PRODUCT SPECIFICATION

0.85" TFT LCD MODULE
MODEL: YDP LCD I 85 S

ROHS

< ◇ >   Preliminary Specification

< ◆ >   Finally Specification

CUSTOMER'S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWED	PD REVIEWED	PREPARED BY
	TFT S. G. H 20240725	TFT 周福云 20240725	TFT D. F. G 20240725

knitter-switch

Revision History

Revision	Date	Originator	Detail	Remarks
1.0	2024.07.25	DFG	Initial Release	

Table of Contents

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 IC and a backlight unit.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	0.85"	
LCD type	IPS TFT	
Display Mode	Transmissive /Normally Black	
Resolution	128 RGB x 128	Pixels
View Direction	FULL VIEW	Best Image
Module Outline	17.58 (H) x 20.82 (V) x 1.5(T)　(Note1)	mm
Active Area	15.2064 (H) x 15.2064 (V)	mm
Pixel Size	118.8(H) x 118.8 (V)	um
Pixel Arrangement	RGB Vertical Stripe	
Display Colors	262K	
Interface	4 Line SPI	
Driver IC	GC9107	-
With or without touch panel	Without	
Operating Temperature	**-20～70**	ºC
Storage Temperature	**-30～80**	ºC
Weight	TBD	g

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

3. Absolute Maximum Ratings

V_{SS}=0V, Ta=25ºC

Item	Symbol	Min.	Max.	Unit
Supply Voltage	VDD	-0.3	4.6	V
Storage temperature	T_{stg}	**-30**	**+80**	ºC
Operating temperature	T_{op}	**-20**	**+70**	ºC

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

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

4. DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage	VDD	2.5	2.8	3.3	V
Interface Operation Voltage	VDDIO	1.65	1.8	3.3	V
Gate Driver High Voltage	VGH	12.2	-	14.97	V
Gate Driver Low Voltage	VGL	-12.5	-	-7.16	V
Operating Current for V_{DD}	I_{DD}	-	(8)	-	mA

5. Backlight Characteristic

5.1. Backlight Characteristic

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Backlight Voltage	V_{LED}	Ta=25 ºC, I_F=20mA/ LED	-	**3.0**	-	V
Backlight Current	I_{LED}	Ta=25 ºC, V_F=3.0V/ LED	-	**20**	-	mA
Power dissipation	P_D	-	-	**60**	-	mW
Uniformity	Avg	-	-	80	-	%
LED working life(25℃)	-		-	(30,000)	-	Hrs
Drive method	Constant current					
LED Configuration	1 WHITE LED					

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 ºC,60%RH±5%, I_F=20mA/LED.
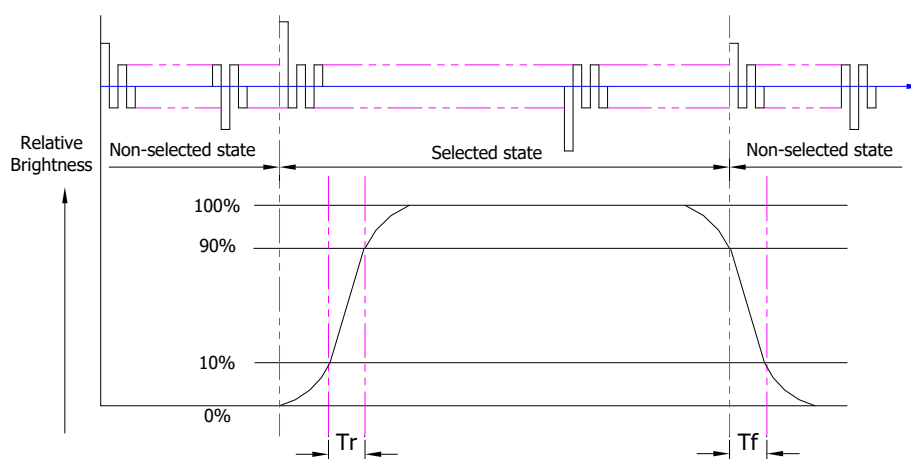
5.2. Backlighting circuit

