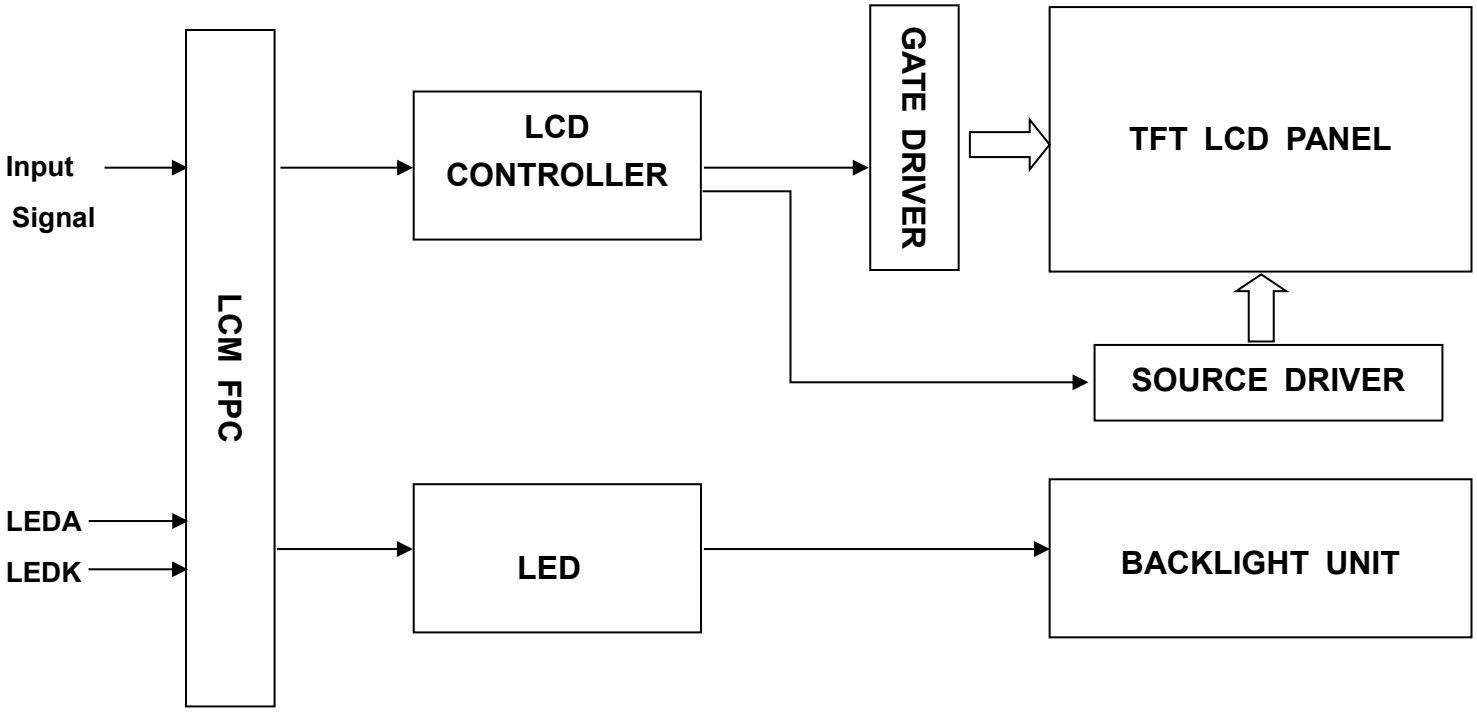
* Features

General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	95.04(H)*53.86(V) (4.3inch)	mm	
Driver element	TFT active matrix	-	
Display colors	16.7M	colors	
Number of pixels	800(RGB)*480	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.1188(H)*0.1122(V)	mm	
Viewing angle	Free	o'clock	
Controller IC	ST7262	-	
Display mode	Transmissive /Normally Black	-	
LCM Interface	4-Lane LVDS(8BIT LVDS)	-	
Operating temperature	-30～+85	℃	
Storage temperature	-30～+85	℃	

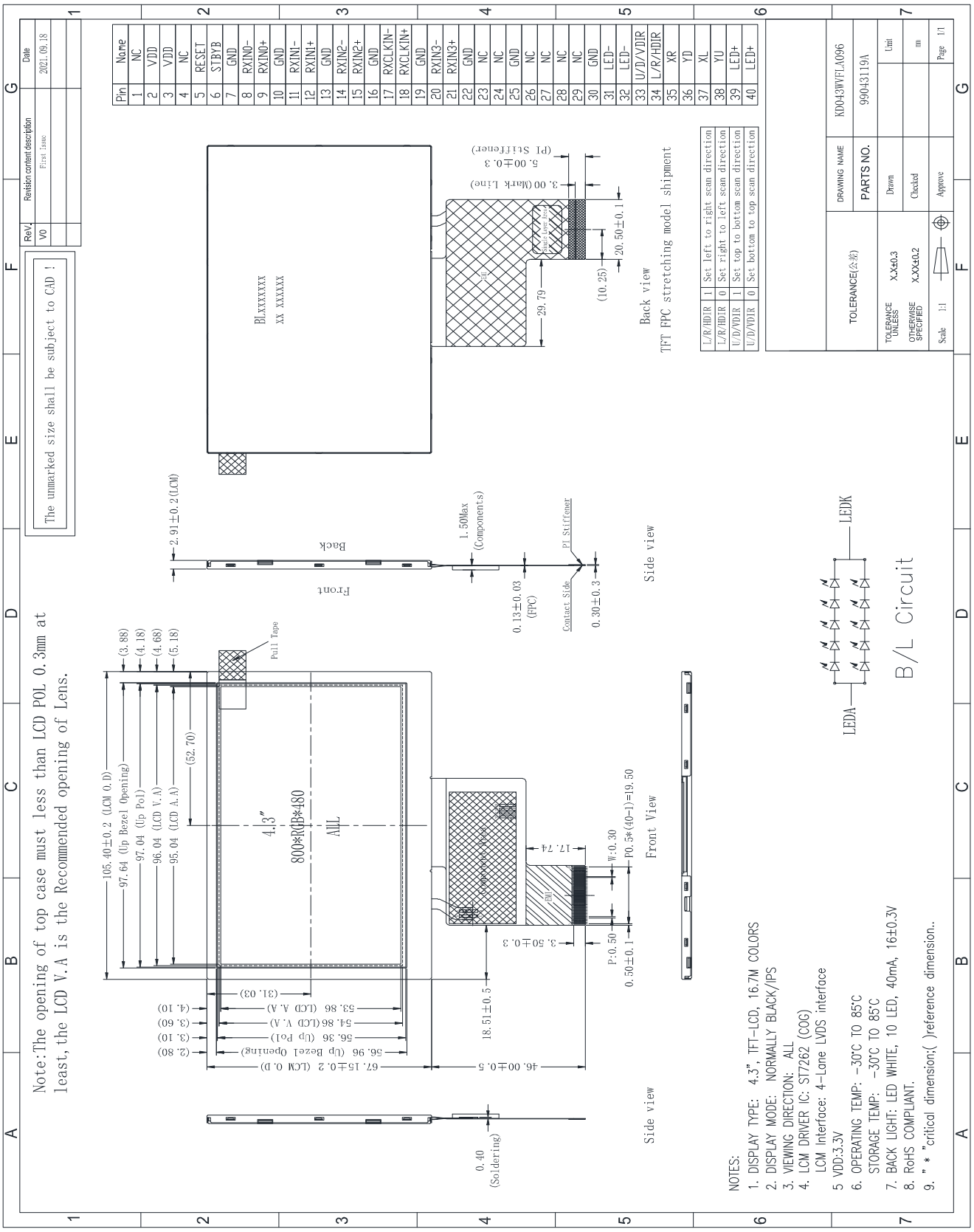
* Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	105.40	-	mm	
	Vertical(V)	-	67.15	-	mm	
	Depth(D)	-	2.91	-	mm	
Weight		-	TBD	-	g	

