MACH-5.0-10801080-AWMN-01 Ver:1.0

TFT (Thin-Film-Transistor) Color Liquid Crystal Display Module

< ◇> Preliminary Specification

< ◆> Finally Specification

CUSTOMER'S APPROVAL	
CUSTOMER :	
SIGNATURE:	DATE:

APPROVED BY	PM REVIEWED	PD REVIEWED	PREPARED BY

Revision History

Revision	Date	Originator	Detail	Remarks
Ver 1.0	20230313		Initial Release	

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1. General Description

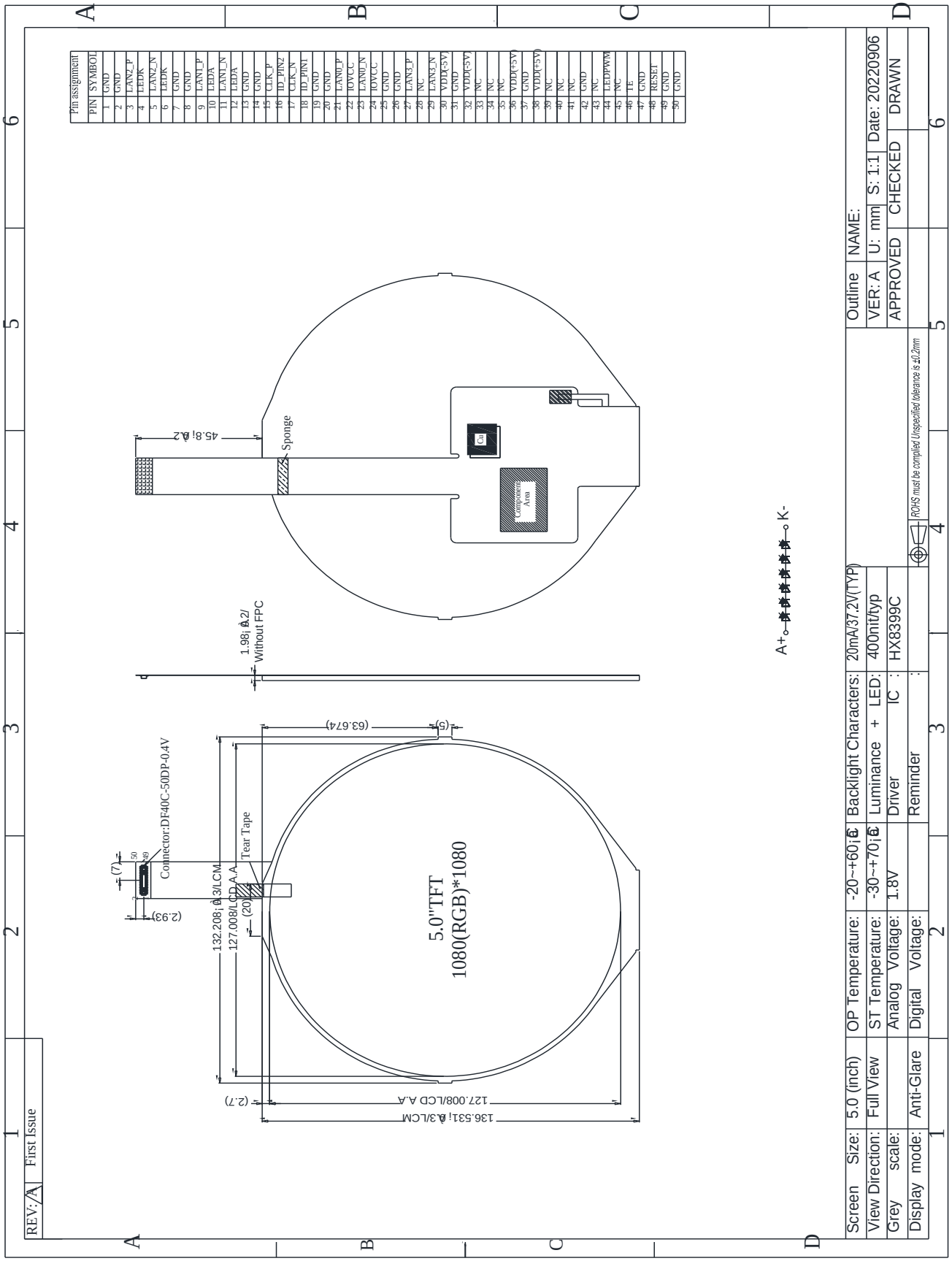
The specification is a transmissive type color active matrix liquid crystal display (LCD) which uses amorphous thin film transistor (TFT) as switching devices. This product is composed of a TFT-LCD panel, driver ICs and a backlight unit.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	5.0”	
LCD type	IPS TFT	
Display Mode	Transmissive /Normally black	
Resolution	1080 RGB x 1080	Pixels
View Direction	FULL VIEW	Best Image
Module Outline	132.208(H) x 136.531 (V) x 1.98 (T) (Note1)	mm
Active Area	127.008 (H) x 127.008 (V)	mm
Pixel Pitch	117.6 (H) x 117.6 (V)	um
Pixel Arrangement	RGB Vertical stripe	
Polarizer Surface Treatment	Anti-glare	
Driver IC	HX8399C	
Display Colors	16.7M	
Interface	MIPI interface	
With or without the touch panel	Without	
Operating Temperature	**-20～60**	ºC
Storage Temperature	**-30～70**	ºC
Weight	-	g

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

2.1. Outline Drawing



3. Absolute Maximum Ratings

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table.