LEDA ○——————▷|—————○LEDK

6. Optical Characteristics

6.1. Optical Characteristics

Ta=25ºC, VDD=2.8V

Item		Symbol	Condition	Specification			Unit
				Min.	Typ.	Max.	
Luminance on TFT(I_f =20mA/LED)		Lv	Normally viewing angle θX = φY =0º	264	330	-	cd/m²
Contrast ratio(See 6.3)		CR		800	1200	-	
Response time (See 6.2)		T_R+T_F		-	30	35	ms
Chromaticity Transmissive (See 6.5)	Red	X_R		-	**TBD**	-	
		Y_R		-	**TBD**	-	
	Green	X_G		-	**TBD**	-	
		Y_G		-	**TBD**	-	
	Blue	X_B		-	**TBD**	-	
		Y_B		-	**TBD**	-	
	White	X_W		-	**TBD**	-	
		Y_W		-	**TBD**	-	
Viewing Angle (See 6.4)	Horizontal	θX+	Center CR≥10	-	80	-	Deg.
		θX-		-	80	-	
	Vertical	φY+		-	80	-	
		φY-		-	80	-	

(Left spanning label: **Backlight On (Transmissive Mode)**)

6.2. Definition of Response Time

6.2.1. Normally Black Type (Negative)

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

Tf 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)
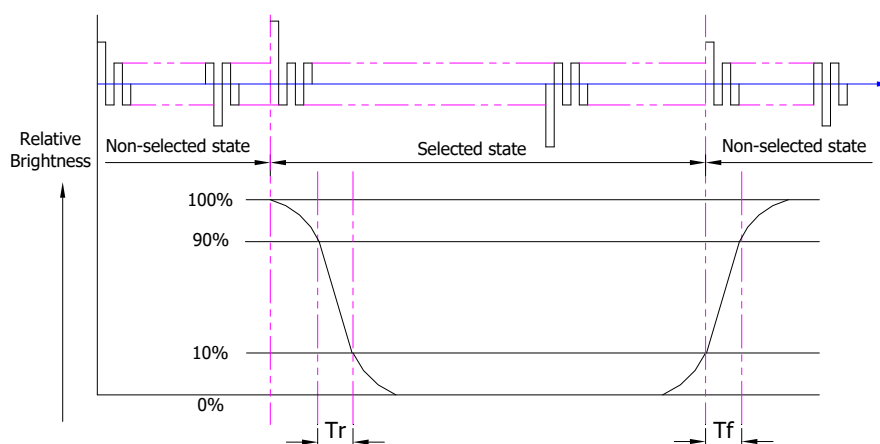
Tr is the time it takes to change form non-selected stage with relative luminance 90% to selected state with relative luminance 10%;

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
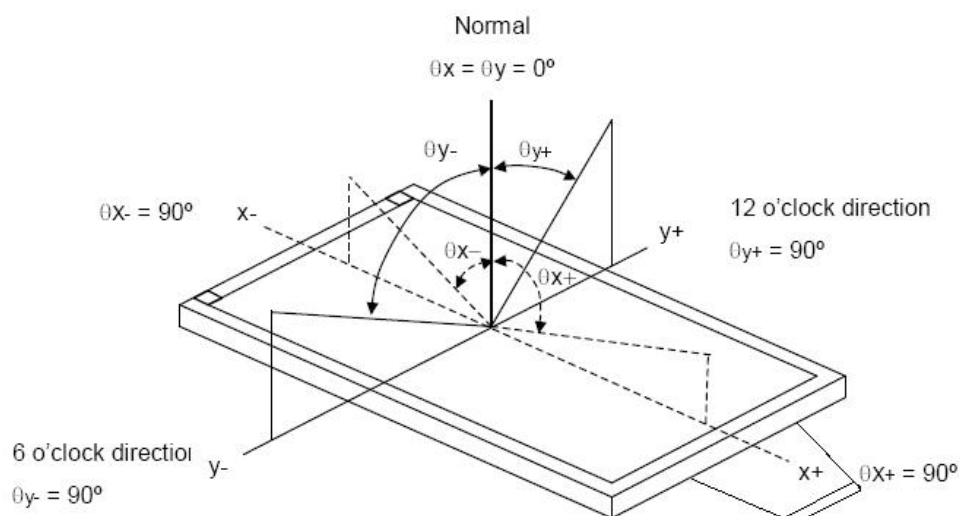
Measuring machine: LCD-5100 or EQUI