1. Block Diagram



2. Outline dimension



3. Input terminal Pin Assignment

NO.	SYMBOL	DISCRIPTION	I/O
1	NC	--	--
2	VDD	Supply voltage(3.3V).	P
3	VDD	Supply voltage(3.3V).	P
4	NC	--	--
5	RESET	Reset pin. The chip is in reset state when RESETB=0.	I
6	STBYB	DISP sets the display mode. H: Normal display mode L: Standby mode	I
7	GND	Ground.	P
8	RXIN0-	- LVDS differential data input	I
9	RXIN0+	+ LVDS differential data input	I
10	GND	Ground.	P
11	RXIN1-	- LVDS differential data input	I
12	RXIN1+	+ LVDS differential data input	I
13	GND	Ground.	P
14	RXIN2-	- LVDS differential data input	I
15	RXIN2+	+ LVDS differential data input	I
16	GND	Ground.	P
17	RXCLKIN-	- LVDS differential clock input	I
18	RXCLKIN+	+ LVDS differential clock input	I
19	GND	Ground.	P
20	RXIN3-	- LVDS differential data input	I
21	RXIN3+	+ LVDS differential data input	I
22	GND	Ground.	P
23	NC	--	--
24	NC	--	--

25	GND	Ground.	P
26	NC	--	--
27	NC	--	--
28	NC	--	--
29	NC	--	--
30	GND	Ground.	I
31	LED-	LED Cathode.	P
32	LED-	LED Cathode.	P
33	U/D/VDIR	Horizontal shift direction (source output) selection(NOTE1)	I
34	L/R/HDIR	Vertical shift direction (gate output) selection(NOTE1)	I
35	XR(NC)	Touch panel Right Glass Terminal	A/D
36	YD(NC)	Touch panel Bottom Film Terminal	A/D
37	XL(NC)	Touch panel LIFT Glass Terminal	A/D
38	YU(NC)	Touch panel Top Film Terminal	A/D
39	LED+	LED Anode	P
40	LED+	LED Anode	P

NOTE1

L/R/HDIR	1	Set left to right scan direction
L/R/HDIR	0	Set right to left scan direction
U/D/VDIR	1	Set top to bottom scan direction
U/D/VDIR	0	Set bottom to top scan direction

4. LCD Optical Characteristics

4.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	Θ=0 Normal viewing angle	--	1200	--		*(2)
Response time	Rising	$T_{R+}T_F$		--	30	--	msec	*(3)
	Falling			--				
Color Gamut		S(%)		--	50	--	%	*(4)
Color Filter Chromacicity	White	W_X		-0.02	0.3178	+0.02		CA-310 Test
		W_Y			0.3492			
	Red	R_X		-0.04	0.6022	+0.04		
		R_Y			0.3680			
	Green	G_X			0.3430			
		G_Y			0.5584			
	Blue	B_X			0.1518			
		B_Y			0.1252			
Viewing angle	Hor.	ΘL	CR>10	--	80	--		*(1)
		ΘR		--	80	--		
	Ver.	ΘU		--	80	--		
		ΘD		--	80	--		
Option View Direction		Free						

*The data comes from the LCD specification.

Measuring Condition

Measuring surrounding : dark room

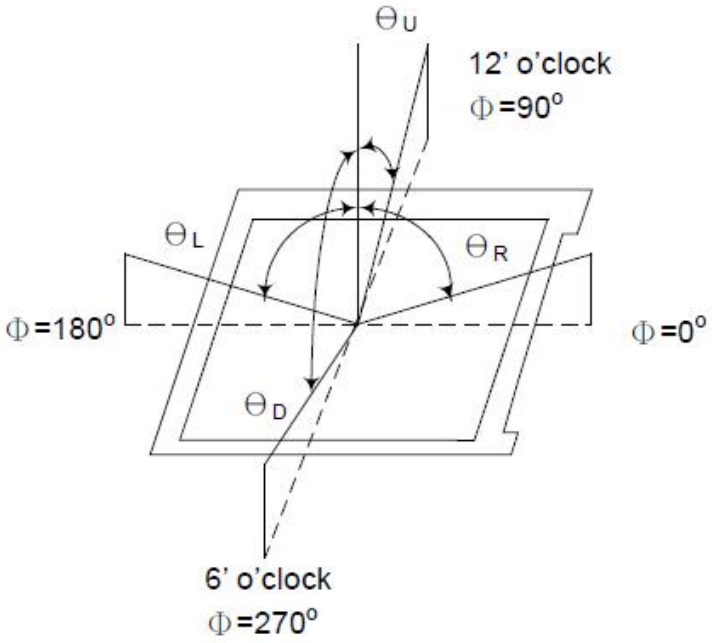
Ambient temperature : 25±2oC

15min. warm-up time.

