

PRODUCT SPECIFICATION

12.1” TFT LCD MODULE  
MODEL: YDP LCD I 1210 LVDS 002



- < ◇ > Preliminary Specification
- < ◆ > Finally Specification

CUSTOMER’S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWED	PD REVIEWED	PREPARED BY
-	<div>TFT W. S. L 20241217</div>	<div>TFT 周福云 20241217</div>	<div>TFT L. L 20241217</div>



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**Revision History**

Revision	Date	Originator	Detail	Remarks
Ver 1.0	2024.12.17	LL	Initial Release	

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## 1. General Description

The specification is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT-LCD panel, driver ICs and a backlight unit.

## 2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	12.1"	
LCD type	IPS TFT	
Display Mode	Transmissive /Normally Black	
Resolution	1280 RGB x 800	Pixels
View Direction	full view	Best Image
Module Outline	277.70(H) x 180.60(V) x 5.60(T) (Note1 )	mm
Active Area	260.35(H) x 162.72(V)	mm
Pixel Pitch	203.4(H) x 203.4(V)	um
Pixel Arrangement	R.G.B Vertical stripe	
Display Colors	16.7M	
Interface	LVDS Interface	
With or without the touch panel	Without	
Operating Temperature	-20~80	°C
Storage Temperature	-30~85	°C
Weight	TBD	g

Note 1: Inclusive hooks, posts, FFC/FPC tail etc.

## 3. Absolute Maximum Ratings

GND=0V, Ta=25°C

Item	Symbol	Min.	Max.	Unit
Digital Supply Voltage	VDD	3.0	3.6	V
Storage temperature	T <sub>STG</sub>	-30	85	°C
Operating temperature	T <sub>OP</sub>	-20	80	°C

**Note 1:** If Ta below 50°C, the maximal humidity is 90%RH, if Ta over 50°C, absolute humidity should be less than 60%RH.

**Note 2:** The response time will be extremely slow when the operating temperature is around -10°C, and the back ground will become darker at high temperature operating.

## 4. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	V <sub>DD</sub>	3.0	3.3	3.6	V
Differential Input High Threshold	V <sub>TH</sub>	-	-	+100	mV
Differential Input Low Threshold	V <sub>TL</sub>	-100	-	-	mV
Differential Input Common Mode Voltage	V <sub>CM</sub>	1	1.2	1.4	V
Input Differential Voltage	V <sub>ID</sub>	200	-	600	mV
Current Consumption	I <sub>VDD</sub>	-	TBD	-	mA

## 5. Backlight Characteristic

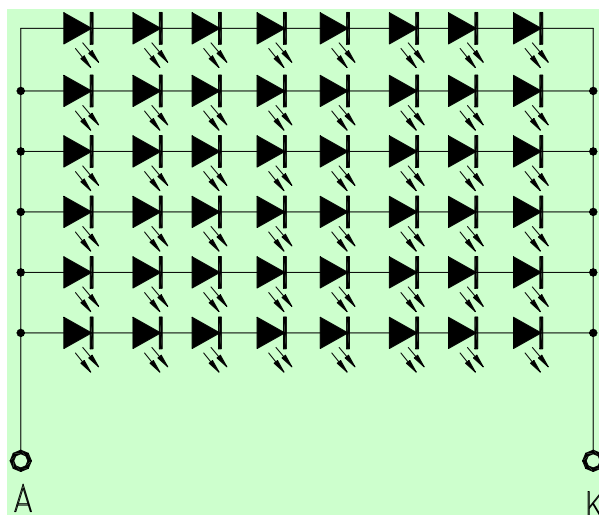
### 5.1. Backlight Characteristic

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V <sub>F</sub>	Ta=25 °C, I <sub>F</sub> =60 mA/LED	22.4	24.8	27.2	V
Forward Current	I <sub>F</sub>	Ta=25 °C, V <sub>F</sub> =3.1/LED	-	360	-	mA
Power dissipation	P <sub>D</sub>	-		8928		mW
Uniformity	Avg	-	-	80	-	%
LED working life(25°C)	-		-	30000	-	Hrs
Drive method	Constant current					
LED Configuration	48 White LEDs ( 8 LEDs in one string and 6 groups in parallel)					

Note1: LED life time defined as follows: The final brightness is at 50% of original brightness.

The environmental conducted under ambient air flow, at Ta=25±2 °C, 60%RH±5%, I<sub>F</sub>=60mA/LED.

### 5.2. Backlighting circuit



## 6. Optical Characteristics

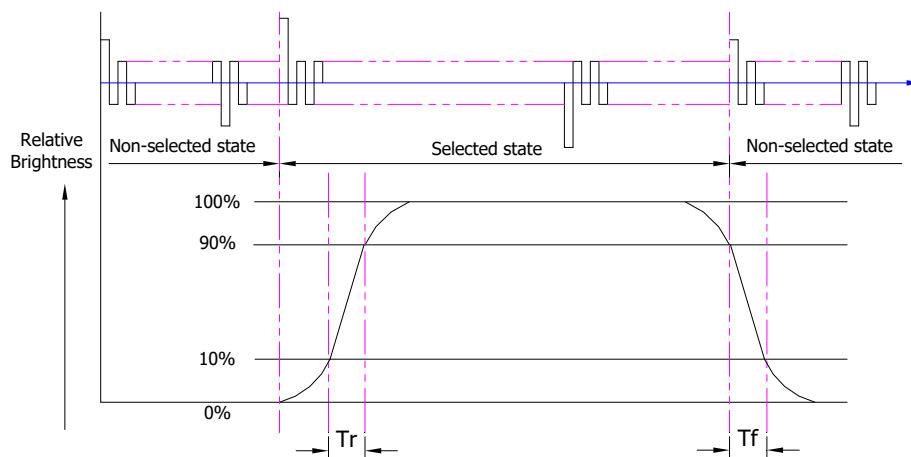
### 6.1. Optical Characteristics

Ta=25°C, VDD=3.3V

Backlight On (Transmissive Mode)	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
	Luminance on TFT( $I_f$ =60mA/LED)		Lv		400	500	-	cd/m <sup>2</sup>
	Contrast ratio(See 6.3)		CR		(1000)	(1200)	-	
	Response time (See 6.2)		TR+TF		-	30	35	ms
	Chromaticity Transmissive (See 6.5)	Red	XR		-	TBD	-	
			YR		-	TBD	-	
		Green	XG		-	TBD	-	
			YG		-	TBD	-	
		Blue	XB		-	TBD	-	
			YB		-	TBD	-	
		White	Xw		-	TBD	-	
			Yw		-	TBD	-	
	Viewing Angle (See 6.4)	Horizontal	θX+	Center CR≥10	80	85	-	Deg.
			θX-		80	85	-	
		Vertical	φY+		80	85	-	
			φY-		80	85	-	
NTSC ratio (Color gamut)				68	70	-	%	