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)

CIE 1931 Chromaticity Diagram
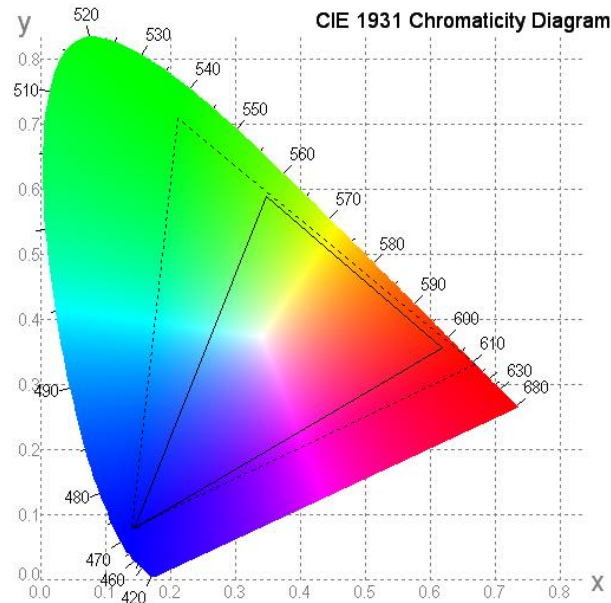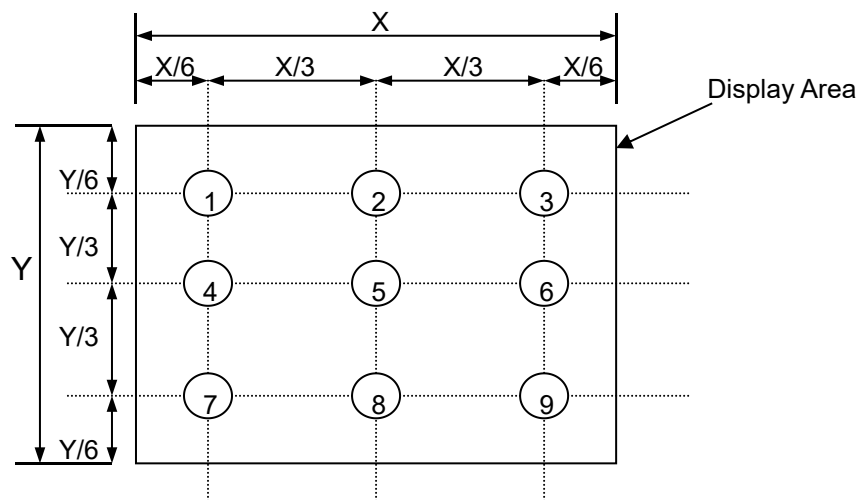
6.6. Definition of Surface Luminance, Uniformity and Transmittance

