PRODUCT SPECIFICATION

12.3 TFT LCD MODULE
MODEL: YDP LCD I 1230 LVDS

ROHS

< ◇> 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
1.0	2019.02.26	ZDT	Initial Release	
1.1	2019.10.18	ZDT	Modify Backlight Characteristic	P5

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 ICs and a backlight unit.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	12.3”	
Display Mode	Transmissive /Normally Black	
Resolution	1920(H)RGB × 720(V)	Pixels
View Direction	FULL VIEW	Best Image
Module Outline	307(H) × 125.9(V) × 10.7(T) (Note1)	mm
Active Area	292.032(H) × 109.512(V)	mm
Pixel Pitch	152.1(H) × 152.1(V)	um
Pixel Arrangement	RGB Vertical stripe	
Display Colors	16.7M	
Interface	Dual-LVDS interface	
Driver IC	HX8290&HX8695	-
With or without the touch panel	Without	
Operating Temperature	**-30～85**	ºC
Storage Temperature	**-40～90**	ºC
Weight	TBD	g

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

3. Absolute Maximum Ratings

V_{SS}=0V, Ta=25ºC

Item	Symbol	Min.	Max.	Unit
Power Supply Voltage	VCC	-0.3	4.0	V
Storage temperature	T_{STG}	**-40**	**90**	ºC
Operating temperature	T_{OP}	**-30**	**85**	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	VCC	3.0	3.3	3.5	V
Differential input high Threshold voltage	V_{TH}	+0.1	-	-	V
Differential input low threshold voltage	V_{TL}	-	-	-0.1	V
Differential input common Mode voltage	V_{CM}	1	1.2	1.7-|Vid|/2	V
LVDS input voltage	V_{INLV}	0.7	-	1.7	V
Differential input voltage	|Vid|	0.2	-	0.6	V
Differential input leakage Current	I_{Ivleak}	-10	-	+10	μA

5. Backlight Characteristic

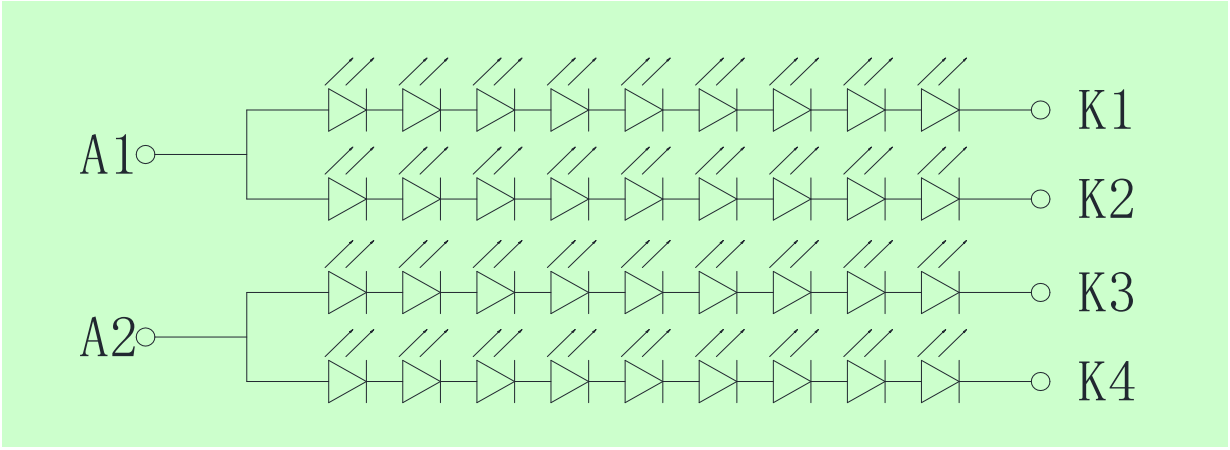
5.1. Backlight Characteristic

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V_F	Ta=25 ºC, I_F=100mA/LED	24.3	**27.9**	30.6	V
Forward Current	I_F	Ta=25 ºC, V_F=3.1V/LED	-	**400**	-	mA
Power dissipation	P_D	-	-	**11160**	-	mW
Uniformity	Avg	-	70	80	-	%
Drive method	Constant current					
LED Configuration	36 White LEDs (9 LEDs in one string and 4 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 ºC,60%RH±5%, I_F=100mA/LED.