### 6.2. Definition of Response Time

#### 6.2.1. Normally Black Type (Negative)

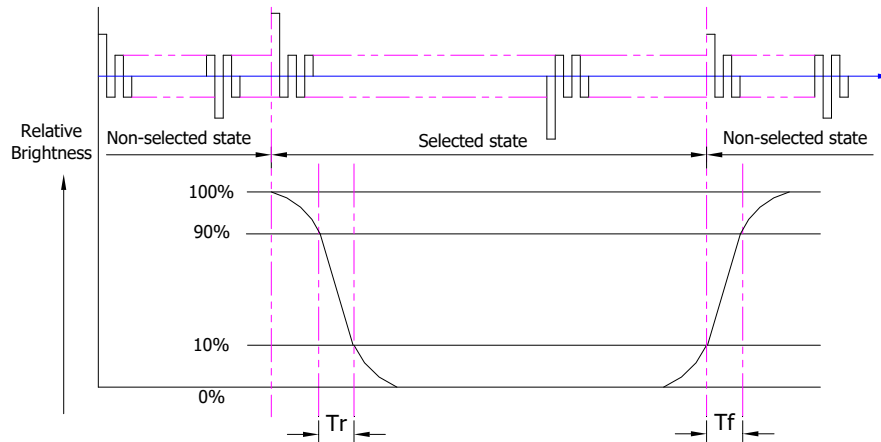


$T_r$  is the time it takes to change from non-selected stage with relative luminance 10% to selected state with relative luminance 90%;

$T_f$  is the time it takes to change from selected state with relative luminance 90% to non-selected state with relative luminance 10%.

Note: Measuring machine: LCD-5100

#### 6.2.2. Normally White Type (Positive)



Tr is the time it takes to change from non-selected state with relative luminance 90% to selected state with relative luminance 10%;

Tf is the time it takes to change from selected state with relative luminance 10% to non-selected state with relative luminance 90%;

Note: Measuring machine: LCD-5100 or EQUI

#### 6.3. Definition of Contrast Ratio

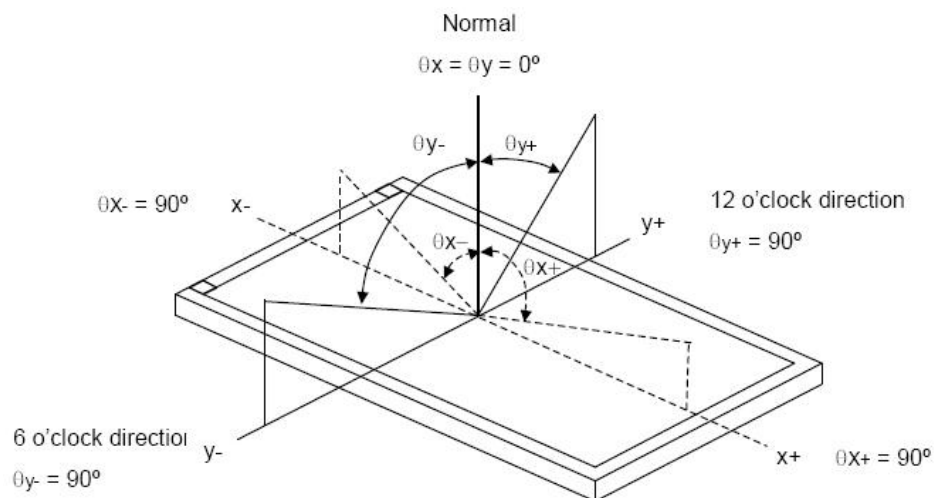
Contrast is measured perpendicular to display surface in reflective and transmissive mode.

The measurement condition is:

Measuring Equipment	Eldim or Equivalent
Measuring Point Diameter	3mm//1mm
Measuring Point Location	Active Area centre point
Test pattern	A: All Pixels white
	B: All Pixel black
Contrast setting	Maximum

Definitions: CR (Contrast) = Luminance of White Pixel / Luminance of Black Pixel

#### 6.4. Definition of Viewing Angles



Measuring machine: LCD-5100 or EQUI

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## 6.5. Definition of Color Appearance

R,G,B and W are defined by (x, y) on the IE chromaticity diagram

NTSC=area of RGB triangle/area of NTSC triangleX100%

Measuring picture: Red, Green, Blue and White (Measuring machine: BM-7)



## 6.6. Definition of Surface Luminance, Uniformity and Transmittance

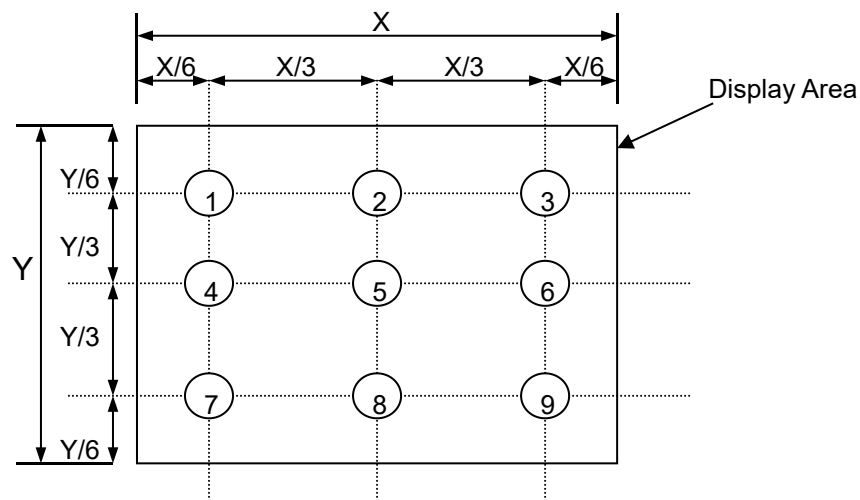
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