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

6.6.1.   Surface Luminance: L_V = 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
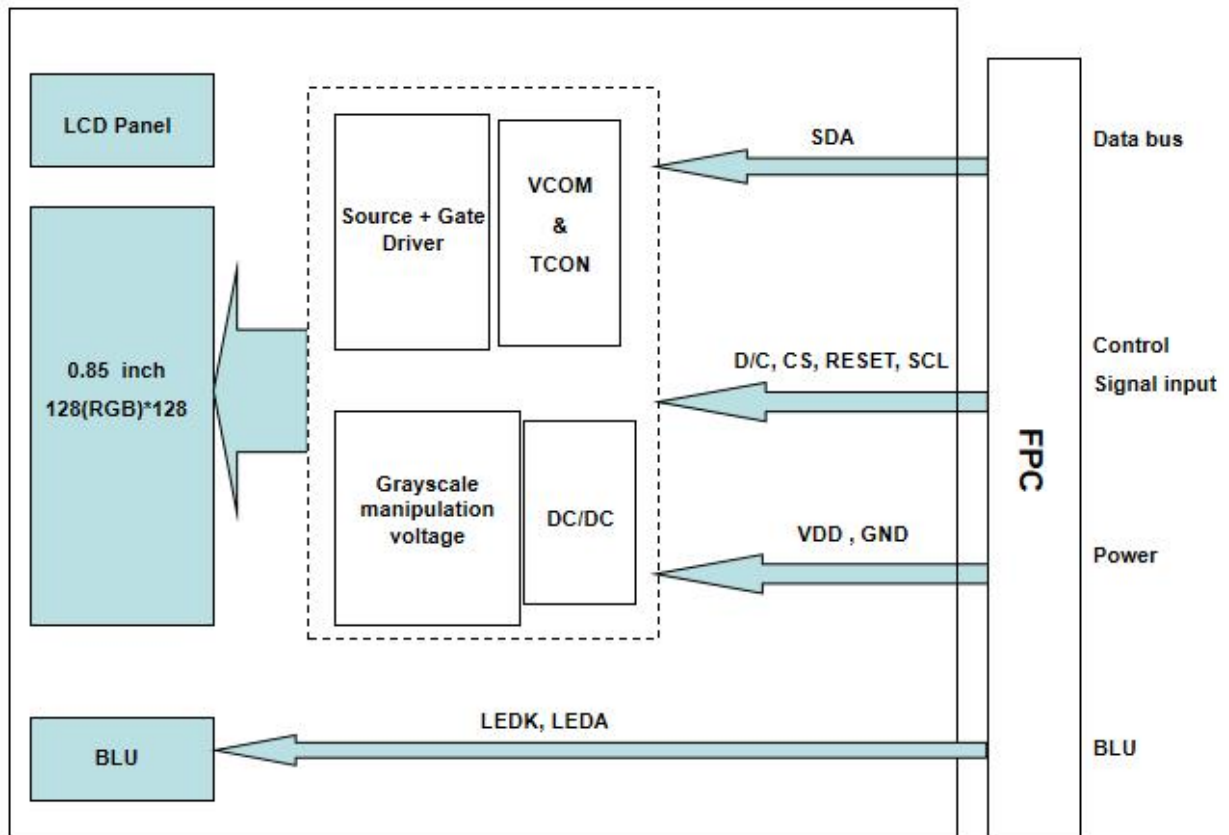
8. Interface Pins Definition

No.	Symbol	Function	Remark
1	GND	Ground	
2	LEDK	LED Cathode	
3	LEDA	LED Anode	
4	VDD	Power supply	
5	GND	Ground	
6	GND	Ground	
7	D/C	Display data/command selection pin in 4-line serial interface	
8	CS	Chip selection pin: Low enable, high disable	
9	SCL	This pin is used to be serial interface clock	
10	SDA	SPI interface input/output pin. The data is 1 attached on the rising edge of the SCL signal.	
11	RESET	This signal will reset the device and it must be applied to properly initialize the chip. Signal is active low.	
12	GND	Ground	

9. AC Characteristics

TBD

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,
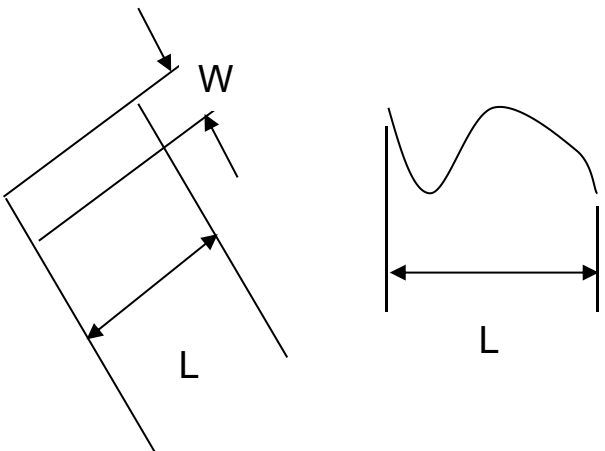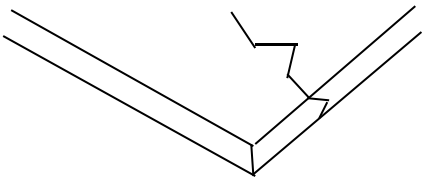
Eye   Eye