Measuring Equipment

FPM520 of Westar Display technologies, INC., which utilized SR-3 for Chromaticity and BM-5A for other optical characteristics.

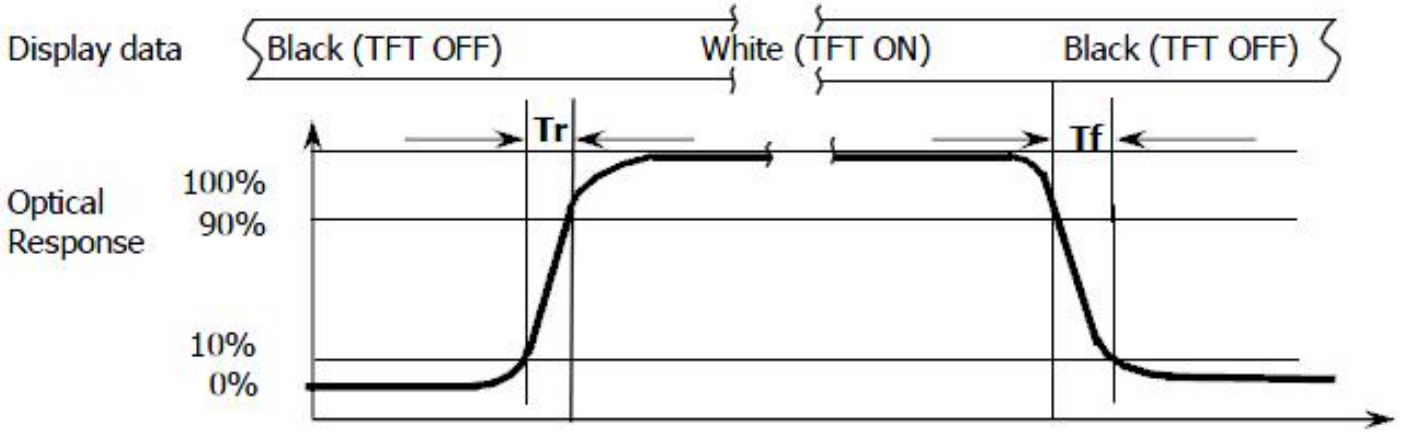
Note (1): Definition of Viewing Angle :



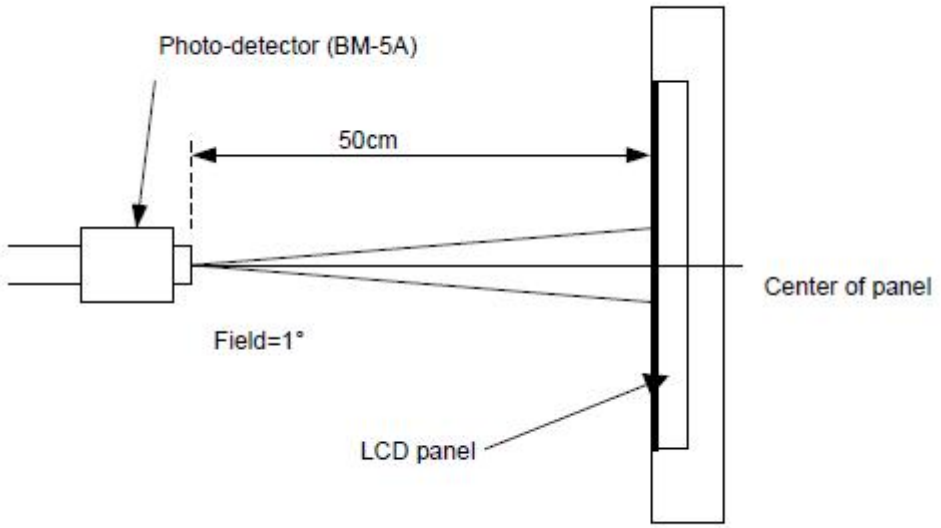
Note (2): Definition of Contrast Ratio(CR) :measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note (3): Response Time



Note (4): Definition of optical measurement setup



5. Electrical Characteristics

5.1 Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	VDD	-0.3	4.0	V	Note1
Operating temperature	T_{OP}	-30	+85	℃	
Storage temperature	T_{ST}	-30	+85	℃	

NOTE1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

5.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	3.0	3.3	3.6	V	
Normal mode Current consumption	IDD	--	40	80	mA	
Level input voltage	V_{IH}	0.7VDD		VDD	V	
	V_{IL}	GND		0.3 VDD	V	
Level output voltage	V_{OH}	VDD-0.4		VDD	V	
	V_{OL}	GND		GND+0.4	V	

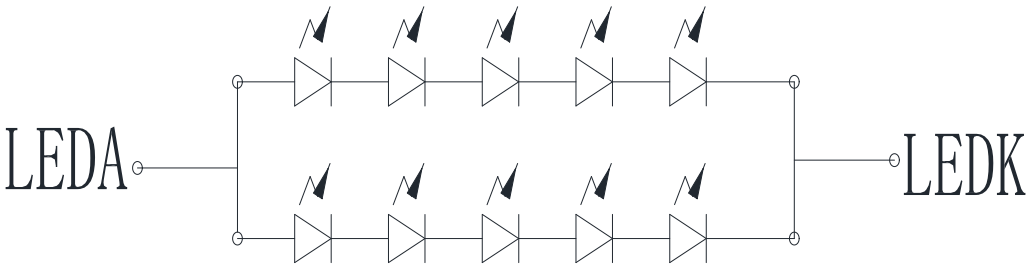
5.3 LED Backlight Characteristics

The back-light system is edge-lighting type with 10chips LED

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F	--	40	--	mA	
Forward Voltage	V_F	--	16	--	V	
LCM Luminance	LV	550	600	--	cd/m2	Note3
LED life time	Hr	--	50000	--	Hour	Note1,2
Uniformity	Avg	80	--	--	%	Note3