6.6.1. Surface Luminance:  $L_V = \text{average } (L_{P1}:L_{P9})$

6.6.2. Uniformity = Minimal ( $L_{P1}:L_{P9}$ ) / Maximal ( $L_{P1}:L_{P9}$ ) \* 100%

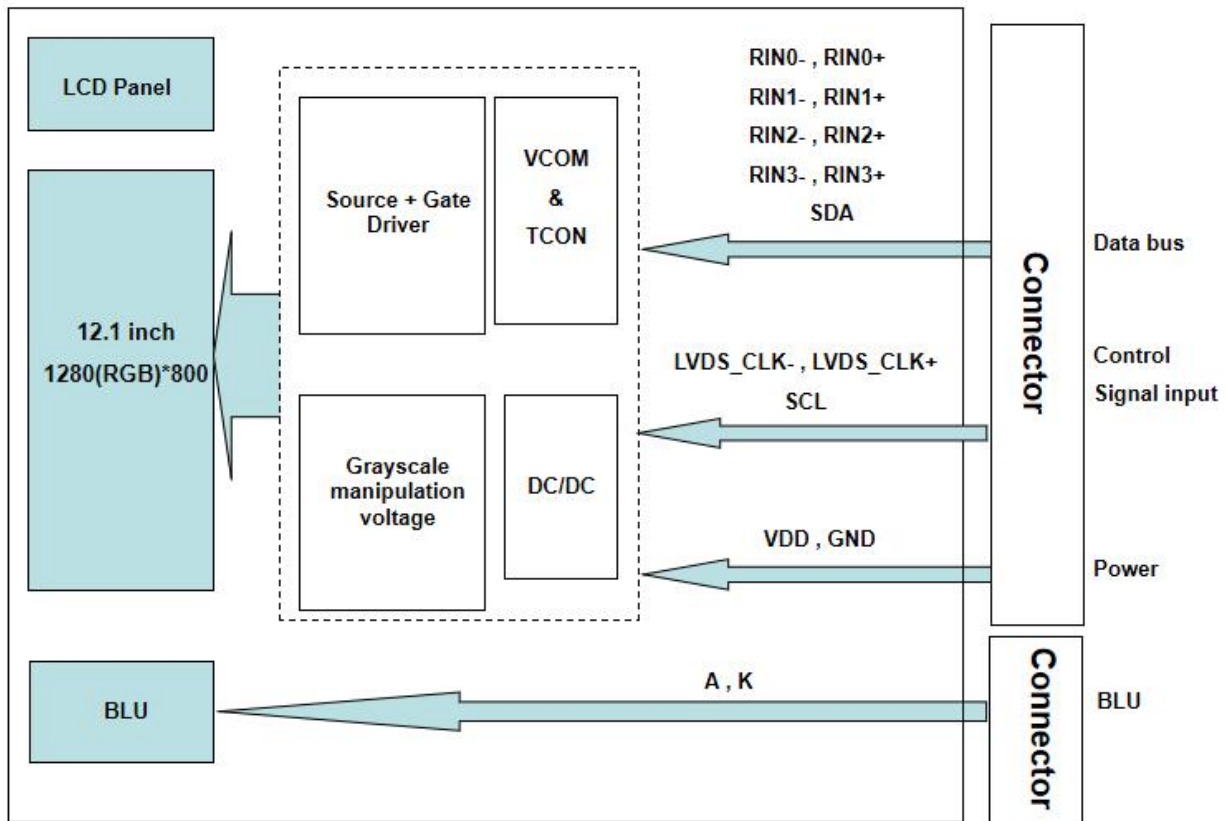
6.6.3. Transmittance =  $L_V$  on LCD /  $L_V$  on Backlight \* 100%

Note: Measuring machine: BM-7





## 7. Block Diagram and Power Supply



## 8. Interface Pins Definition

No.	Symbol	Function	Remark
1	NC	No connected	
2	VDD	Power supply	
3	VDD	Power supply	
4	VDD	Power supply	
5	NC	No connected	
6	GND	Ground	
7	GND	Ground	
8	RIN0-	LVDS Data differential signal input pins	
9	RIN0+	LVDS Data differential signal input pins	
10	GND	Ground	
11	RIN1-	LVDS Data differential signal input pins	
12	RIN1+	LVDS Data differential signal input pins	
13	GND	Ground	
14	RIN2-	LVDS Data differential signal input pins	
15	RIN2+	LVDS Data differential signal input pins	
16	GND	Ground	
17	LVDS_CLK-	LVDS cLOCK differential signal input pins	
18	LVDS_CLK+	LVDS cLOCK differential signal input pins	
19	GND	Ground	
20	RIN3-	LVDS Data differential signal input pins	
21	RIN3+	LVDS Data differential signal input pins	
22	GND	Ground	
23	NC	No connected	
24	NC	No connected	
25	GND	Ground	
26	SDA	Serial data input/output for I2C Interface	
27	SCL	Clock Input for I2C interface	
28	GND	Ground	
29	NC	No connected	
30	NC	No connected	
31	GND	Ground	
32	GND	Ground	
33	GND	Ground	
34	NC	No connected	
35	PWM/NC	No connected	
36	LED-EN/NC	No connected	
37	NC/NC	No connected	
38	VLED/NC	No connected	
39	VLED/NC	No connected	
40	VLED/NC	No connected	