V_{SS}=0V, Ta=25ºC

Item	Symbol	Min.	Max.	Unit
Supply Voltage	IOVCC	-0.3	3.6	V
Analog Positive Power Supply	VSP	-0.3	6.6	V
Analog Negative Power Supply	VSN	0	-6.6	V
Storage temperature	T_{STG}	**-30**	**+70**	ºC
Operating temperature	T_{OP}	**-20**	**+60**	ºC

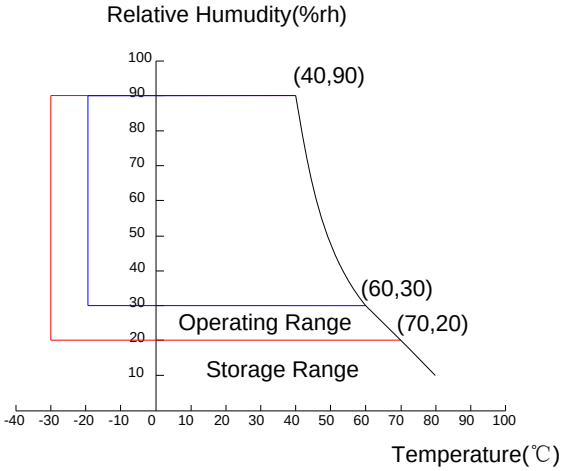
Note 1: If Ta below 50ºC, the maximal humidity is 90%RH, if Ta over 50ºC, absolute humidity should be less than 60%RH.

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.

Note 3: These range above is maximum value not the actual operating temperature . Actual Operating temperature is no more than 40℃ and temperature refers to the LCM surface temperature ;

Note 4: GWD is not responsible for product problems beyond the use conditions.

Note 5: Temperature and relative humidity range are shown in the figure below.Wet bulb temperature should be 39 ℃ max. and no condensation of water.



4. DC Characteristics

Item		Symbol	Min.	Typ.	Max.	Unit
Supply Voltage		IOVCC	1.65	1.8	3.3	V
Analog Positive Power Supply		VSP	4.8	5	6	V
Analog Negative Power Supply		VSN	-6	-5	-4.8	V
VDDIO Input low level voltage		V_{IL}	0	-	0.3*IOVCC	V
VDDIO Input high level voltage		V_{IH}	0.7*IOVCC	-	IOVCC	V
Current Consumption All Black	Logic Analog	I_{CC+} I_{IN}	-	-	-	mA

Note 1: All of the voltage listed above are with respective to GND = 0v

Note 2:Device is subject to be damaged permanently if stresses beyond those absolute maximum rating listed above

5. Backlight Characteristic

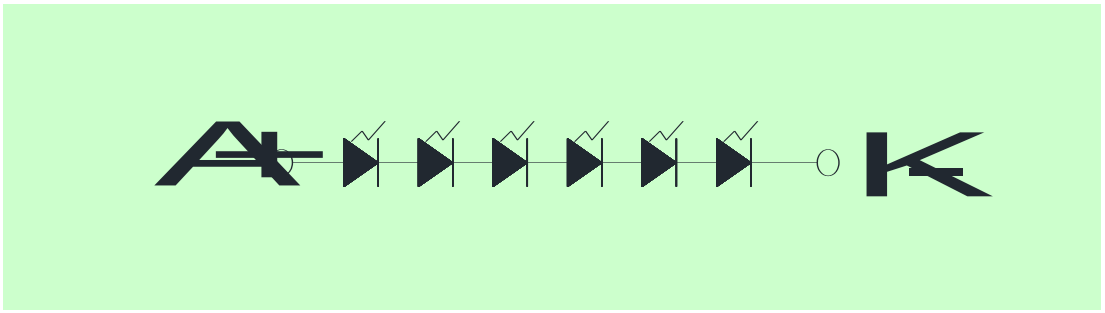
5.1. Backlight Characteristic

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	Ta=25 ºC, I_F=20mA/LED	-	**19.2**	-	V
Forward Current	I_F	Ta=25 ºC, V_F=6.2V/LED	-	**20**	-	mA
Power dissipation	P_D		-	**384**	-	mW
Uniformity	Avg		70	-	-	%
LED working life(25℃)	Constant current					
Drive method	6 White LEDs (6 LEDs in one string)					
LED Configuration	V_F	Ta=25 ºC, I_F=20mA/LED	-	**37.2**	38.4	V

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.

5.2. Backlighting circuit



6. Optical Characteristics

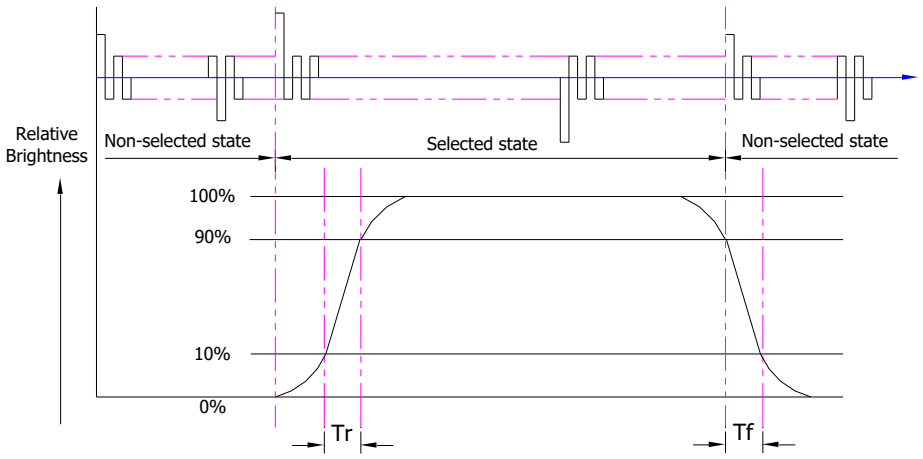
6.1. Optical Characteristics

Ta=25ºC, DVDD=3.3V

	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
Backlight On (Transmissive Mode)	Luminance on TFT(I_f =20mA/LED)		Lv		**320**	**400**	-	cd/m²
	Contrast ratio(See 6.3)		CR		1000	1500	-	
	Response time (See 6.2)		TR+TF		-	-	35	ms
	Chromaticity Transmissive (See 6.5)	Red	XR		0.582	0.632	0.682	
			YR		0.263	0.313	0.363	
		Green	XG		0.252	0.302	0.352	
			YG		0.547	0.597	0.647	
		Blue	XB		0.093	0.143	0.193	
			YB		0.087	0.137	0.187	
		White	XW		-	-	-	
			YW		-	-	-	
	Viewing Angle (See 6.4)	Horizontal	θX+	Center CR≥10	70	80	-	Deg.
			θX-		70	80	-	
		Vertical	φY+		70	80	-	
			φY-		70	80	-	
	NTSC ratio（Color gamut）					55	60	%