45° 45°
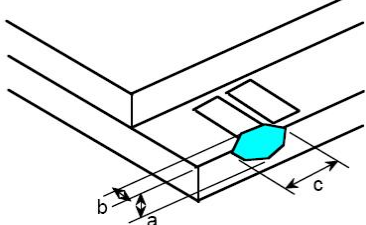
A zone

B zone
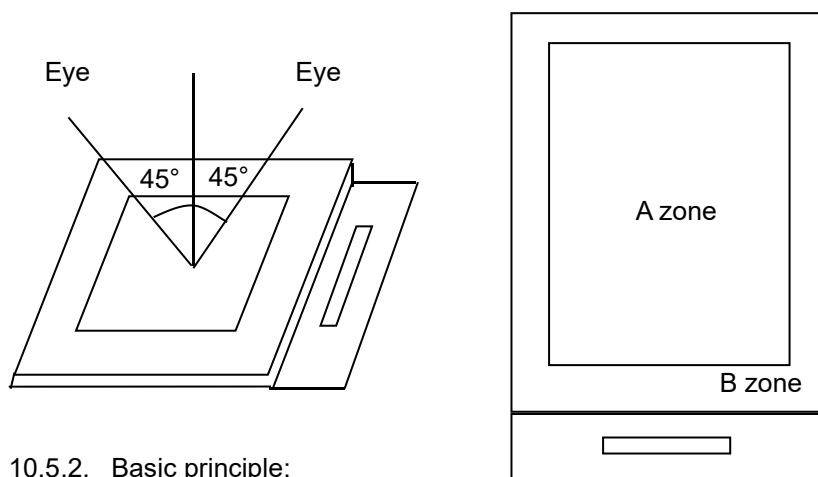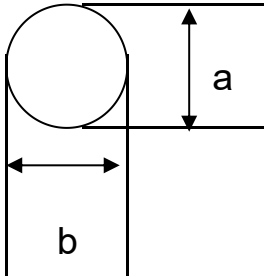
10.5.2. Basic principle:

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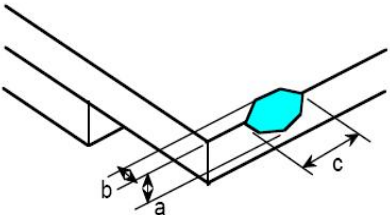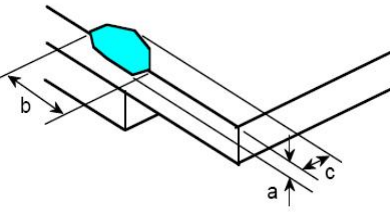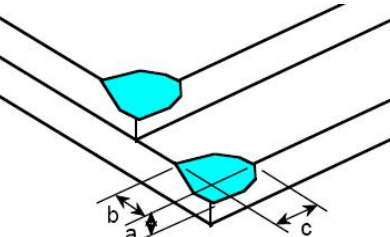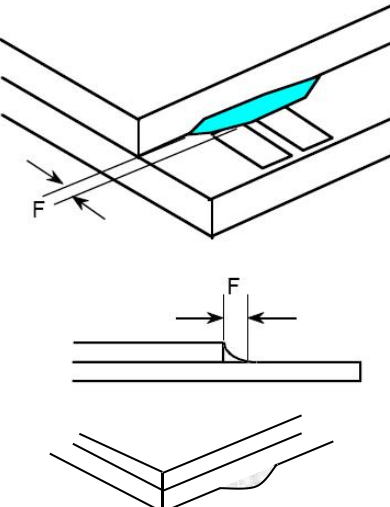
    10.5.2.2. New item must be added on time when it is necessary.
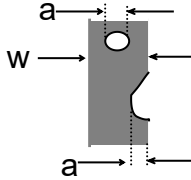
10.6. Inspection Specification