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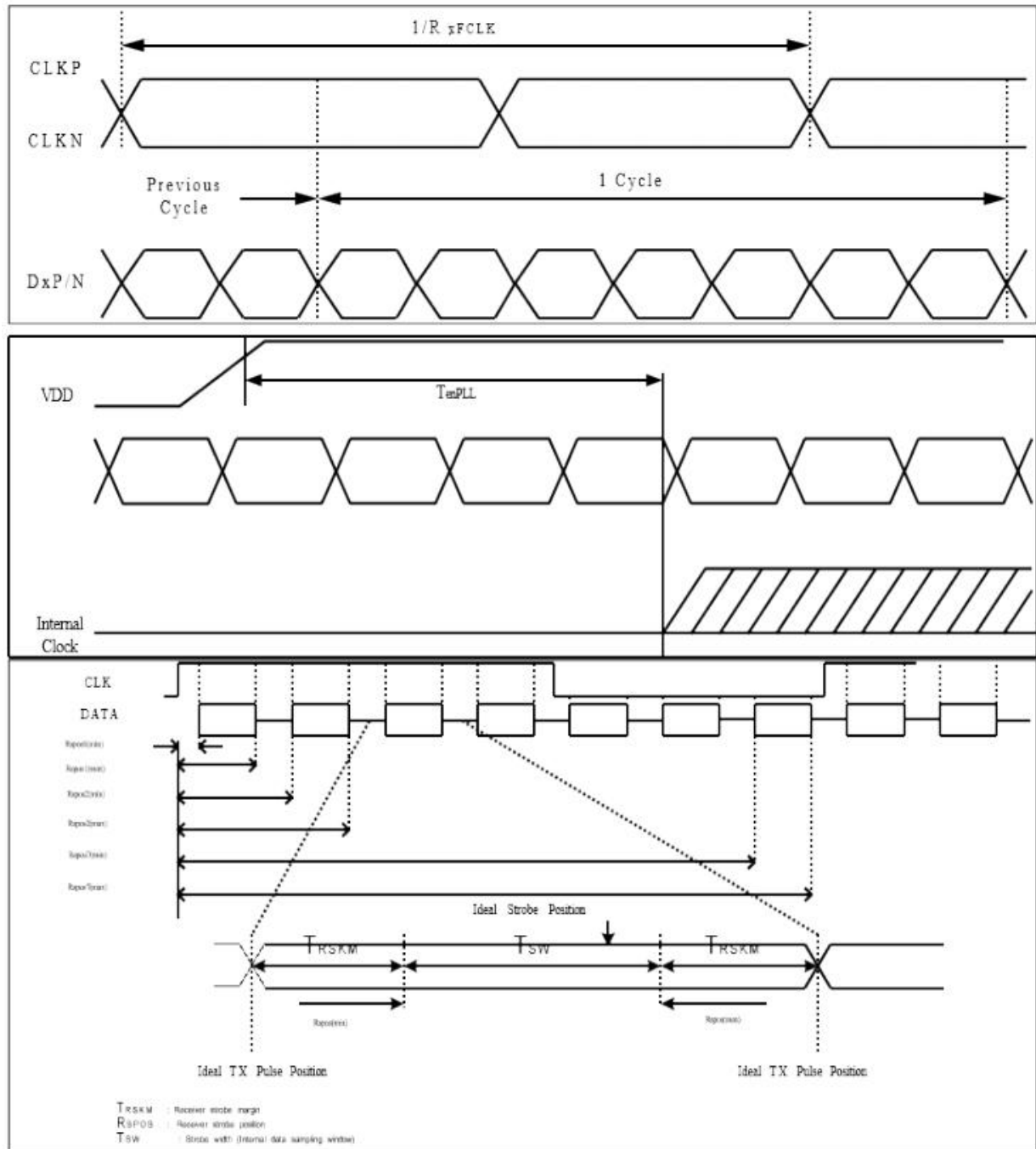
BLU:

No.	Symbol	Function
1	A	Backlight anode
2	K	Backlight cathode

## 9. AC Specification

### 9.1. LVDS Receiver Differential Input ( AC Characteristics )

Parameter	Symbol	Min	Typ	Max	Unit	Notes
LVDS Strobe Width	$t_{SW}$	200	-	-	ps	$V_{cm} = 1.2V$ $V_{ID} = 200mV$ @81MHz
LVDS Receiver Skew Margin	$t_{RSKM}$	500	-	-	ps	



## 9.2. Timing Parameters (DE only mode)

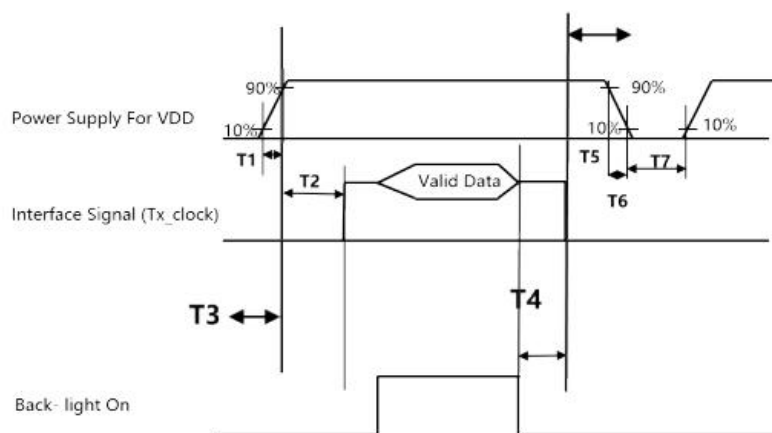
Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60Hz (LVDS)	$F_{DCLK}$	69.7	75	80.9	MHz
Horizontal display area	$T_{HD}$	1280			DCLK
HSYNC period time	$T_H$	1380	1440	1500	DCLK
HSYNC blanking	$T_{HBP}+T_{HFP}$	100	160	220	DCLK
Vertical display area	$T_{VD}$	800			H
VSYNC period time	$T_V$	842	838	872	H
VSYNC blanking	$T_{VBP}+T_{VFP}$	24	38	72	H

### Note

1. DE Only Mode, While operation, DE signal should be have the same cycle. The input of HSYNC & VSYNC signal does not have an effect on normal operation.
2. Best operation clock frequency is 75Mhz.
3. Frequency] = [H Total] \* [V Total] \* [vertical Frame rate]  
H Total, V Total and Frame rate]should operate within the range between Frequency\_Min and Frequency\_Max
4. Except Best operation clock frequency, FOS(Flicker & Brightness & Crosstalk, Etc.) are not  
gua5r.anMtaeiend.  
frequency Max is 80.9Mhz MHz without spread spectrum

### 9.3. POWER SEQUENCE

To prevent a latch-up or DC operation of the Open Cell, the power on/off sequence shall be as shown in below



Parameter	Values			Units
	Min	Typ	Max	
T1	0.1	-	10	ms
T2	0.1	-	50	ms
T3	300	-	-	ms
T4	200	-	-	ms
T5	0.1	-	50	s
T6	0.1	-	10	ms
T7	500	-	-	ms

Note 1: Even though T1 is over the specified value, there is no problem if the rush current is within Spec.