6.2. Definition of Response Time

6.2.1. Normally Black Type (Negative)

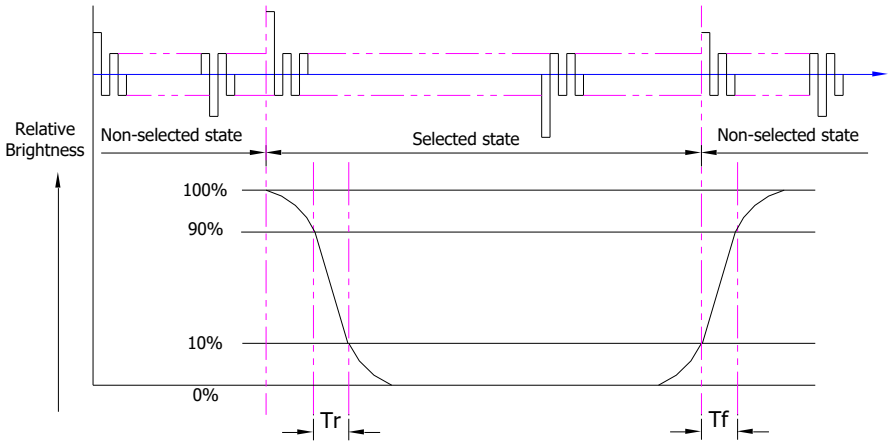


Tr is the time it takes to change form non-selected stage with relative luminance 10% to selected state with relative luminance 90%;

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

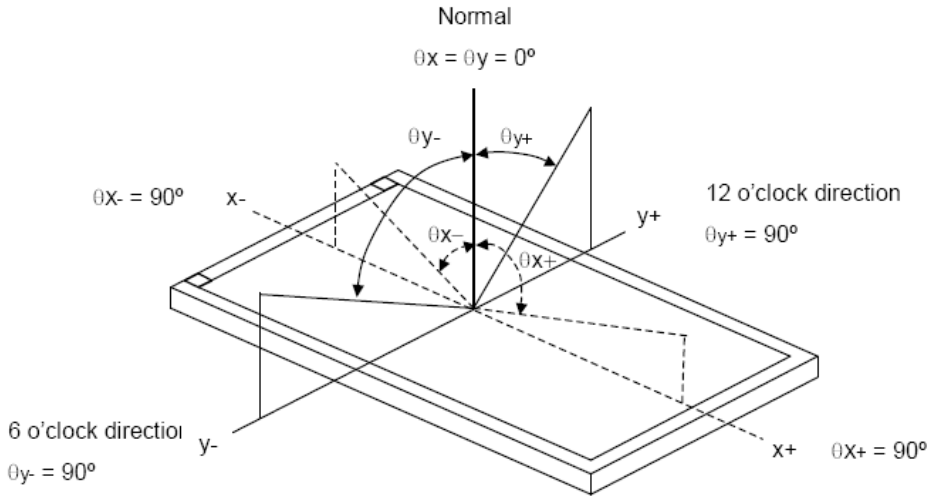
6.3. Definition of Contrast Ratio

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



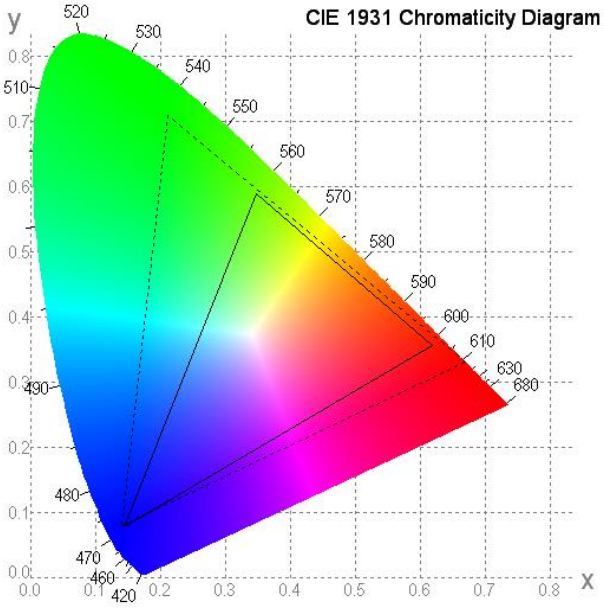
Measuring machine: LCD-5100 or EQUI

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)



6.6. Definition of Surface Luminance, Uniformity and Transmittance

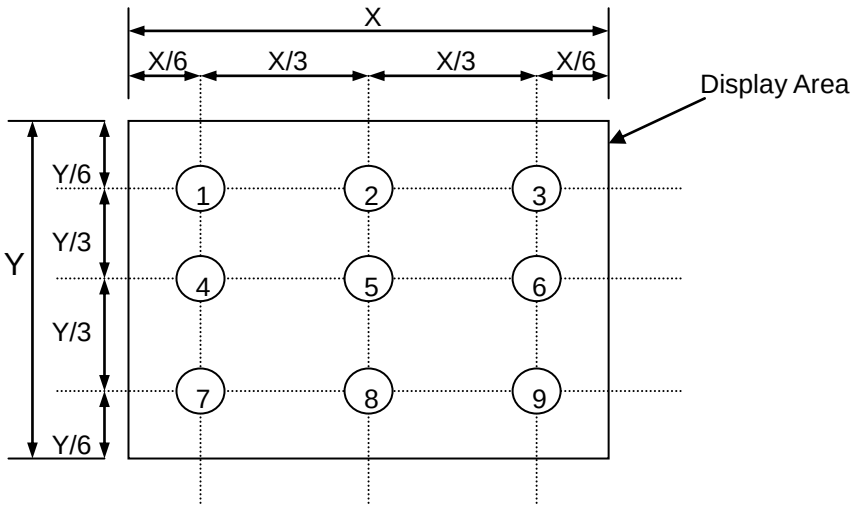
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