No.	Item	Criteria (Unit: mm)
01	Black / White spot Foreign material (Round type) Pinholes Stain Particles inside cell. (Minor defect)	(Round defect diagram with dimensions a and b) $\varphi = (a + b)/2$ Distance between 2 defects should more than 3mm apart.

Table within item 01:

Size \ Area	Acc. Qty
$\varphi \leq 0.10$	Ignore
$0.10 < \varphi \leq 0.15$	2
$0.15 < \varphi \leq 0.25$	1
$0.25 < \varphi$	0
Total	2 no include $\varphi \leq 0.10$

No.	Item	Criteria (Unit: mm)
02	Electrical Defect (Minor defect)	(see table below) Remark: 1. Bright dot caused by scratch and foreign object accords to item 1.

Table within item 02:

	Display Area	Total	
Bright dot	0	0	Note1
Dark dot	N≤2	N≤2	Note1
Total dot	N≤2	N≤2	Note1
Mura	Not visible through 5% ND filters.		Note 2

03	Black and White line Scratch Foreign material (Line type) (Minor defect)	

Length	Width	Acc. Qty
/	W ≦ 0.03	Ignore
L ≦ 2.5	0.03 < W ≦ 0.05	3
L ≦ 2.5	0.05 < W ≦ 0.10	2
/	0.1 < W	0
Total		3

Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable.

04	Glass Crack (Minor defect)	Crack is potential to enlarge, any type is not allowed.

05	Glass Chipping Pad Area: (Minor defect)	

Length and Width	Acc. Qty
c > 3.0, b< 1.0	1
c< 3.0, b< 1.0	3
a<Glass Thickness	

06	Glass　Chipping Rear of Pad Area: (Minor defect) 		
		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<Glass Thickness	

07	Glass　Chipping Except Pad Area: (Minor defect) 		
		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<Glass Thickness	

08	Glass Corner Chipping: (Minor defect) 		
		Length and Width	Acc. Qty
		$c < 3.0, b < 3.0$	Ignore
		a<Glass Thickness	

09	Glass Burr: (Minor defect) 		
		Length	Acc. Qty
		$F < 1.0$	Ignore
		Glass burr don't affect assemble and module dimension.	

10	FPC Defect: (Minor defect) a→ w→ (diagram) a→	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><td>Diameter</td><td>Acc. Qty</td></tr><tr><td>φ≤0.20</td><td>Ignore</td></tr><tr><td>0.20 <φ≤0.30</td><td>4</td></tr><tr><td>0.30 <φ≤0.50</td><td>1</td></tr><tr><td>0.50 < φ</td><td>None</td></tr></table>
12	Dent on Polarizer (Minor defect)	<table><tr><td>Diameter</td><td>Acc. Qty</td></tr><tr><td>φ≤0.20</td><td>Ignore</td></tr><tr><td>0.20 <φ≤0.30</td><td>4</td></tr><tr><td>0.30 <φ≤0.50</td><td>1</td></tr><tr><td>0.50 < φ</td><td>None</td></tr></table>
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.