Note 2: When the power supply VDD is 0V, keep the level of input signals on the low or high impedance;

※ Please avoid floating state of interface signal at invalid period.

※ When the power supply for LCD (VDD) is off, be sure to pull down the valid and invalid data to 0V.

Note 3: The T3 / T4 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.

Note 4: T6: Voltage of VDD must decay smoothly after power-off, there should be no re-bounding voltage. (customer system decide this value)

Note 5: T7 should be measured after the Module has been fully discharged between power off and on period

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## **10. Quality Assurance**

### **10.1.Purpose**

This standard for Quality Assurance assures the quality of LCD module products supplied to customer.

### **10.2.Standard for Quality Test**

#### 10.2.1. Sampling Plan:

GB2828.1-2012

Single sampling, general inspection level II

#### 10.2.2. Sampling Criteria:

Visual inspection: AQL 1.5.

Electrical functional: AQL 0.65.

#### 10.2.3. Reliability Test:

Detailed requirement refer to Reliability Test Specification.

### **10.3.Nonconforming Analysis & Disposition**

#### 10.3.1. Nonconforming analysis:

10.3.1.1. Customer should provide overall information of non-conforming sample for their complaints.

10.3.1.2. After receipt of detailed information from customer, the analysis of nonconforming parts usually should be finished in one week.

10.3.1.3. If cannot finish the analysis on time, customer will be notified with the progress status.

#### 10.3.2. Disposition of nonconforming:

10.3.2.1. Non-conforming product over PPM level will be replaced.

10.3.2.2. The cause of non-conformance will be analyzed. Corrective action will be discussed and implemented.

### **10.4.Agreement Items**

Shall negotiate with customer if the following situation occurs:

10.4.1. There is any discrepancy in standard of quality assurance.

10.4.2. Additional requirement to be added in product specification.

10.4.3. Any other special problem.

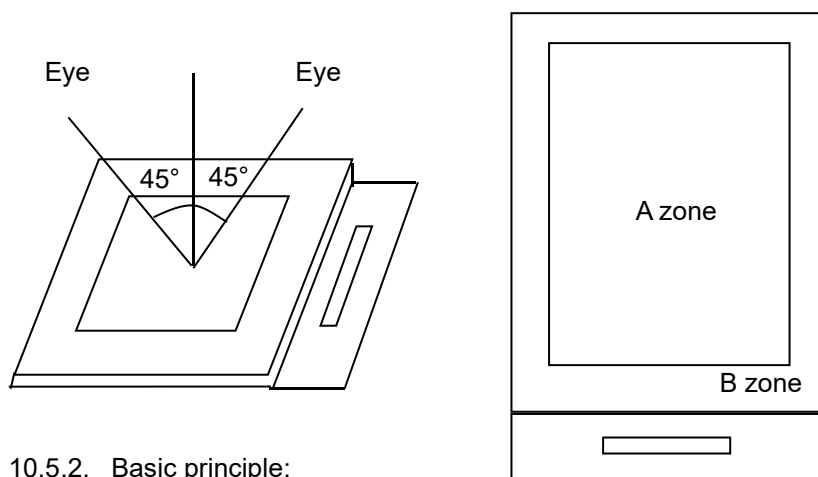
### **10.5.Standard of the Product Visual Inspection**

#### 10.5.1. Appearance inspection:

10.5.1.1. The inspection must be under illumination about 1000 – 1500 lx, and the distance of view must be at 30cm ± 2cm.

10.5.1.2. The viewing angle should be 45° from the vertical line without reflection light or follows customer's viewing angle specifications.

### 10.5.1.3. Definition of area: A Zone: Active Area, B Zone: Viewing Area,

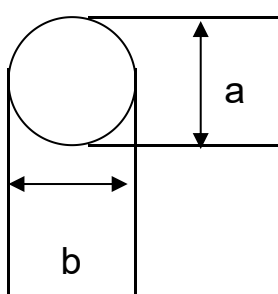


### 10.5.2. Basic principle:

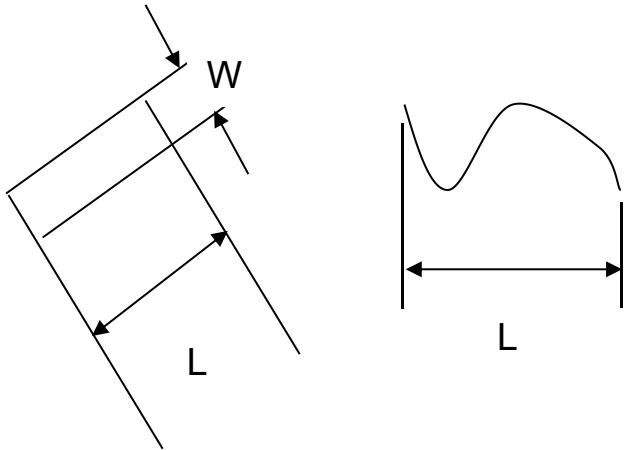
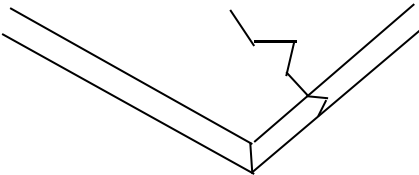
10.5.2.1. A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.

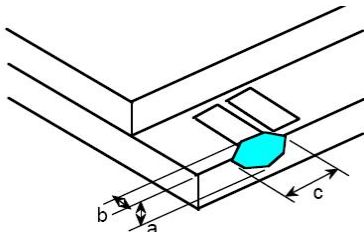
10.5.2.2. New item must be added on time when it is necessary.