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

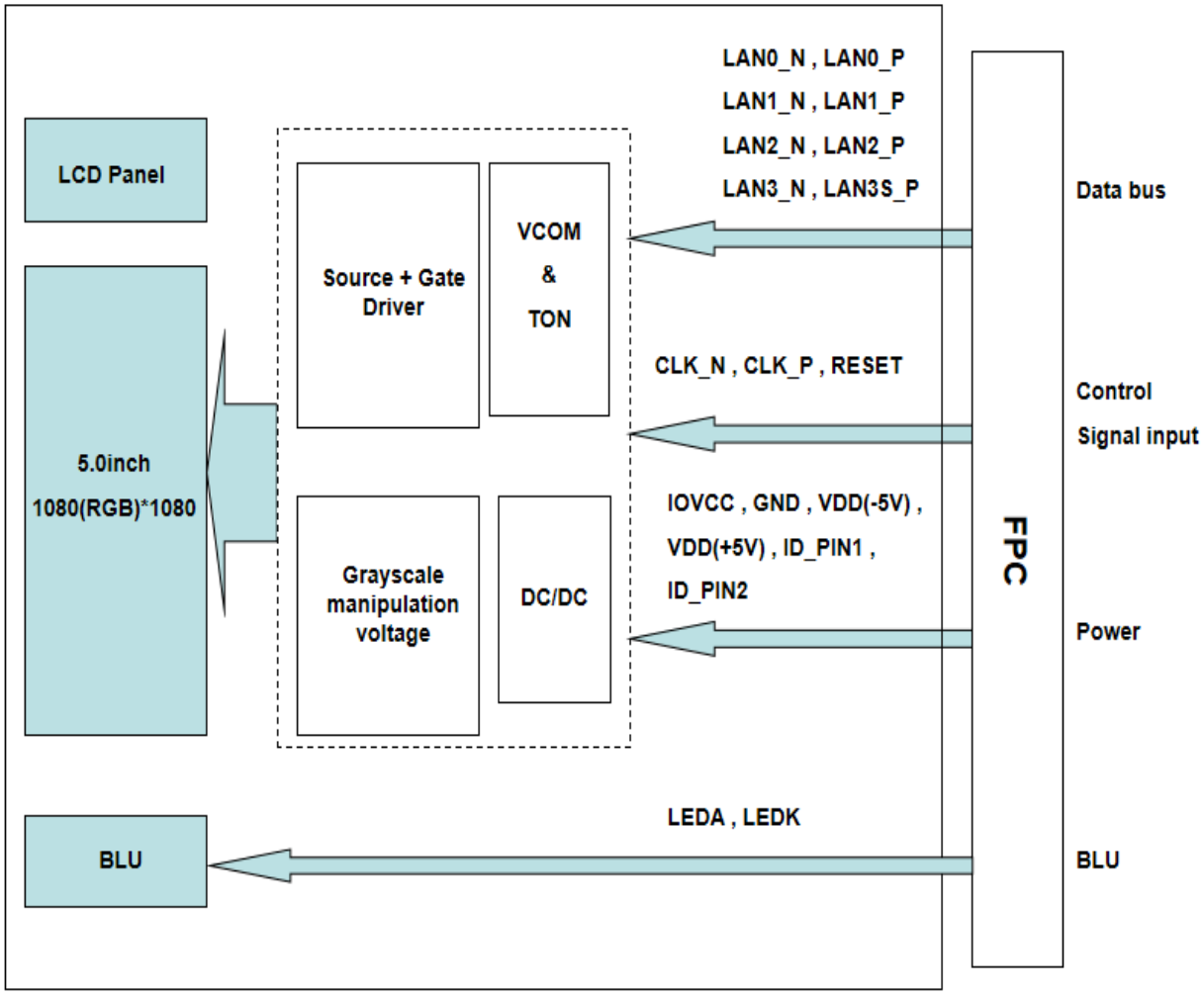
6.6.2. Uniformity = Minimal (L_{P1}:L_{P9}) / Maximal (L_{P1}:L_{P9}) * 100%