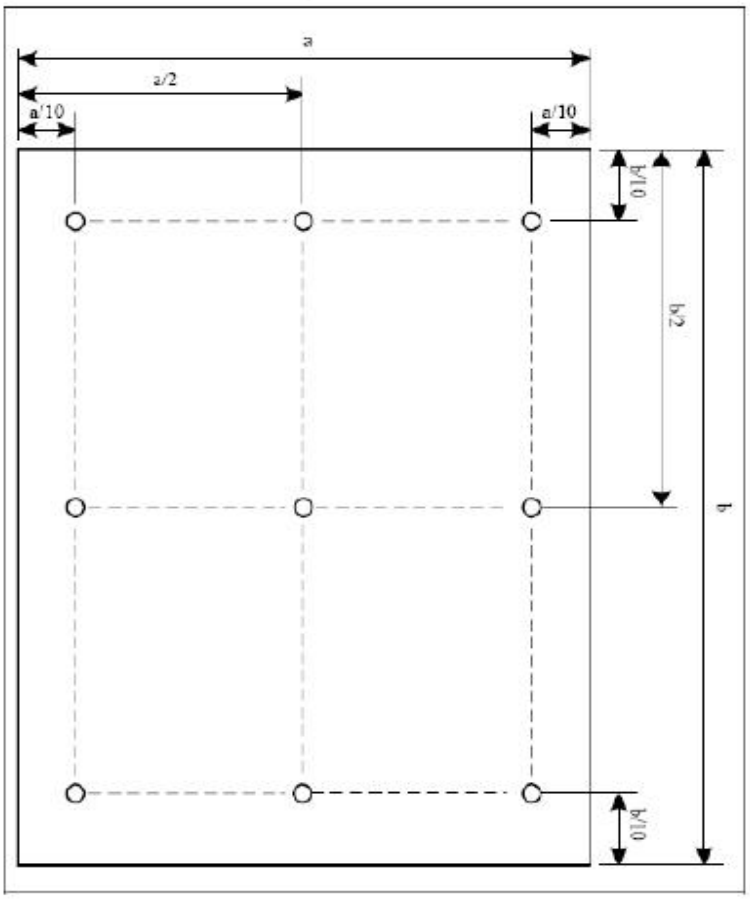
Note1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition: Ta=25±3 ℃, typical IL value indicated in the above table until the brightness becomes less than 50%.

Note 2: The “LED life time” is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and IL=40mA. The LED lifetime could be decreased if operating IL is larger than 40mA. The constant current driving method is suggested.



B/L Circuit

Note (3) Luminance Uniformity of these 9 points is defined as below:

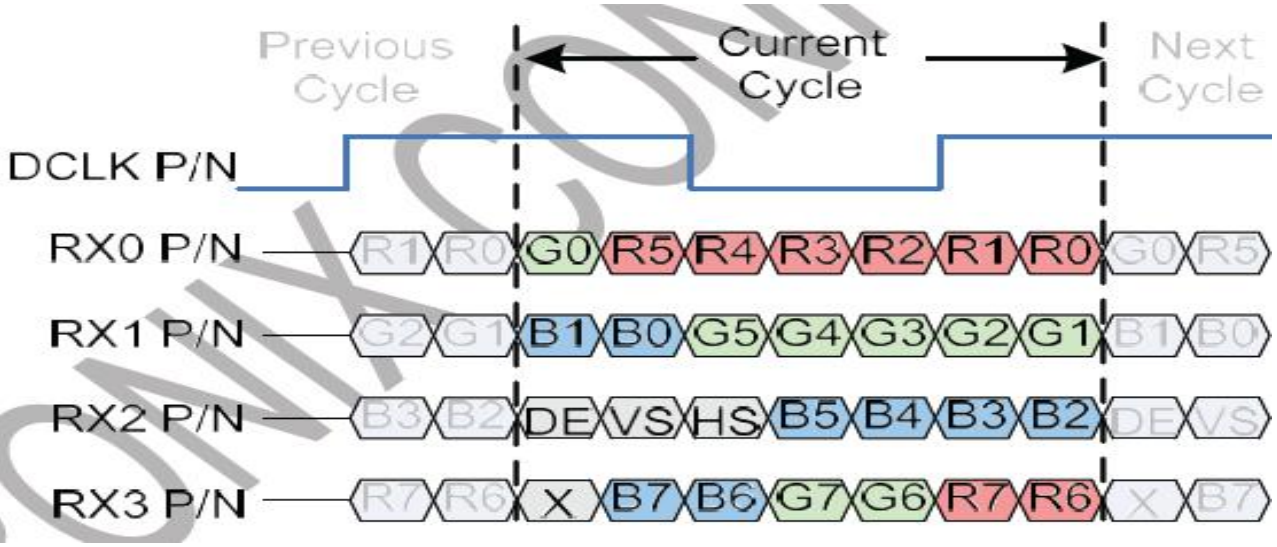


$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

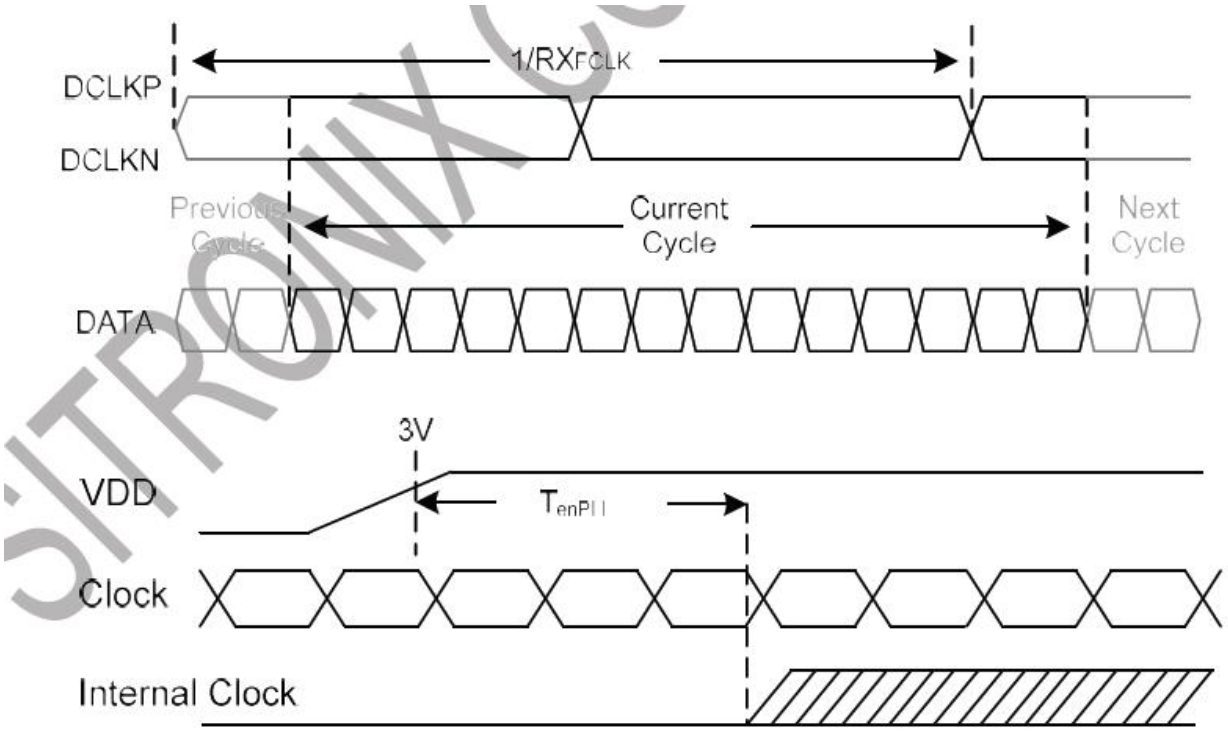
$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