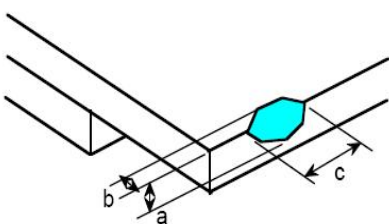
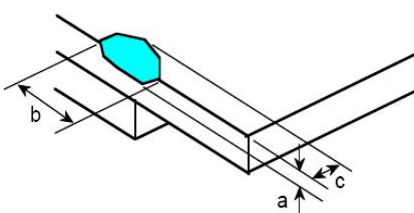
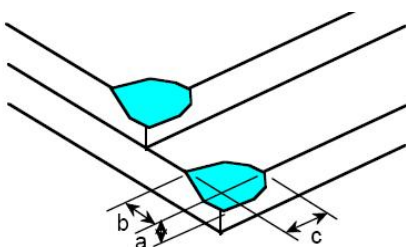
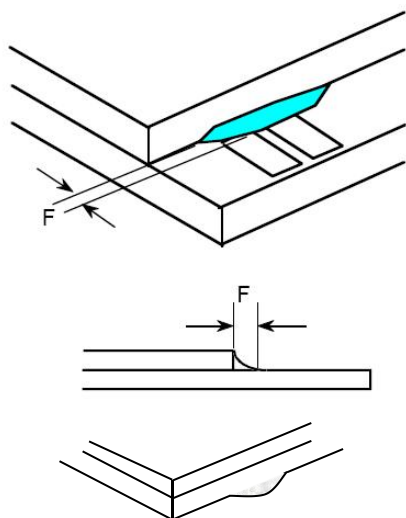
## 10.6. Inspection Specification

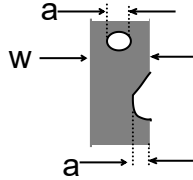
No.	Item	Criteria (Unit: mm)																		
01	Black / White spot Foreign material (Round type) Pinholes Stain Particles inside cell. (Minor defect)	 $\phi = (a + b) / 2$	<table><tr><th>Size \ Area</th><th>Acc. Qty</th></tr><tr><td><math>\phi \leq 0.20</math></td><td>Ignore</td></tr><tr><td><math>0.20 &lt; \phi \leq 0.50</math></td><td><math>N \leq 3</math></td></tr><tr><td><math>0.50 &lt; \phi</math></td><td>0</td></tr></table>		Size \ Area	Acc. Qty	$\phi \leq 0.20$	Ignore	$0.20 < \phi \leq 0.50$	$N \leq 3$	$0.50 < \phi$	0								
			Size \ Area	Acc. Qty																
$\phi \leq 0.20$	Ignore																			
$0.20 < \phi \leq 0.50$	$N \leq 3$																			
$0.50 < \phi$	0																			
		Distance between 2 defects should more than 5mm apart.																		
02	Electrical Defect (Minor defect)	<table><tr><td rowspan="2">Bright dot</td><td>Display Area</td><td>Total</td><td rowspan="3">Note1</td></tr><tr><td><math>N \leq 2</math></td><td><math>N \leq 2</math></td></tr><tr><td>Dark dot</td><td><math>N \leq 4</math></td><td><math>N \leq 4</math></td></tr><tr><td>Total dot</td><td><math>N \leq 4</math></td><td><math>N \leq 4</math></td></tr><tr><td>Mura</td><td colspan="2">Not visible through 5% ND filters.</td><td>Note 2</td></tr></table>			Bright dot	Display Area	Total	Note1	$N \leq 2$	$N \leq 2$	Dark dot	$N \leq 4$	$N \leq 4$	Total dot	$N \leq 4$	$N \leq 4$	Mura	Not visible through 5% ND filters.		Note 2
		Bright dot	Display Area	Total		Note1														
$N \leq 2$	$N \leq 2$																			
Dark dot	$N \leq 4$	$N \leq 4$																		
Total dot	$N \leq 4$	$N \leq 4$																		
Mura	Not visible through 5% ND filters.		Note 2																	
		Remark: 1. Bright dot caused by scratch and foreign object accords to item 1.																		



03	Black and White line Scratch Foreign material (Line type) (Minor defect)	 <table border="1" data-bbox="608 705 1233 969"> <thead> <tr> <th>Length</th><th>Width</th><th>Acc. Qty</th></tr> </thead> <tbody> <tr> <td>/</td><td><math>W \leq 0.1</math></td><td>Ignore</td></tr> <tr> <td><math>L \leq 2.5</math></td><td><math>0.1 &lt; W \leq 0.2</math></td><td>3</td></tr> <tr> <td><math>L &gt; 2.5</math></td><td><math>0.2 &lt; W</math></td><td>0</td></tr> <tr> <td colspan="2">Total</td><td>3</td></tr> </tbody> </table> <p>Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable.</p>	Length	Width	Acc. Qty	/	$W \leq 0.1$	Ignore	$L \leq 2.5$	$0.1 < W \leq 0.2$	3	$L > 2.5$	$0.2 < W$	0	Total		3
Length	Width	Acc. Qty															
/	$W \leq 0.1$	Ignore															
$L \leq 2.5$	$0.1 < W \leq 0.2$	3															
$L > 2.5$	$0.2 < W$	0															
Total		3															
04	Glass Crack (Minor defect)	 <p>Crack is potential to enlarge, any type is not allowed.</p>															

05	Glass Chipping Pad Area: (Minor defect)		<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td><math>c &gt; 3.0, b &lt; 1.0</math></td><td>1</td></tr><tr><td><math>c &lt; 3.0, b &lt; 1.0</math></td><td>3</td></tr><tr><td colspan="2"><math>a &lt; \text{Glass Thickness}</math></td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	3	$a < \text{Glass Thickness}$	
	Length and Width	Acc. Qty									
$c > 3.0, b < 1.0$	1										
$c < 3.0, b < 1.0$	3										
$a < \text{Glass Thickness}$											