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

Note: Measuring machine: BM-7



7. Block Diagram and Power Supply



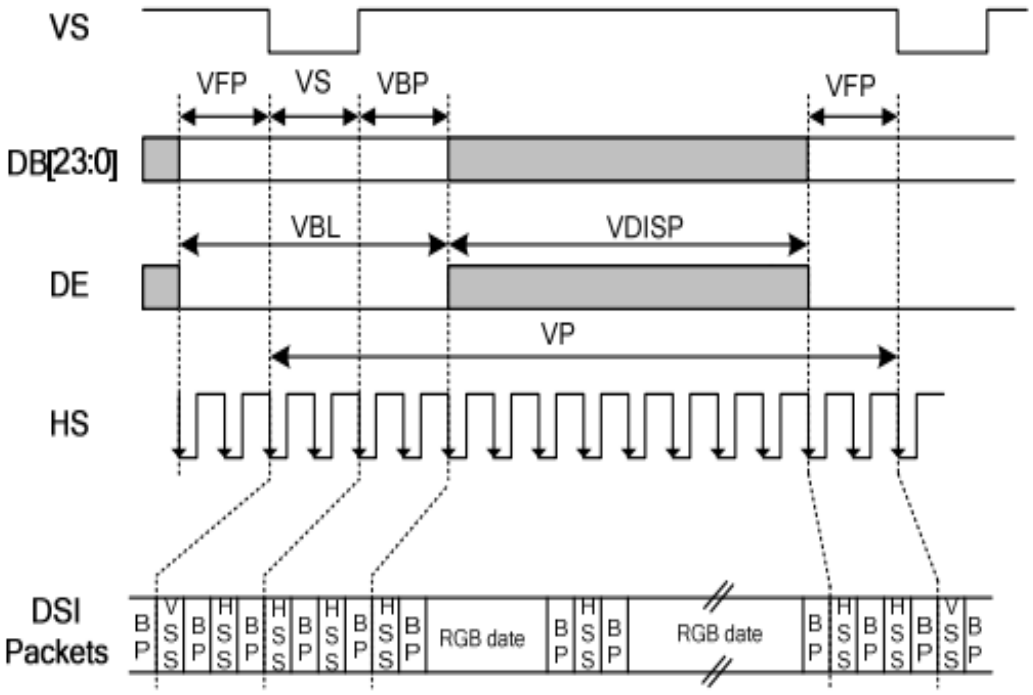
8. Interface Pins Definition

No.	Symbol	Function	Remark
1	GND	Ground	
2	GND	Ground	
3	LAN2_P	Disp MIPI lane 2+	
4	LEDK	LED cathode□	
5	LAN2_N	Disp MIPI lane 2-	
6	LEDK	LED cathode□	
7	GND	Ground	
8	GND	Ground	
9	LAN1_P	Disp MIPI lane 1+	
10	LEDA	LED Anode□	
11	LAN1_N	Disp MIPI lane 1-	
12	LEDA	LED Anode□	
13	GND	Ground	
14	GND	Ground	
15	CLK_P	Disp MIPI CLK+□	
16	ID_PIN2	ID pd to 1.8V (BOE)□	
17	CLK_N	Disp MIPI CLK-	
18	ID_PIN1	ID pd to GND (BOE)□	
19	GND	Ground	
20	GND	Ground	
21	LAN0_P	Disp□MIPI□lane□0+	
22	IOVCC	Disp□digital□power□	
23	LAN0_N	Disp□MIPI□lane□0-	
24	IOVCC	Disp□digital□power□	
25	GND	Ground	
26	GND	Ground	
27	LAN3_P	Disp□MIPI□lane□3+	
28	NC	No connection	
29	LAN3_N	Disp□MIPI□lane□3-	
30	VDD(-5V)	Display□-5V□analog□rail□	
31	GND	Ground	
32	VDD(-5V)	Display□-5V□analog□rail□	
33	NC	No connection	
34	NC	No connection	
35	NC	No connection	
36	VDD(+5V)	Display +5V□analog□rail□	
37	GND	Ground	
38	VDD(+5V)	Display +5V□analog□rail□	
39	NC	No connection	
40	NC	No connection	

41	NC	No connection	
42	GND	Ground	
43	NC	No connection	
44	LEDPWM	Backlight pwm output	
45	NC	No connection	
46	TE	Disp tearing effect out□	
47	GND	Ground	
48	RESET	Disp reset	
49	GND	Ground	
50	GND	Ground	

9. AC Characteristics

9.1. Vertical Timings

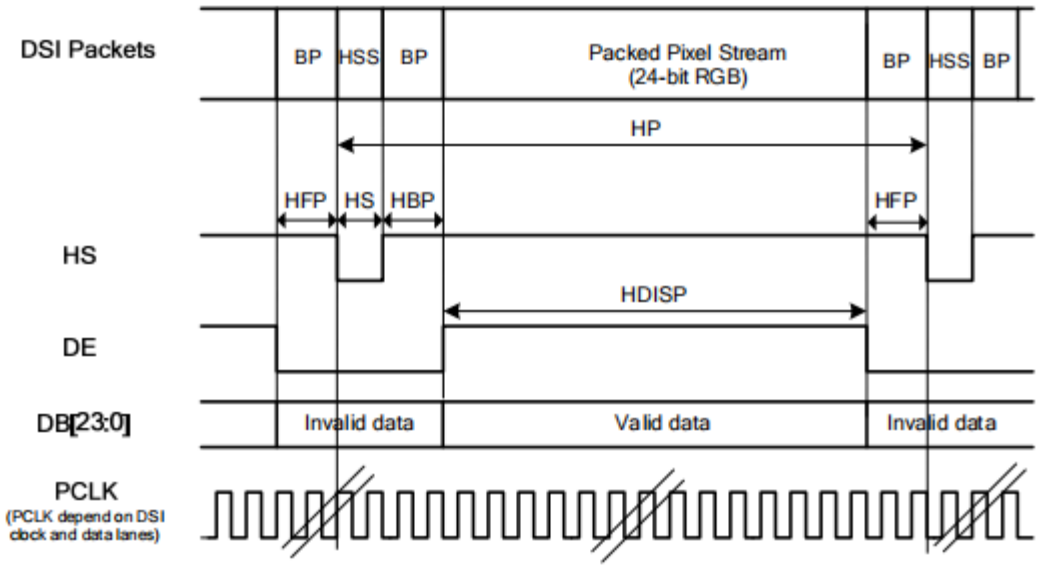


Vertical Resolution=528+8xNL (VSSA=0V, VDD1=1.8V, VDD3=2.8V, T_A=25°C)

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
Vertical cycle	VP	-	534+8xNL	-	-	Line
Vertical low pulse width	VS	-	2	-	Note(1)	Line
Vertical front porch	VFP	-	2	-	-	Line
Vertical back porch	VBP	-	2	-	Note(1)	Line
Vertical data start point	-	VS+VBP	4	-	Note(1)	Line
Vertical blanking period	VBL	VS+VBP+VFP	6	-	-	Line
Vertical active area	-	VDISP	-	528+8xNL	-	Line
Vertical Refresh rate	VRR	-	-	60	-	Hz

Note: (1) The VS and VBP pulse width are related to GSP and GCK timing. The GSP and GCK must be set at corresponding position for LCD normal display.

9.2. Horizontal Timings

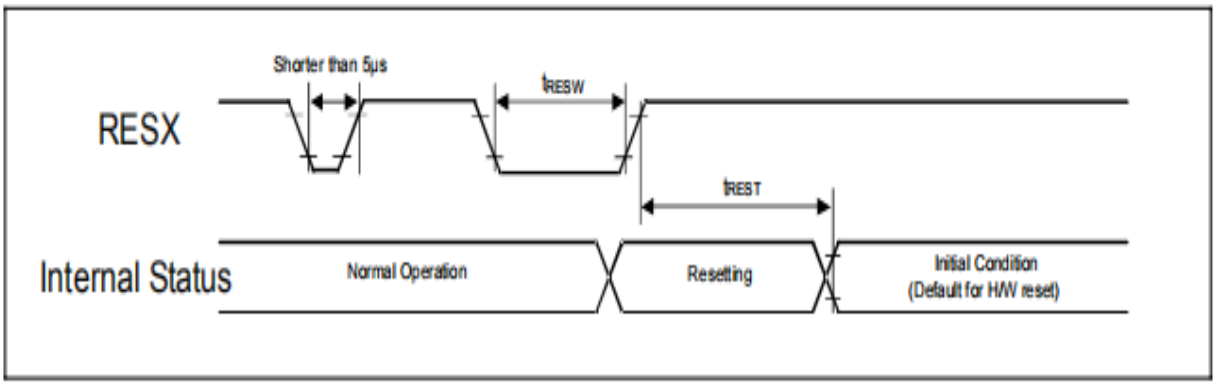


Horizontal Resolution=H_RES(1080/1024/960/900/800/720) (VSSA=0V, VDD1=1.8V, VDD3 = HS_VCC =2.8V, T_A=25°C)