5.2. Backlighting circuit



6. Optical Characteristics

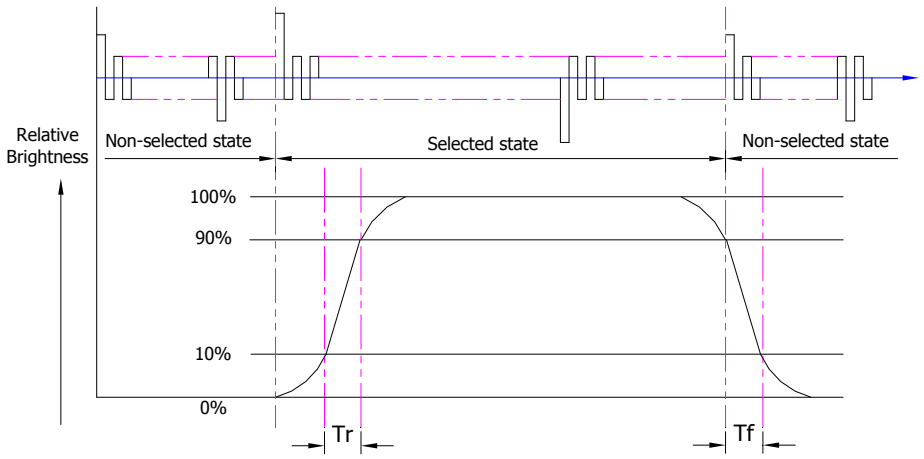
6.1. Optical Characteristics

Ta=25ºC, VCC=3.3V

	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
Backlight On (Transmissive Mode)	Luminance on TFT(I_f =100mA/LED)		Lv		800	1000	-	cd/m²
	Contrast ratio(See 6.3)		CR		-	1100	-	
	Response time (See 6.2)		TR+TF		-	-	25	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	88	-	Deg.
			θX-		80	88	-	
		Vertical	φY+		80	88	-	
			φY-		80	88	-	
	NTSC Ratio(Gamut)				-	72	-	%

6.2. Definition of Response Time

6.2.1. Normally Black Type (Negative)

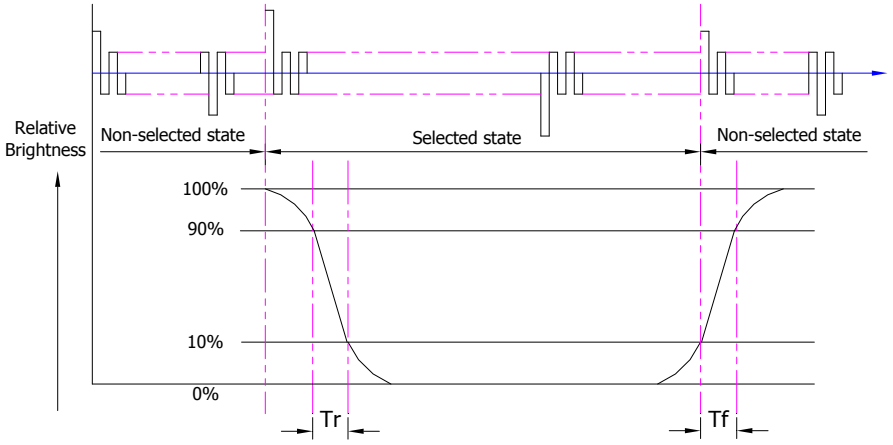


Tr is the time it takes to change form non-selected stage with relative luminance 10% to selected state with relative luminance 90%;