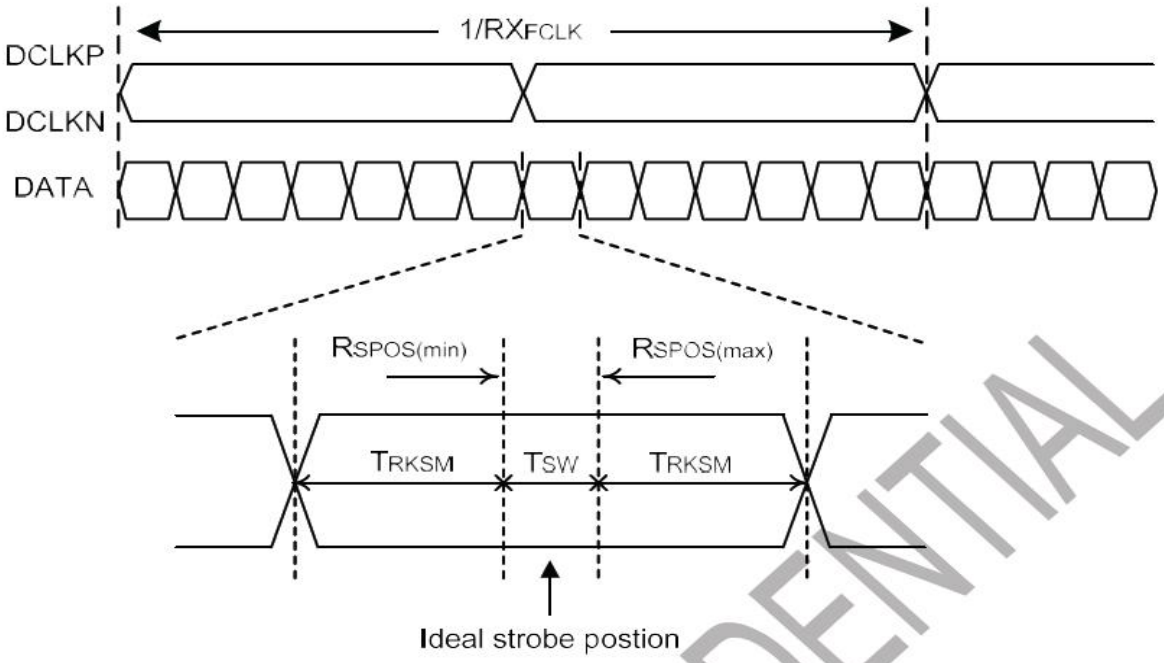
6. LVDS Interface

6.1 4 Lane VESA Data Format Color Bit Map



6.2 LVDS Input Timing Table





RRKSM : Receiver strobe margin
RSPOS : Receiver strobe position
TSW : Strobe width (internal DATA sampling window)

LVDS Input Timing (PVDD=PVDD1=VDD=VDDI= 3.3V, AGND= 0V, TA=25°C)

Item	Symbol	Min.	Typ.	Max.	Unit	Conditions
Clock Frequency	RX_{FCLK}	23	25	27	MHz	
Input Data Skew Margin	T_{RSKM}	400			ps	
Clock High Time	T_{LVCH}	4/(7 x RX_{FCLK})			ns	
Clock Low Time	T_{LVCL}	3/(7 x RX_{FCLK})			ns	
PLL Wake-up Time	T_{enPLL}			150	us	
LVDS Spread Spectrum Clocking (SSC) Tolerance of LVDS Receiver						
Modulation Frequency	SSC_{MF}			100	KHz	
Modulation Rate	SSC_{MR}			+/-3	%	