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

TFT-LCD Panel

TFT-LCD Panel
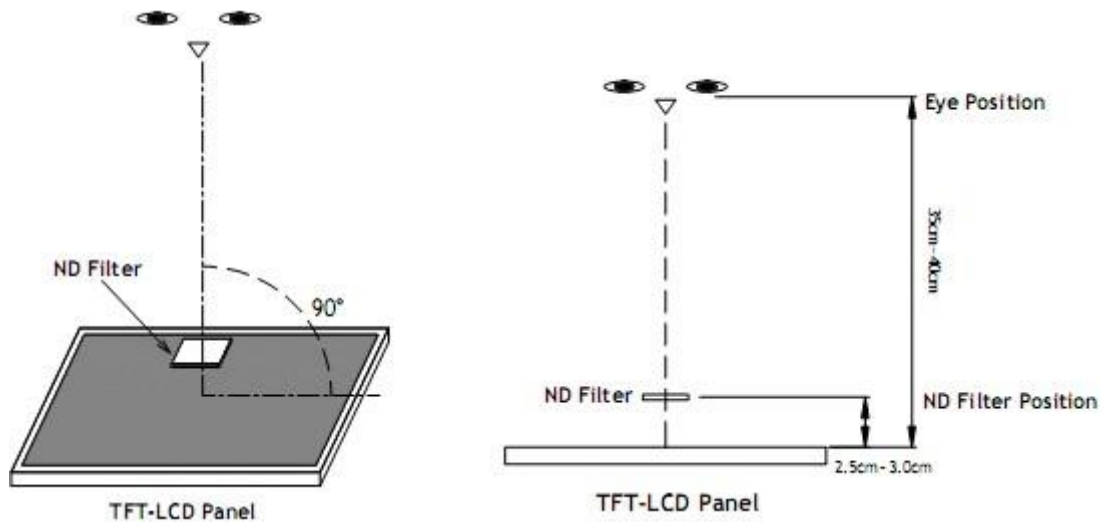
Bright dot: The bright dot size defect at black display pattern. It can be recognized by 2% transparency of filter when the distance between eyes and panel is 350mm±50mm.

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 350mm±50mm.

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

11. Reliability Specification

No	Item	Condition	Quantity	Criteria
1	High Temperature Operating	**70℃, 96Hrs**	2	GB/T2423.2 -2008
2	Low Temperature Operating	**-20℃, 96Hrs**	2	GB/T2423.1 -2008
3	High Humidity Storage	**50℃, 85%RH, 96Hrs**	2	GB/T2423.3 -2016
4	High Temperature Storage	**80℃, 96Hrs**	2	GB/T2423.2 -2008
5	Low Temperature Storage	**-30℃, 96Hrs**	2	GB/T2423.1 -2008
6	Thermal Cycling Test Storage	**-10℃, 60min~60℃, 60min, 20 cycles.**	2	GB/T2423.22 -2012
7	Packing vibration	Frequency range:10Hz~50Hz Acceleration of gravity:5G X, Y, Z 30 min for each direction.	-	GB/T5170.14 -2009
8	Electrical Static Discharge	Air:±4KV 150pF/330Ω 5 times	2	GB/T17626.2 -2018
		Contact:±2KV 150pF/330Ω 5 times		
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

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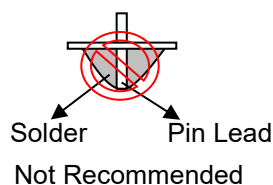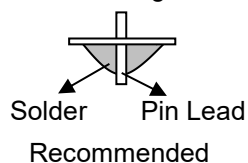
Solder Type: Sn96.3~94-Ag3.3~4.3-Cu0.4~1.1

Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

12.4.1.3. Solder Wetting

Solder　　Pin Lead　　　　Solder　　　Pin Lead
Recommended　　　　　　Not Recommended

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℃
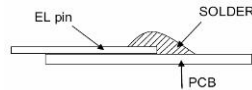
Typical Soldering Time: ≤2s
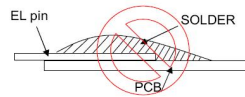
Minimum solder distance from EL lamp (body):2.0mm

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

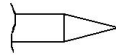12.4.2.5. 180° bend EL leads three times is not allowed.
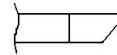
12.4.2.6. Solder Wetting

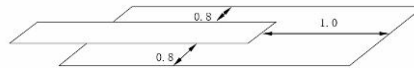| Recommended | Not Recommended |

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 may 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.

13. Packaging

TBD

14. Outline Drawing