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

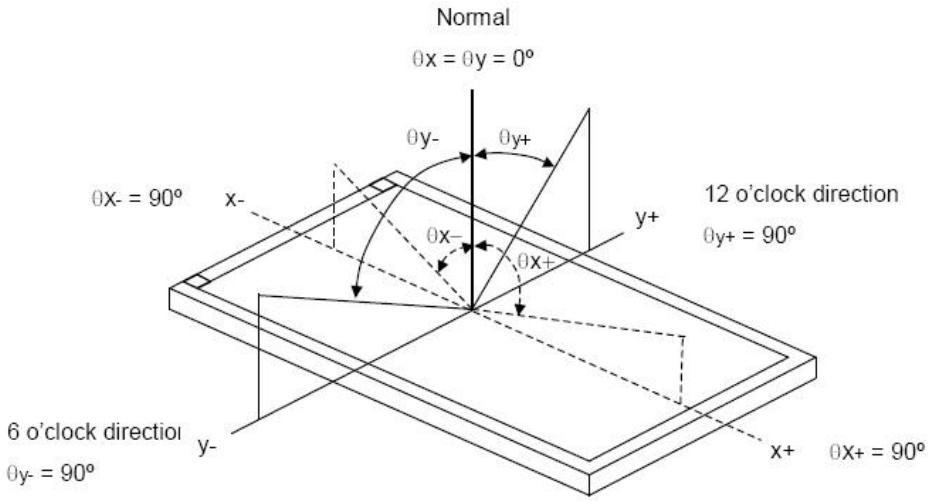
6.3. Definition of Contrast Ratio

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



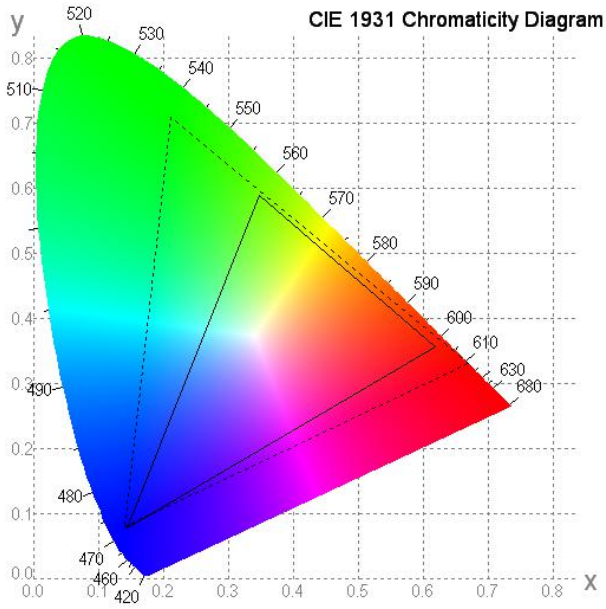
Measuring machine: LCD-5100 or EQUI

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

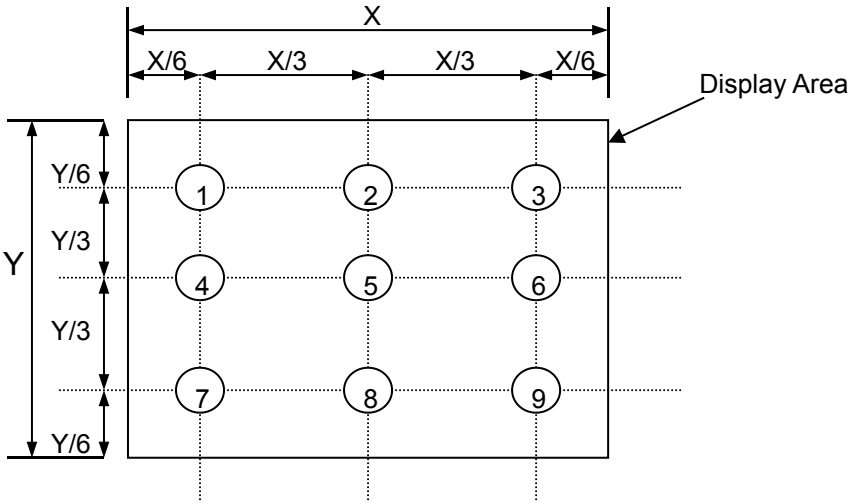
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