06	<p>Glass Chipping Rear of Pad Area: (Minor defect)</p> 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td><math>c &gt; 3.0, b &lt; 1.0</math></td><td>1</td></tr><tr><td><math>c &lt; 3.0, b &lt; 1.0</math></td><td>2</td></tr><tr><td><math>c &lt; 3.0, b &lt; 0.5</math></td><td>4</td></tr><tr><td colspan="2"><math>a &lt; \text{Glass Thickness}</math></td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
07	<p>Glass Chipping Except Pad Area: (Minor defect)</p> 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td><math>c &gt; 3.0, b &lt; 1.0</math></td><td>1</td></tr><tr><td><math>c &lt; 3.0, b &lt; 1.0</math></td><td>2</td></tr><tr><td><math>c &lt; 3.0, b &lt; 0.5</math></td><td>4</td></tr><tr><td colspan="2"><math>a &lt; \text{Glass Thickness}</math></td></tr></table>	Length and Width	Acc. Qty	$c > 3.0, b < 1.0$	1	$c < 3.0, b < 1.0$	2	$c < 3.0, b < 0.5$	4	$a < \text{Glass Thickness}$	
Length and Width	Acc. Qty											
$c > 3.0, b < 1.0$	1											
$c < 3.0, b < 1.0$	2											
$c < 3.0, b < 0.5$	4											
$a < \text{Glass Thickness}$												
08	<p>Glass Corner Chipping: (Minor defect)</p> 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td><math>c &lt; 3.0, b &lt; 3.0</math></td><td>Ignore</td></tr><tr><td colspan="2"><math>a &lt; \text{Glass Thickness}</math></td></tr></table>	Length and Width	Acc. Qty	$c < 3.0, b < 3.0$	Ignore	$a < \text{Glass Thickness}$					
Length and Width	Acc. Qty											
$c < 3.0, b < 3.0$	Ignore											
$a < \text{Glass Thickness}$												
09	<p>Glass Burr: (Minor defect)</p> 	<table><tr><th>Length</th><th>Acc. Qty</th></tr><tr><td><math>F &lt; 1.0</math></td><td>Ignore</td></tr></table> <p>Glass burr don't affect assemble and module dimension.</p>	Length	Acc. Qty	$F < 1.0$	Ignore						
Length	Acc. Qty											
$F < 1.0$	Ignore											

10	FPC Defect: (Minor defect) 	10.1 Dent, pinhole width $a < w/3$ . (w: circuitry width.) 10.2 Open circuit is unacceptable. 10.3 No oxidation, contamination and distortion.								
11	Bubble on Polarizer (Minor defect)	<table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td><math>\varphi \leq 0.30</math></td><td>Ignore</td></tr><tr><td><math>0.30 &lt; \varphi \leq 0.50</math></td><td><math>N \leq 2</math></td></tr><tr><td><math>0.50 &lt; \varphi</math></td><td><math>N = 0</math></td></tr></table>	Diameter	Acc. Qty	$\varphi \leq 0.30$	Ignore	$0.30 < \varphi \leq 0.50$	$N \leq 2$	$0.50 < \varphi$	$N = 0$
Diameter	Acc. Qty									
$\varphi \leq 0.30$	Ignore									
$0.30 < \varphi \leq 0.50$	$N \leq 2$									
$0.50 < \varphi$	$N = 0$									
12	Dent on Polarizer (Minor defect)	<table><tr><th>Diameter</th><th>Acc. Qty</th></tr><tr><td><math>\varphi \leq 0.25</math></td><td>Ignore</td></tr><tr><td><math>0.25 &lt; \varphi \leq 0.50</math></td><td><math>N \leq 4</math></td></tr><tr><td><math>0.50 &lt; \varphi</math></td><td>None</td></tr></table>	Diameter	Acc. Qty	$\varphi \leq 0.25$	Ignore	$0.25 < \varphi \leq 0.50$	$N \leq 4$	$0.50 < \varphi$	None
Diameter	Acc. Qty									
$\varphi \leq 0.25$	Ignore									
$0.25 < \varphi \leq 0.50$	$N \leq 4$									
$0.50 < \varphi$	None									
13	Bezel	13.1 No rust, distortion on the Bezel. 13.2 No visible fingerprints, stains or other contamination.								
14	PCB	14.1 No distortion or contamination on PCB terminals. 14.2 All components on PCB must same as documented on the BOM/component layout. 14.3 Follow IPC-A-600F.								
15	Soldering	Follow IPC-A-610C standard								
16	Electrical Defect (Major defect)	The below defects must be rejected. 16.1 Missing vertical / horizontal segment, 16.2 Abnormal Display. 16.3 No function or no display. 16.4 Current exceeds product specifications. 16.5 LCD viewing angle defect. 16.6 No Backlight. 16.7 Dark Backlight. 16.8 Touch Panel no function.								

Remark: LCD Panel Broken shall be rejected. Defect out of LCD viewing area is acceptable.

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## 10.7. Classification of Defects

10.7.1. Visual defects (Except no / wrong label) are treated as minor defect and electrical defect is major.

10.7.2. Two minor defects are equal to one major in lot sampling inspection.

## 10.8. Identification/marketing criteria

Any unit with illegible / wrong / double or no marking/ label shall be rejected.

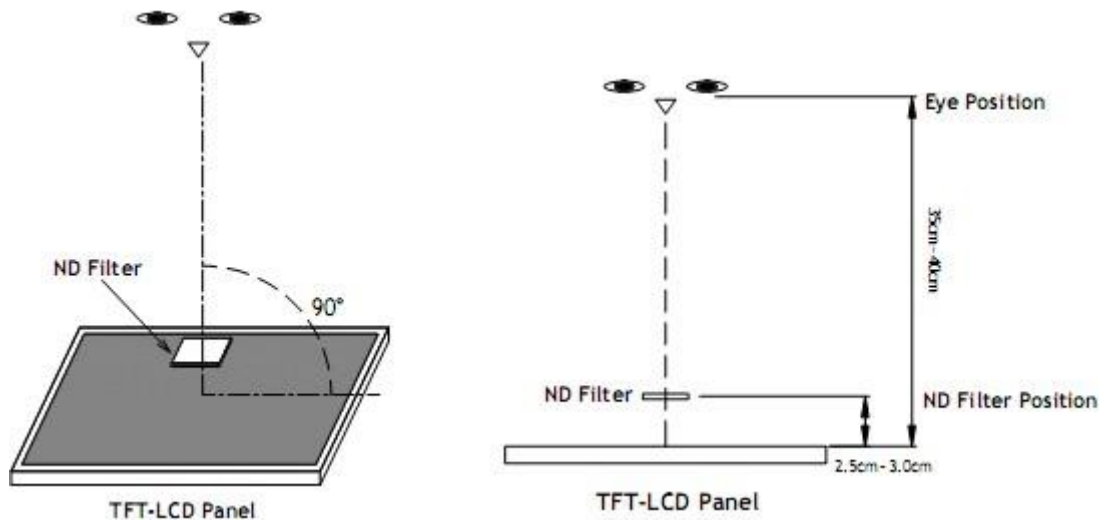
## 10.9. Packing

10.9.1. There should be no damage of the outside carton box, each packaging box should have one identical label.

10.9.2. Modules inside package box should have compliant mark.

10.9.3. All direct package materials shall offer ESD protection.

**Note1:** Bright dot is defined as the defective area of the dot is larger than 50% of one sub-pixel area.



**Bright dot:** The bright dot size defect at black display pattern. It can be recognized by 2% transparency of filter when the distance between eyes and panel is  $350\text{mm} \pm 50\text{mm}$ .