Parameter	Symbol	Condition	Spec.			Unit
			Min.	Typ.	Max.	
HS cycle	HP	-	H_RES+66	-	-	DCK
HS low pulse width	HS	-	25	-	-	DCK
Horizontal back porch	HBP	-	25	-	-	DCK
Horizontal front porch	HFP	-	16	-	-	DCK
Horizontal data start point	-	HS+HBP	50 Note(1)	-	-	DCK
Horizontal blanking period	HBLK	HS+HBP+HFP	66	-	-	DCK
Horizontal active area	HDISP	-	-	H_RES	-	DCK

Note: (1) HS+HBP must larger than 50 PCLK.

9.3. Vertical Timings

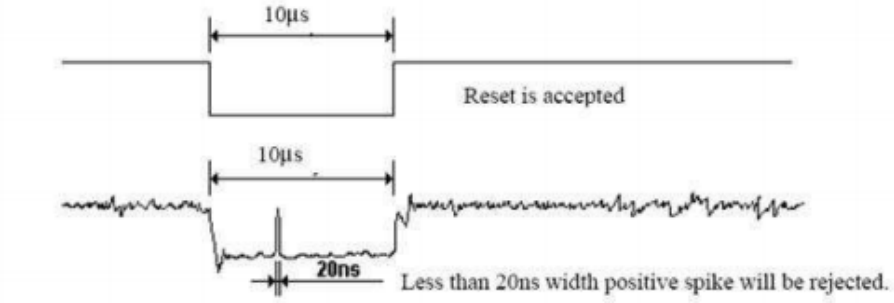


Symbol	Parameter	Related pins	Spec.			Unit	Note
			Min.	Typ.	Max.		
t_{RESW}	Reset low pulse width(1)	RESX	10	-	-	μs	-
t_{REST}	Reset complete time(2)	-	-	-	50	ms	-

Note: (1) Spike due to an electrostatic discharge on RESX line does not cause irregular system reset according to the table below.

RESX Pulse	Action
Shorter than 5μs	Reset Rejected
Longer than 10μs	Reset
Between 5μs and10μs	Reset Start

(2) During Reset Complete Time, OTP will be latched to internal register during this period. This loading is done every time when there is H/W reset complete time **(tREST)** within 5ms after a rising edge of RESX.
(3) Spike Rejection also applies during a valid reset pulse as shown below:



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.

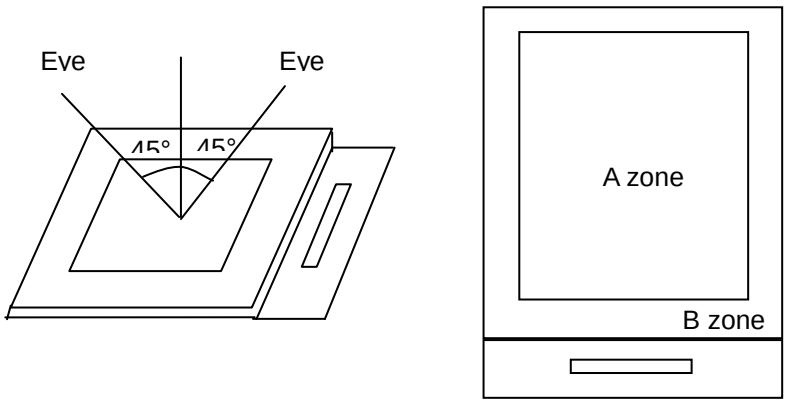
10.5. Standard of the Product Visual Inspection

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

These inspection standards shall be applied to LCD Module supplied by INNOLUX Optoelectronics Corporation. This model is only used in CE product, if it is used in other product applications; it still adopts this copy of specification. If there are any other product applications such as handwriting recognition, Industrial use, Medical use, Aerospace usage and so on, the specifications should be negotiated separately.

01 Definition of dot defect induced from the panel inside

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)

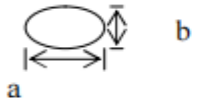
No.	Display Inspection		
02	**Items**		**Criteria (Unit: mm)**
	Bright dot	Random	N ≦ 1
		2 dots adjacent	N ≦ 0
		3 dots adjacent	N ≦ 0
	Dark dot	Random	N ≦ 2
		2 dots adjacent	N ≦ 0
		3 dots adjacent	N ≦ 0
	Total bright dot and dark dot		N ≦ 2
	Distance	Minimum Distance Between dark dots Minimum Distance Between dark and bright dots	5mm
Tiny bright dot			visible through 6% ND filter D≦0.1mm，Ignore 0.1mm＜D≦0.3mm，N≦2 Distance≧5mmm
Display failure（V-line/Cross line etc)			Not allowable
Mura/Waving/Hot spot	Not visible through 6% ND filter in 50% gray or judge by limit sample if necessary		

*Note: Defect which is on the Black Matrix (outside of Active Area) are not considered as a defect.

No.	Appearance & Display inspection	
03	**Items**	**Criteria (Unit: mm)**
	Foreign Black/White/Bright Spot (Display & Appearance)	D≦0.1mm, Ignore, 0.1mm＜D≦0.3mm, N≦2 Distance≧5mm,It is shown in Fig. 2.
	Foreign Black/White/Bright Line (Display & Appearance)	W≦0.03 mm，Ignore 0.03＜W≦0.05 mm L≦3.0 mm，N≦3 It is shown in Fig. 3.
	Polarizer Dent/Air Bubble	D≦0.1mm, Ignore 0.1mm＜D≦0.3mm, N≦2 Distance≧5mm
	Polarizer Scratches	W≦0.03 mm, Ignore 0.03＜W≦0.05 mm L≦3.0 mm, N≦3

Notes: If any specific defect is not included in the above defect table, this defect should be judged by INX/ODM/Brand customer discussion.