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

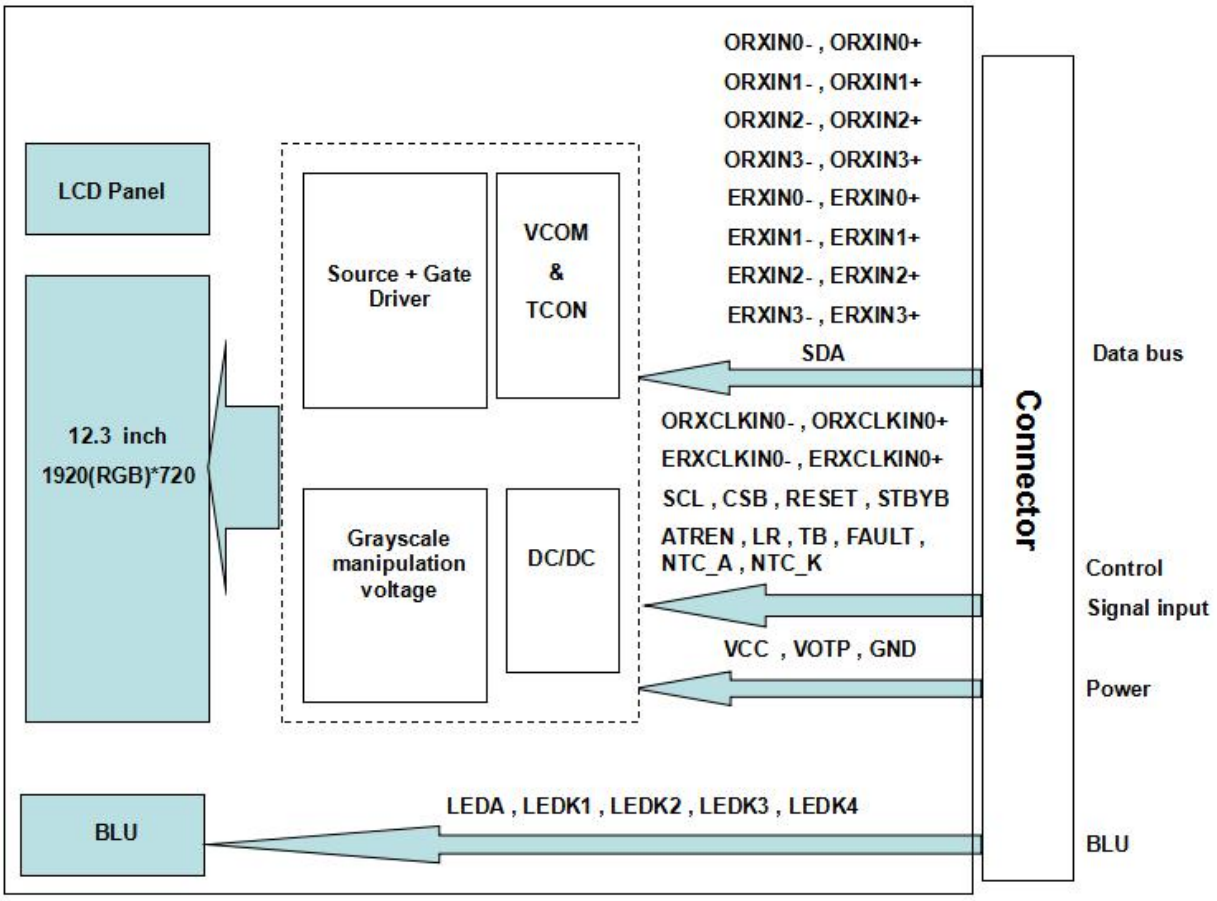
6.6.2. Uniformity = Minimal (L_{P1}:L_{P9}) / Maximal (L_{P1}:L_{P9}) * 100%

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

Note: Measuring machine: BM-7



7. Block Diagram and Power Supply



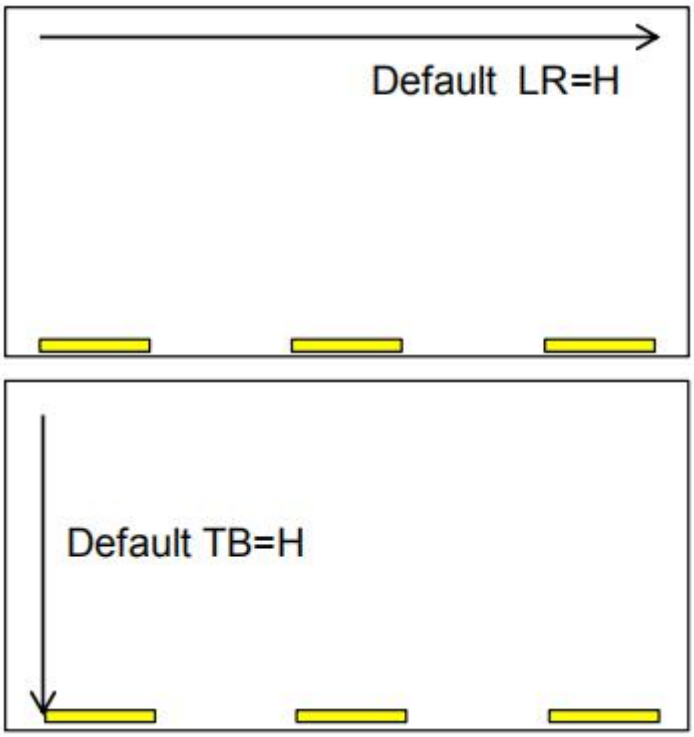
8. Interface Pins Definition

Connector: Hirose FH28-60S-0.5H(05)