CONFIDENTIAL

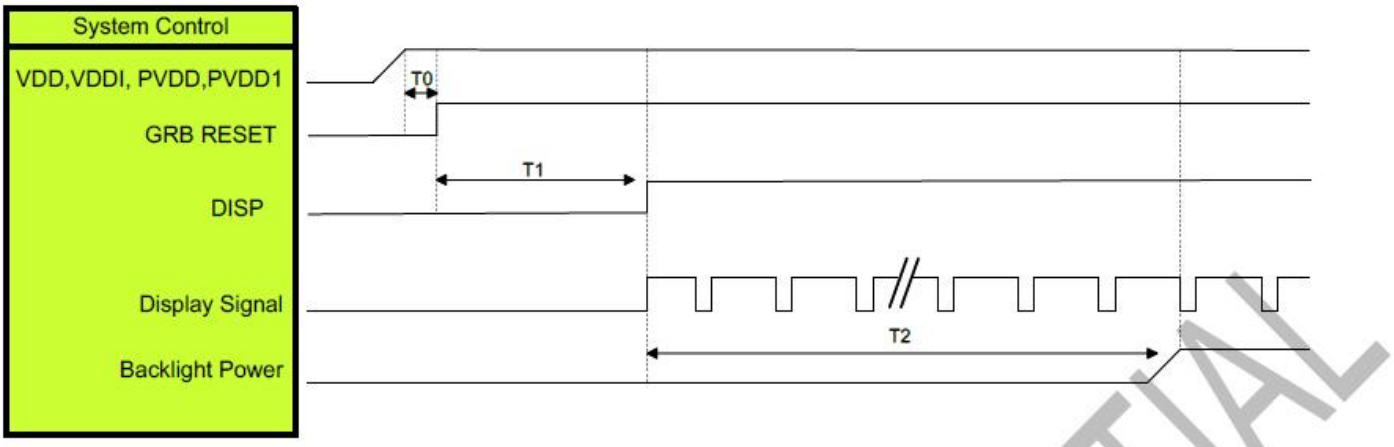
6.3 Timing Table

Parallel 24-bit RGB Interface Timing Table							
Item		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK Frequency		Fclk	23	25	27	MHz	
HSYNC	Period Time	Th	-	816	896	DCLK	
	Display Period	Thdisp		800		DCLK	
	Back Porch	Thbp	-	8	48	DCLK	
	Front Porch	Thfp	-	8	48	DCLK	
	Pulse Width	Thw	-	4	8	DCLK	
VSYNC	Period Time	Tv	-	496	504	HSYNC	
	Display Period	Tvdisp		480		HSYNC	
	Back Porch	Tvbp	-	8	12	HSYNC	
	Front Porch	Tvfp	-	8	12	HSYNC	
	Pulse Width	Tvw	-	4	8	HSYNC	

Note: Keep LCD refresh rate 60HZ

7. POWER ON/OFF SEQUENCE

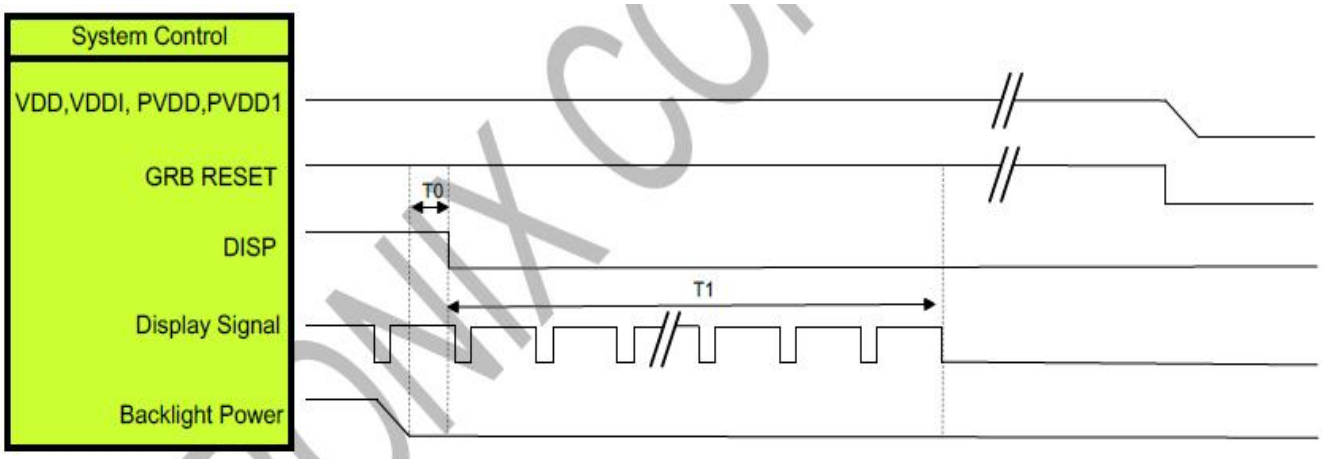
7.1 Power On Sequence



Symbol	Description	Min. Time	Unit
T0	System power stability to GRB RESET signal	0	ms
T1	GRB RESET= “High” to DISP=”High”	10	ms
T2	Display Signal output to Backlight Power on	250	ms

Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

7.2 Power Off Sequence



Symbol	Description	Min. Time	Unit
T0	Backlight Power off to DISP=”Low”	5	ms
T1	DISP=”Low” to IC internal voltage discharge complete	100	ms

Note: RGB interface Display signal: DCLK; VSYNC; HSYNC; DE; DR[7:0]; DG[7:0]; DB[7:0]

SITRONIX CONFIDENTIAL

8. LCD Module Out-Going Quality Level
8.1 VISUAL & FUNCTION INSPECTION STANDARD

8.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

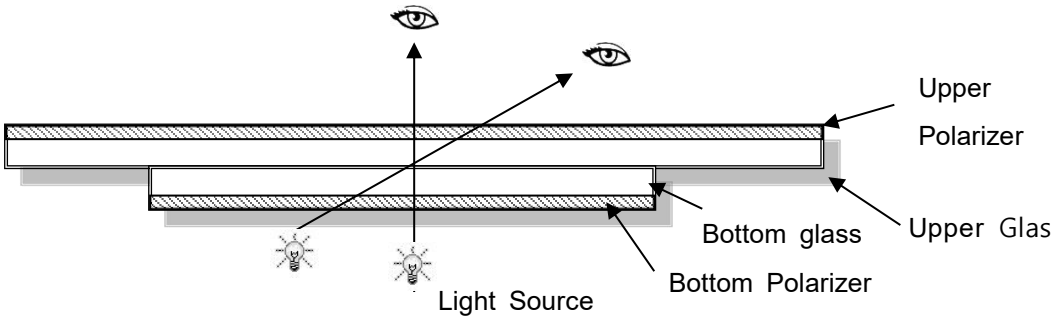
Temperature : 25±5℃

Humidity : 65%±10%RH

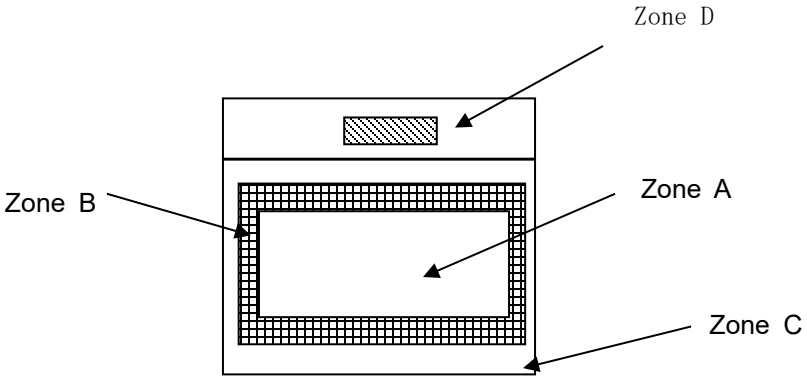
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