**Dark dot:** Cyan, Magenta or Yellow dot size defect at white display pattern. It can be recognized by 5% transparency of filter when the distance between eyes and panel is  $350\text{mm} \pm 50\text{mm}$ .

**Note2:** Mura on display which appears darker / brighter against background brightness on parts of display area.

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## 11. Reliability Specification

No	Item	Condition	Quantity	Criteria
1	High Temperature Operating	80℃, 96Hrs	2	GB/T2423.2-2008
2	Low Temperature Operating	-20℃, 96Hrs	2	GB/T2423.1-2008
3	High Humidity Storage	60℃, 90%RH, 96Hrs	2	GB/T2423.3-2016
4	High Temperature Storage	85℃, 96Hrs	2	GB/T2423.2-2008
5	Low Temperature Storage	-30℃, 96Hrs	2	GB/T2423.1-2008
6	Thermal Cycling Test Storage	-20℃, 60min~60℃, 60min, 20 cycles.	2	GB/T2423.22-2012
7	Packing vibration	Frequency range:10Hz~50Hz Acceleration of gravity:1.5G X,Y,Z 30 min for each direction.	-	GB/T5170.14-2009
8	Electrical Static Discharge	Air:±8KV 150pF/330Ω 5 times Contact:±4KV 150pF/330Ω 5 times	2	GB/T17626.2-2018
9	Drop Test (Packaged)	Height:80 cm,1 corner, 3 edges, 6 surfaces.	-	GB/T2423.7-2018

Note1. No defection cosmetic and operational function allowable.

Note2. Total current Consumption should be below double of initial value

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## 12. Precautions and Warranty

### 12.1.Safety

- 12.1.1. The liquid crystal in the LCD is poisonous. Do not put it in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water.
- 12.1.2. Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

### 12.2.Handling

- 12.2.1. Reverse and use within ratings in order to keep performance and prevent damage.
- 12.2.2. Do not wipe the polarizer with dry cloth, as it might cause scratch. If the surface of the LCD needs to be cleaned, wipe it swiftly with cotton or other soft cloth soaked with petroleum IPA, do not use other chemicals.

### 12.3.Storage

- 12.3.1. Do not store the LCD module beyond the specified temperature ranges.
- 12.3.2. Strong light exposure causes degradation of polarizer and color filter.

### 12.4.Metal Pin (Apply to Products with Metal Pins)

#### 12.4.1. Pins of LCD and Backlight

- 12.4.1.1. Solder tip can touch and press on the tip of Pin LEAD during the soldering

#### 12.4.1.2. Recommended Soldering Conditions

Solder Type: Sn96.3~94-Ag3.3~4.3-Cu0.4~1.1

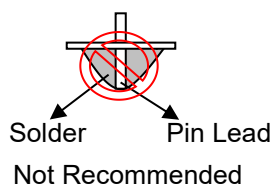
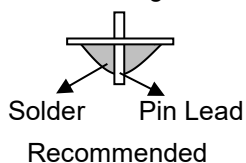
Maximum Solder Temperature: 370°C

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20°C

Typical Soldering Time: ≤3s

#### 12.4.1.3. Solder Wetting



#### 12.4.2. Pins of EL

- 12.4.2.1. Solder tip can touch and press on the tip of EL leads during soldering.

- 12.4.2.2. No Solder Paste on the soldering pad on the motherboard is recommended.

#### 12.4.2.3. Recommended Soldering Conditions

Solder type: Nippon Alimit Leadfree SR-34, size 0.5mm

Recommended Solder Temperature: 270~290°C

Typical Soldering Time: ≤2s

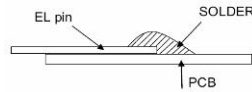
Minimum solder distance from EL lamp (body):2.0mm

- 12.4.2.4. No horizontal press on the EL leads during soldering.

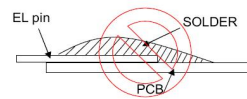
- 12.4.2.5. 180° bend EL leads three times is not allowed.
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#### 12.4.2.6. Solder Wetting

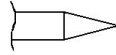


Recommended

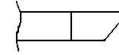


Not Recommended

#### 12.4.2.7. The type of the solder iron:

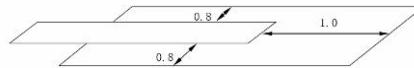


Recommended



Not Recommended

#### 12.4.2.8. Solder Pad



### 12.5.Operation

- 12.5.1. Do not drive LCD with DC voltage
- 12.5.2. Response time will increase below lower temperature
- 12.5.3. Display may change color with different temperature
- 12.5.4. Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear “fractured”.
- 12.5.5. Do not connect or disconnect the LCM to or from the system when power is on.
- 12.5.6. Never use the LCM under abnormal condition of high temperature and high humidity.
- 12.5.7. Module has high frequency circuits. Sufficient suppression to the electromagnetic interface shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.
- 12.5.8. *Do not display the fixed pattern for long time (we suggest the time not longer than one hour) because it will develop image sticking due to the TFT structure.*

### 12.6.Static Electricity

- 12.6.1. CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.
- 12.6.2. The normal static prevention measures should be observed for work clothes and benches.
- 12.6.3. The module should be kept into anti-static bags or other containers resistant to static for storage.

### 12.7.Limited Warranty

- 12.7.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.
- 12.7.2. If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.
- 12.7.3. After the product shipped, any product quality issues must be feedback within three months, otherwise, we will not be responsible for the subsequent or consequential events.

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### 13. Packaging

TBD



## 14. Outline Drawing