No.	Symbol	Function	Remark
1	GND	Ground	
2	VCC	Power Supply	
3	VCC	Power Supply	
4	GND	Ground	
5	ORXIN0-	LVDS Receiver Signal(-)	
6	ORXIN0+	LVDS Receiver Signal(+)	
7	GND	Ground	
8	ORXIN1-	LVDS Receiver Signal(-)	
9	ORXIN1+	LVDS Receiver Signal(+)	
10	GND	Ground	
11	ORXIN2-	LVDS Receiver Signal(-)	
12	ORXIN2+	LVDS Receiver Signal(+)	
13	GND	Ground	
14	ORXCLKIN-	LVDS Receiver Signal(-)	
15	ORXCLKIN+	LVDS Receiver Signal(+)	
16	GND	Ground	
17	ORXIN3-	LVDS Receiver Signal(-)	
18	ORXIN3+	LVDS Receiver Signal(+)	
19	GND	Ground	
20	ERXIN0-	LVDS Receiver Signal(-)	
21	ERXIN0+	LVDS Receiver Signal(+)	
22	GND	Ground	
23	ERXIN1-	LVDS Receiver Signal(-)	
24	ERXIN1+	LVDS Receiver Signal(+)	
25	GND	Ground	
26	ERXIN2-	LVDS Receiver Signal(-)	
27	ERXIN2+	LVDS Receiver Signal(+)	
28	GND	Ground	
29	ERXCLKIN-	LVDS Receiver Signal(-)	
30	ERXCLKIN+	LVDS Receiver Signal(+)	
31	GND	Ground	
32	ERXIN3-	LVDS Receiver Signal(-)	
33	ERXIN3+	LVDS Receiver Signal(+)	
34	GND	Ground	
35	NC	No connection	
36	RESET	Reset Signal	
37	STBYB	STBYB Sign	
38	SCL	SPI Signal	
39	SDA	SPI Signal	
40	CSB	SPI Signal	

41	ATREN	Enable auto reload Single	
42	NC	No connection	
43	VOTP	OTP Voltage	
44	GND	Ground	
45	LR	Horizontal shift direction	Note 1
46	TB	Vertical shift direction	Note 1
47	FAULT	Fault dection	
48	NC	No connection	
49	LEDA	Power Supply of LED	
50	LEDA	Power Supply of LED	
51	NC	No connection	
52	NC	No connection	
53	LEDK1	Ground of LED	
54	LEDK2	Ground of LED	
55	LEDK3	Ground of LED	
56	LEDK4	Ground of LED	
57	NC	No connection	
58	NTC_A	Thermistor Sensor	
59	NC	No connection	
60	NTC_K	Thermistor Sensor	

Note1:

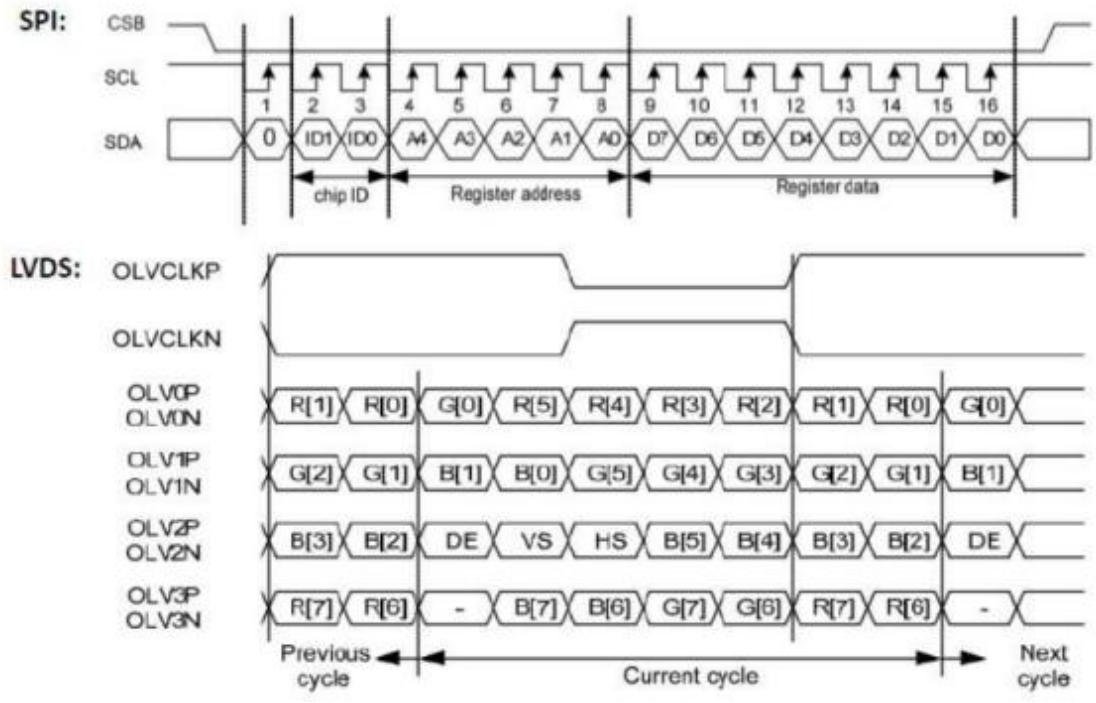


9. SIGNAL SPECIFICATION

1) LVDS Signal Timing

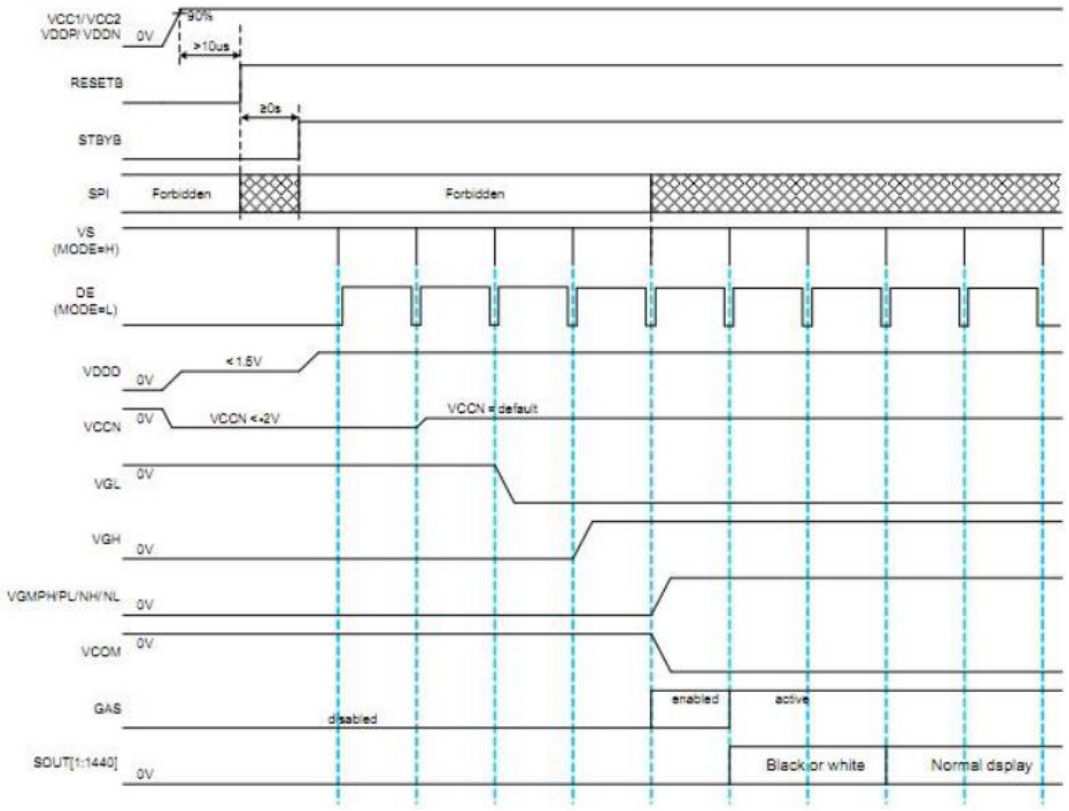
Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	RxFCLK		44.1		MHz	
Horizontal Display Area	thd		960		DCLK	
HS Period	th	984	992	1005	DCLK	
HS Blanking	Thb+thfp		32		DCLK	
Vertical Display Area	tvd		720		TH	
VS Period	tv	730	741	753	TH	
VS Blanking	Tvbp+tvfp		21		TH	
Input data skew margin	TRSKM	400			ps	
Clock high time	TLVCH	2.45	3	4.55	ns	
Clock low time	TLVCL	2.45	4	4.55	ns	
PLL wake-up time	TenPLL			150	us	