1. W：Width
2. L：Length
3. D：Average Diameter
4. N：Count

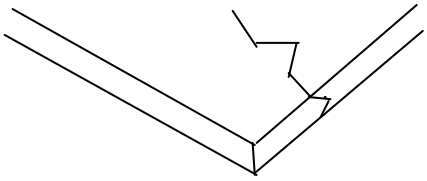
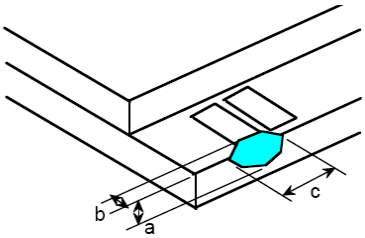
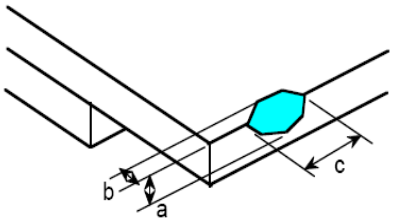
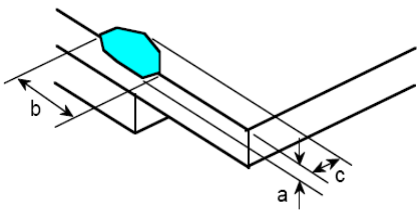


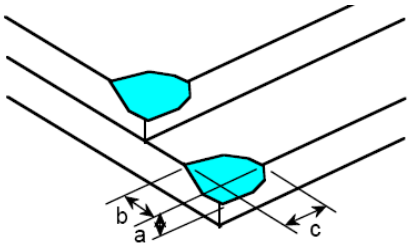
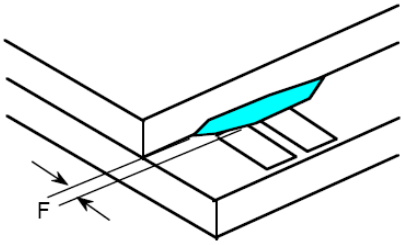
D=(a+b)/2

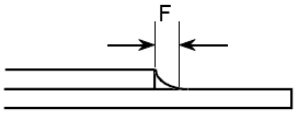
Fig. 2

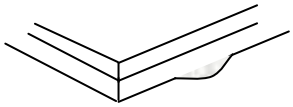
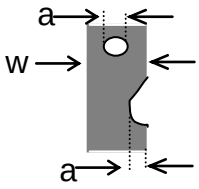
W: width, L：length

Fig. 3

<table>
<tr><th>No.</th><th>Item</th><th>Criteria (Unit: mm)</th></tr>
<tr><td>04</td><td>Glass Crack
(Minor defect)</td><td> 
Crack is potential to enlarge, any type is not allowed.</td></tr>
<tr><td>05</td><td>Glass Chipping Pad Area:
(Minor defect)
  </td><td><table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c > 3.0, b< 1.0</td><td>1</td></tr><tr><td>c< 3.0, b< 1.0</td><td>3</td></tr><tr><td colspan="2">a<Glass Thickness</td></tr></table></td></tr>
<tr><td>06</td><td>Glass Chipping Rear of Pad Area:
(Minor defect)
  </td><td><table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c > 3.0, b< 1.0</td><td>1</td></tr><tr><td>c< 3.0, b< 1.0</td><td>2</td></tr><tr><td>c< 3.0, b< 0.5</td><td>4</td></tr><tr><td colspan="2">a<Glass Thickness</td></tr></table></td></tr>
<tr><td>07</td><td>Glass Chipping Except Pad Area:
(Minor defect)
  </td><td><table><tr><td>Length and Width</td><td>Acc. Qty</td></tr><tr><td>c > 3.0, b< 1.0</td><td>1</td></tr><tr><td>c< 3.0, b< 1.0</td><td>2</td></tr><tr><td>c< 3.0, b< 0.5</td><td>4</td></tr><tr><td colspan="2">a<Glass Thickness</td></tr></table></td></tr>
</table>

<table>
<tr>
<td>08</td>
<td>Glass Corner Chipping:
(Minor defect)
 
</td>
<td><table>
<tr><td>Length and Width</td><td>Acc. Qty</td></tr>
<tr><td>c < 3.0, b< 3.0</td><td>Ignore</td></tr>
<tr><td colspan="2">a<Glass Thickness</td></tr>
</table></td>
</tr>
<tr>
<td>09</td>
<td>Glass Burr:
(Minor defect)
 



 </td>
<td><table>
<tr><td>Length</td><td>Acc. Qty</td></tr>
<tr><td>F < 1.0</td><td>Ignore</td></tr>
</table>
Glass burr don’t affect assemble and module dimension.</td>
</tr>
<tr>
<td>10</td>
<td>FPC Defect:
(Minor defect)
 
</td>
<td>10.1 Dent, pinhole width a<w/3.
(w: circuitry width.)
10.2 Open circuit is unacceptable.
10.3 No oxidation, contamination and distortion.</td>
</tr>
<tr>
<td>11</td>
<td>Bubble on Polarizer
(Minor defect)</td>
<td><table>
<tr><td>Diameter</td><td>Acc. Qty</td></tr>
<tr><td>φ≤0.30</td><td>Ignore</td></tr>
<tr><td>0.30 <φ≤0.50</td><td>N≤2</td></tr>
<tr><td>0.50 < φ</td><td>N=0</td></tr>
</table></td>
</tr>
</table>