8.1.2 Definition



Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C : Outside (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D : IC Bonding Area

Note:As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

8.1.3 Sampling Plan

According to GB/T 2828-2003 ; , normal inspection, Class Ⅱ

AQL:

Major defect	Minor defect
0.65	1.5

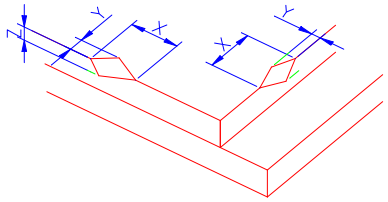
LCD: Liquid Crystal Display , LCM: Liquid Crystal Module,

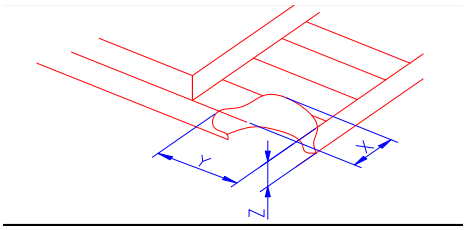
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. etc…	Major
2	Missing	Missing components and etc…	
3	Outline dimension	Overall outline dimension beyond the drawi ng is not allowed,deformation and etc…	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot/Line defect	Light dot,Dim spot,(Note1) Polarizer Air Bubble, Polarizer accidented spot and etc.	
6	Soldering appearance	Good soldering , Peeling off is not allowed and etc.	
7	LCD/Polarizer	Black/White spot/line, scratch, crack, etc.	

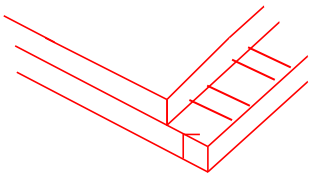
Note1: a) Light dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

b) Dim dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

8.1.4 Criteria (Visual)

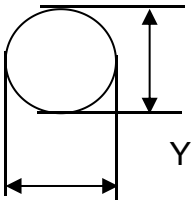
<table>
<tr><th>Number</th><th>Items</th><th>Criteria(mm)</th></tr>
<tr><td rowspan="3">1.0 LCD Crack/Broken
NOTE:
X: Length
Y: Width
Z: Height
L: Length of ITO,
T: Height of LCD</td><td>(1) The edge of LCD broken</td><td>

<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≤3.0mm</td><td><Inner border line of the seal</td><td>≤T</td></tr>
</table></td></tr>
<tr><td>(2)LCD corner broken</td><td>

<table>
<tr><th>X</th><th>Y</th><th>Z</th></tr>
<tr><td>≤3.0mm</td><td>≤L</td><td>≤T</td></tr>
</table></td></tr>
<tr><td>(3) LCD crack</td><td>
Crack
Not allowed</td></tr>
</table>

2.0

Spot defect



Φ=(X+Y)/2

① light dot (black/white spot , pinhole, stain , etc.)

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

② Dim spot (light leakage、dent、dark spot , etc)

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.15	Ignore	Ignore	
0.15<Φ≤0.25	3(distance≧10mm)		
0.25<Φ≤0.4	2(distance≧10mm)		
Φ>0.4	0		

③ Polarizer accidented spot

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.5	2(distance≧10mm)		
Φ>0.5	0		

④Polarizer Bubble

Zone / Size (mm)	Acceptable Qty		
	A	B	C
Φ≤0.2	Ignore		Ignore
0.2<Φ≤0.4	3(distance≧10mm)		
Φ>0.4	0		

3.0	LCD Pixel defect	Pixel bad points

Item	Zone A	Acceptable Qt
Bright dot	Random	N≤2
	2 dots adjacent	N≤0
	3 dots adjacent	N≤0
Dark dot	Random	N≤2
	2 dots adjacent	N≤0
	3 dots adjacent	N≤0
Distance	1. Minimum Distance Between Bright dots. 2. Minimum Distance Between dark dots 3. Minimum Distance Between dark and bright dot.	5mm
Total bright and dark dot		N≤4

Note:

A) Bright dot：Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.

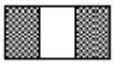
B) Dark dot: Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture.

C) 2 dot adjacent = 1 pair = 2 dots

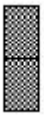
Picture:



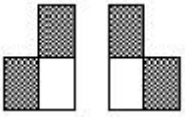
2 dot adjacent



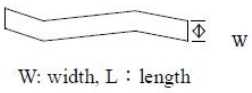
2 dot adjacent



2 dot adjacent (vertical)



2 dot adjacent (slant)

<table>
<tr><td>4.0</td><td>Line defect (LCD /Polarizer backlight black/white line, scratch, stain)


N : Count</td><td>
<table>
<tr><td rowspan="2">Width(mm)</td><td rowspan="2">Length(mm)</td><td colspan="3">Acceptable Qty</td></tr>
<tr><td>A</td><td>B</td><td>C</td></tr>
<tr><td>Φ≤0.05</td><td>Ignore</td><td colspan="2">Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.05<W≤0.06</td><td>L≤4.0</td><td colspan="2">N≤3</td></tr>
<tr><td>0.06<W≤0.08</td><td>L≤3.0</td><td colspan="2">N≤2</td></tr>
<tr><td>W>0.08</td><td colspan="4">Define as spot defect</td></tr>
</table>
</td></tr>
<tr><td>5.0</td><td>Electronic Components SMT.</td><td>Not allow missing parts , solderless connection , cold solder joint , mismatch , The positive and negative polarity opposite</td></tr>
<tr><td>6.0</td><td>Display color& Brightness.</td><td>1. Color : Measuring the color coordinates, The measurement standard according to the datasheet or samples.
2. Brightness : Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples.</td></tr>
<tr><td>7.0</td><td>LCD Mura/Waving/ Hot spot</td><td>Not visible through 5% ND filter in 50% gray or judge by limit sample if necessary.</td></tr>
</table>

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed

9. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	85℃,96HR	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Non-display; 3.Missing segments/line; 4.Glass crack; 5.Current IDD is twice higher than initial value.
Low Temperature Operating	-30℃, 96HR	
High Temperature Storage	85℃, 96HR	
Low Temperature Storage	-30℃, 96HR	
High Temperature & High Humidity Operating	+60℃, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-30℃,30 min ↔ 85℃,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±8KV, 5times; Contact:±6KV, 5 times; (Environment: 15℃~35℃, 30%~60%).	
Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces,80㎝(MEDIUM BOX)	

Remark:

1.The test samples should be applied to only one test item.