2) Signal Format

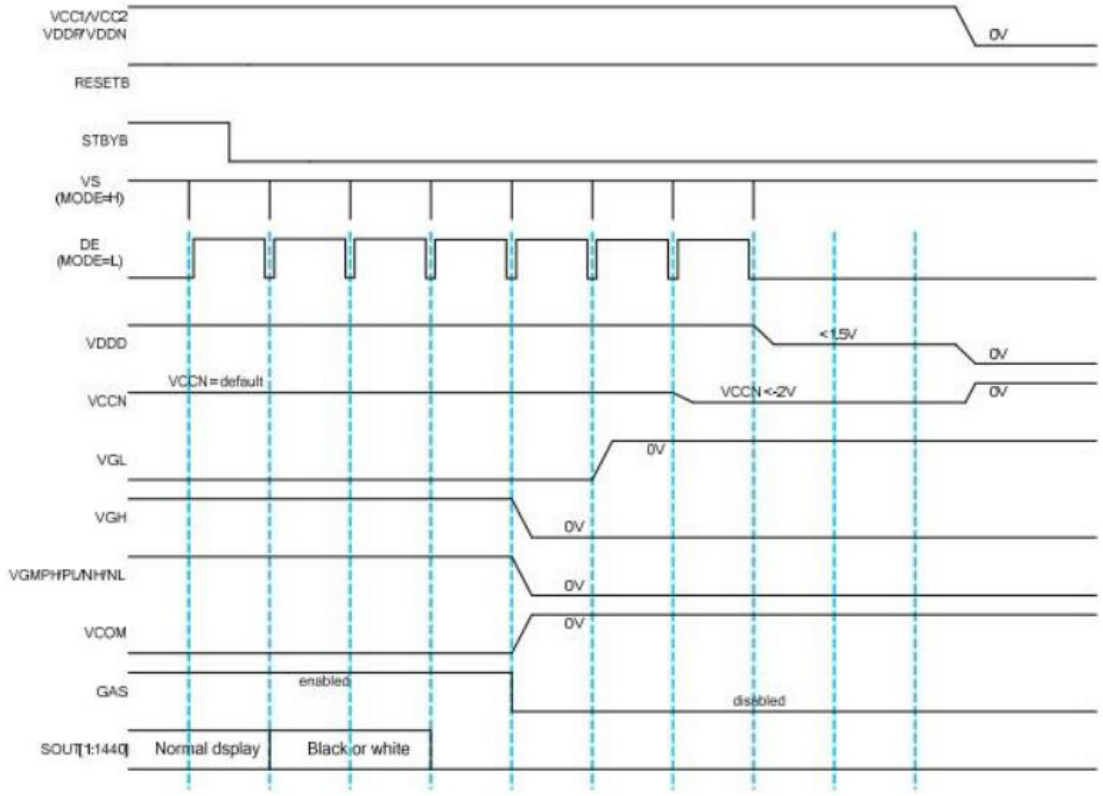


10. POWER ON/OFF SEQUENCE

1) Power on sequence



2) Power off sequence



11. Quality Assurance

11.1. Purpose

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

11.2. Standard for Quality Test

11.2.1. Sampling Plan:

GB2828.1-2012

Single sampling, general inspection level II

11.2.2. Sampling Criteria:

Visual inspection: AQL 1.5%

Electrical functional: AQL 0.65%.

11.2.3. Reliability Test:

Detailed requirement refer to Reliability Test Specification.

11.3. Nonconforming Analysis & Disposition

11.3.1. Nonconforming analysis:

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

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

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

11.3.2. Disposition of nonconforming:

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

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

11.4. Agreement Items

Shall negotiate with customer if the following situation occurs:

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

11.4.2. Additional requirement to be added in product specification.

11.4.3. Any other special problem.

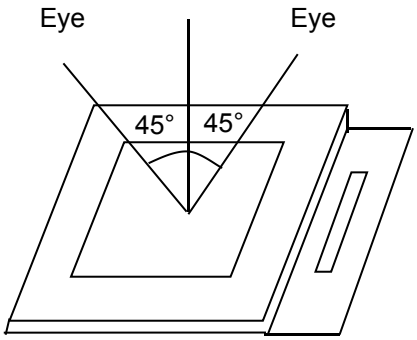
11.5. Standard of the Product Visual Inspection

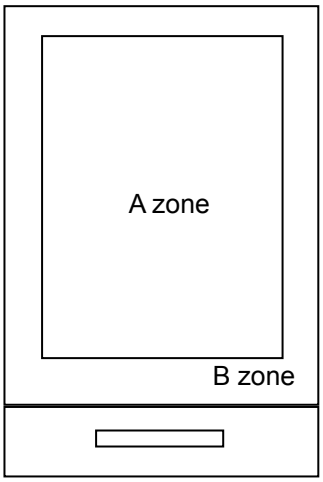
11.5.1. Appearance inspection:

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

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

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



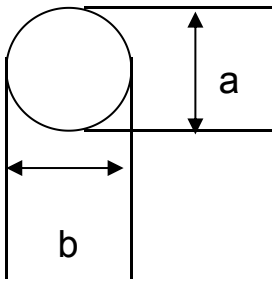


11.5.2. Basic principle:

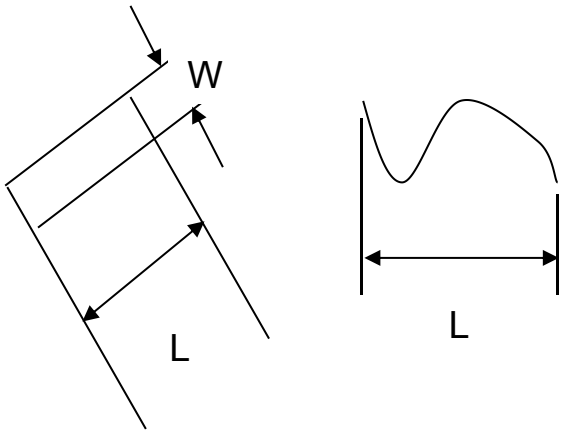
11.5.2.1. A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.