<table>
<tr><td>12</td><td>Dent on Polarizer
(Minor defect)</td><td><table><tr><td>Diameter</td><td>Acc. Qty</td></tr><tr><td>φ≤0.25</td><td>Ignore</td></tr><tr><td>0.25 <φ≤0.50</td><td>N≤4</td></tr><tr><td>0.50 < φ</td><td>None</td></tr></table></td></tr>
<tr><td>13</td><td>Bezel</td><td>13.1 No rust, distortion on the Bezel.
13.2 No visible fingerprints, stains or other contamination.</td></tr>
<tr><td>14</td><td>Touch Panel</td><td>D: Diameter W: width L: length
14.1 Spot: D<0.25 is acceptable
0.25≤D≤0.4
2dots are acceptable and the distance between defects should more than 10 mm.
D>0.4 is unacceptable
14.2 Dent: D>0.40 is unacceptable
14.3 Scratch: W≤0.03, L≤10 is acceptable,
0.03<W≤0.10, L≤10 is acceptable
Distance between 2 defects should more than 10 mm.
W>0.10 is unacceptable.</td></tr>
<tr><td>15</td><td>LCD Ripple</td><td>Touch the touch panel, cannot see the LCD ripple.
Pen: R 0.8mm silicon rubber.
Operation Force:120g</td></tr>
<tr><td>16</td><td>PCB</td><td>16.1 No distortion or contamination on PCB terminals.
16.2 All components on PCB must same as documented on the BOM/component layout.
16.3 Follow IPC-A-600F.</td></tr>
<tr><td>17</td><td>Soldering</td><td>Follow IPC-A-610C standard</td></tr>
<tr><td>18</td><td>Electrical Defect
(Major defect)</td><td>The below defects must be rejected.
18.1 Missing vertical / horizontal segment,
18.2 Abnormal Display.
18.3 No function or no display.
18.4 Current exceeds product specifications.
18.5 LCD viewing angle defect.
18.6 No Backlight.
18.7 Dark Backlight.
18.8 Touch Panel no function.</td></tr>
</table>

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

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/marking criteria

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

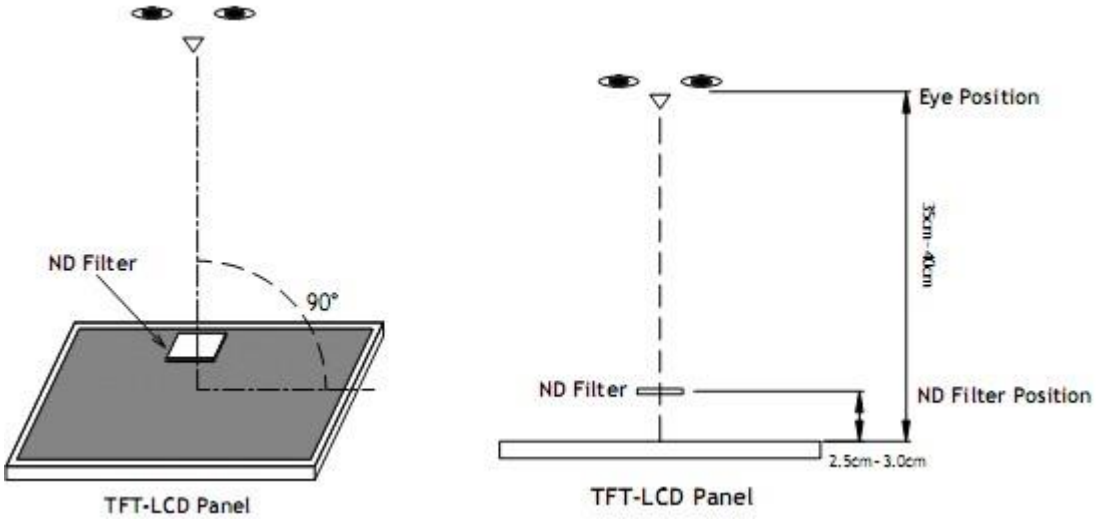
10.9. Packing

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 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	60℃, 120Hrs	2	GB/T2423.2 -2008
2	Low Temperature Operating	-20℃, 120Hrs	2	GB/T2423.1 -2008
3	High Humidity	**40℃, 90%RH,120Hrs**	2	GB/T2423.3 -2006
4	High Temperature Storage	70℃,120Hrs	2	GB/T2423.2 -2008
5	Low Temperature Storage	-30℃, 120Hrs	2	GB/T2423.1 -2008
6	Thermal Cycling Test	-20℃, 60min~70℃, 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.	2	GB/T5170.14 -2009
8	Electrical Static Discharge	Air:±8KV 150pF/330Ω 5 times Contact:±4KV 150pF/330Ω 5 times	2	GB/T17626.2 -2006
9	Drop Test (Packaged)	Height:80 cm,1 corner, 3 edges, 6 surfaces.	2	GB/T2423.8 -1995

Note1. After the reliability test, the product only guarantee function normally without any fatal defect (non-display, line defect, abnormal display). All the cosmetic specification is judged before the reliability test.

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

Note3. One product only can borne one item of reliability test. Can not take same single one product to do different reliability test .

Note4. All adjustment of display are performed after temperature of product back to room temperature and under static situation for 2 hrs.

Note5. Under no condensation of dew

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

13.4.1.1 Solder tip can touch and press on the tip of Pin LEAD during the soldering

13.4.1.2 Recommended Soldering Conditions

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

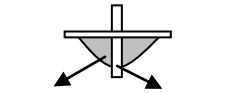
Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

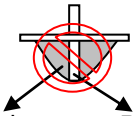
Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

13.4.1.3 Solder Wetting



Recommended



Not Recommended

12.4.2. Pins of EL

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

13.4.2.2 No Solder Paste on the soldering pad on the motherboard is recommended.

13.4.2.3 Recommended Soldering Conditions

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

Recommended Solder Temperature: 270～290℃

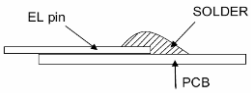
Typical Soldering Time: ≤2s

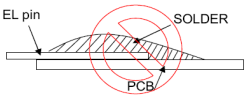
Minimum solder distance from EL lamp (body):2.0mm

13.4.2.4 No horizontal press on the EL leads during soldering.

13.4.2.5 180° bend EL leads three times is not allowed.

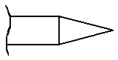
13.4.2.6 Solder Wetting

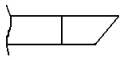




Recommended Not Recommended

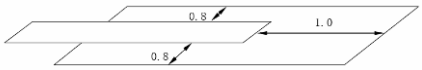
13.4.2.7 The type of the solder iron:





Recommended Not Recommended

13.4.2.8 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 duration time not longer than half an 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