2.Sample size for each test item is 5~10pcs.

3.For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.

4.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

5.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

6. The color fading mura of polarizing filter should not care.

10. Cautions and Handling Precautions

10.1 Handling and Operating the Module

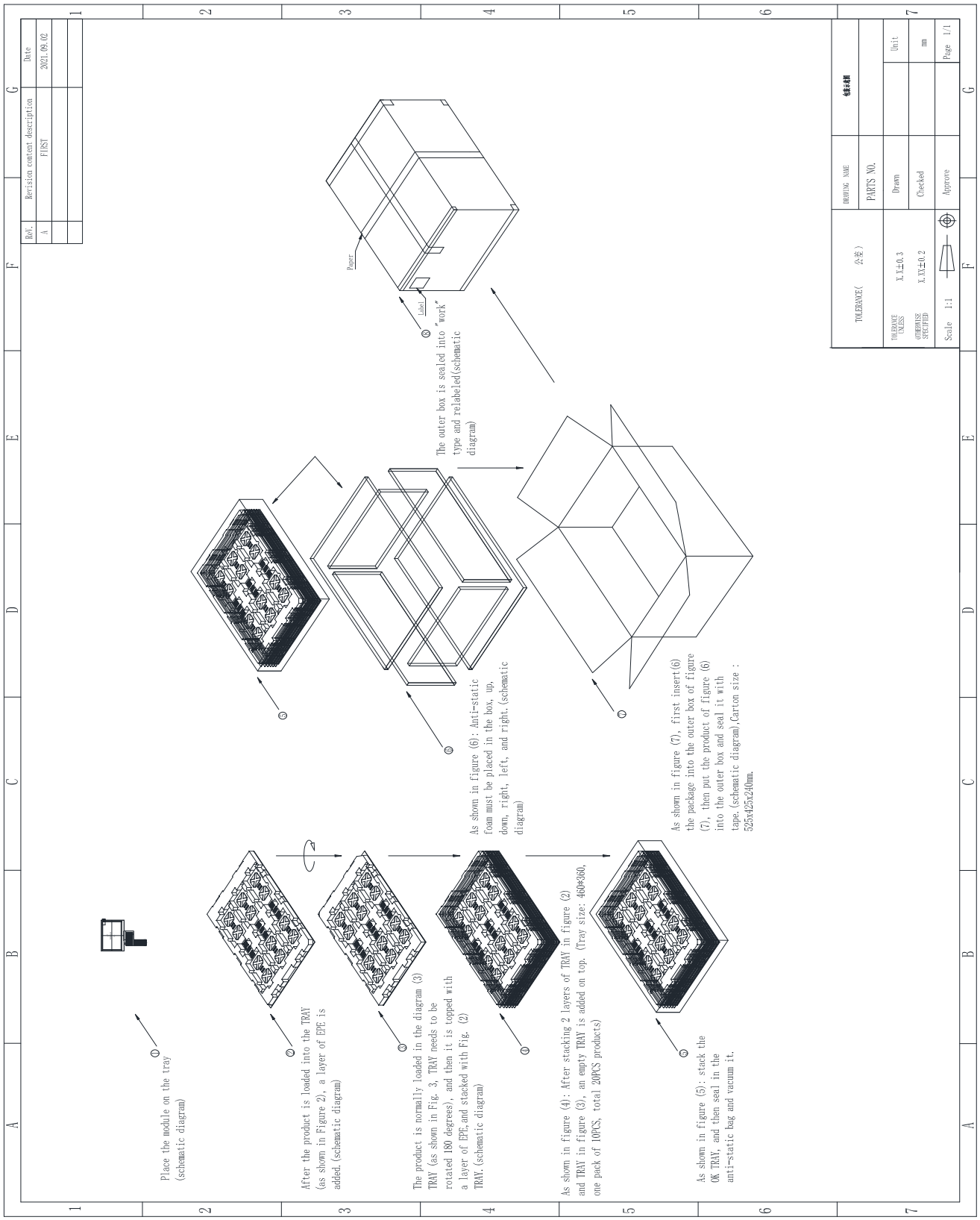
(1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.
(2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
(3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
(4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.
(5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
(6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
(7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
(8) Protect the module from static; it may cause damage to the CMOS ICs.
(9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
(10) Do not disassemble the module.
(11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
(12) Pins of I/F connector shall not be touched directly with bare hands.
(13) Do not connect, disconnect the module in the “Power ON” condition.

10.2 Storage and Transportation.

(1) Do not leave the panel in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35 ℃ and relative humidity of less than 70%
(2) Do not store the TFT-LCD module in direct sunlight.
(3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
(4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.

(5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

11. Packing


Rev.
A
Revision content description
FIRST
Date
2021.09.02
DRAWING NAME
包装流程
PARTS NO.
TOLERANCE(公差)
TOLERANCE UNLESS
X.X±0.3
OTHERWISE SPECIFIED
X.XX±0.2
Drawn
Checked
Approve
Unit
mm
Scale 1:1
Page 1/1
Paper
Label
"work"
① Place the module on the tray (schematic diagram)
② After the product is loaded into the TRAY (as shown in Figure 2), a layer of EPE is added.(schematic diagram)
③ The product is normally loaded in the diagram (3) TRAY (as shown in Fig. 3, TRAY needs to be rotated 180 degrees), and then it is topped with a layer of EPE,and stacked with Fig. (2) TRAY.(schematic diagram)
④ As shown in figure (4): After stacking 2 layers of TRAY in figure (2) and TRAY in figure (3), an empty TRAY is added on top. (Tray size: 460*360, one pack of 10PCS, total 20PCS products)
⑤ As shown in Figure (5): stack the OK TRAY, and then seal in the anti-static bag and vacuum it.
⑥ As shown in figure (6): Anti-static foam must be placed in the box, up, down, right, left, and right.(schematic diagram)
⑦ As shown in figure (7), first insert(6) the package into the outer box of figure (7), then put the product of figure (6) into the outer box and seal it with tape.(schematic diagram),Carton size : 525x425x240mm.
⑧ The outer box is sealed into type and relabeled(schematic diagram)