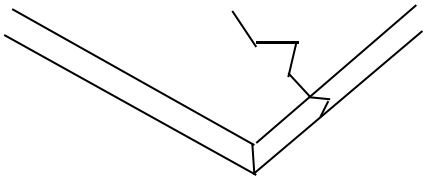
11.5.2.2. New item must be added on time when it is necessary.

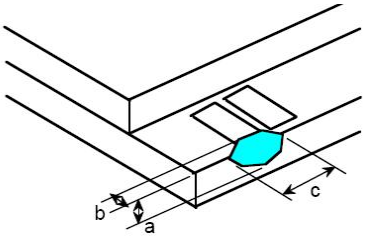
11.6. Inspection Specification

<table>
<tr><th>No.</th><th>Item</th><th>Criteria (Unit: mm)</th></tr>
<tr><td>01</td><td>Black / White spot
Foreign material
(Round type)
Pinholes
Stain
Particles inside cell.
(Minor defect)</td><td>


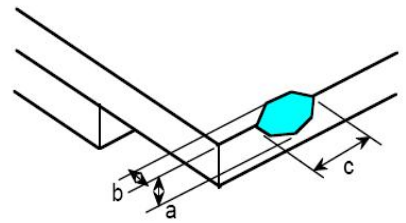
<table>
<tr><th>Area
Size</th><th>Acc. Qty</th></tr>
<tr><td>φ≤0.20</td><td>Ignore</td></tr>
<tr><td>0.20<φ≤0.50</td><td>N≤3</td></tr>
<tr><td>0.50<φ</td><td>0</td></tr>
</table>
φ= (a + b) /2
Distance between 2 defects should more than 5mm apart.
</td></tr>
<tr><td>02</td><td>Electrical Defect
(Minor defect)</td><td>
<table>
<tr><td rowspan="2">Bright dot</td><td>Display Area</td><td>Total</td><td rowspan="4">Note1</td></tr>
<tr><td>N≤2</td><td>N≤2</td></tr>
<tr><td>Dark dot</td><td>N≤4</td><td>N≤4</td></tr>
<tr><td>Total dot</td><td>N≤4</td><td>N≤4</td></tr>
<tr><td>Mura</td><td colspan="2">Not visible through 5% ND filter.</td><td>Note 2</td></tr>
</table>
Remark:
1. Bright dot caused by scratch and foreign object accords to item 1.
</td></tr>
</table>

<table>
<tr>
<td>03</td>
<td>Black and White line
Scratch
Foreign material
(Line type)
(Minor defect)</td>
<td>


<table>
<tr><th>Length</th><th>Width</th><th>Acc. Qty</th></tr>
<tr><td>/</td><td>W ≦ 0.1</td><td>Ignore</td></tr>
<tr><td>L ≦ 2.5</td><td>0.1 ＜ W ≦ 0.2</td><td>3</td></tr>
<tr><td>L＞2.5</td><td>0.2 ＜ W</td><td>0</td></tr>
<tr><td colspan="2">Total</td><td>3</td></tr>
</table>
Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable.
</td>
</tr>
<tr>
<td>04</td>
<td>Glass Crack
(Minor defect)</td>
<td>

Crack is potential to enlarge, any type is not allowed.
</td>
</tr>
</table>

<table>
<tr>
<td>05</td>
<td>Glass Chipping Pad Area:
(Minor defect)


</td>
<td>
<table>
<tr><th>Length and Width</th><th>Acc. Qty</th></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>
</table>

<table>
<tr>
<td>06</td>
<td>Glass Chipping Rear of Pad Area:
(Minor defect)
 
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<td><table>
<tr><th>Length and Width</th><th>Acc. Qty</th></tr>
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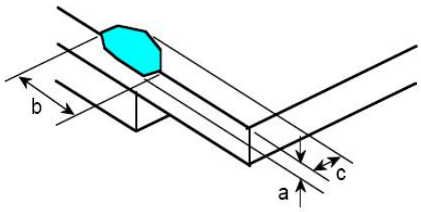
<tr><td>c< 3.0, b< 1.0</td><td>2</td></tr>
<tr><td>c< 3.0, b< 0.5</td><td>4</td></tr>
<tr><td colspan="2">a<Glass Thickness</td></tr>
</table></td>
</tr>
<tr>
<td>07</td>
<td>Glass Chipping Except Pad Area:
(Minor defect)
 
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<tr><th>Length and Width</th><th>Acc. Qty</th></tr>
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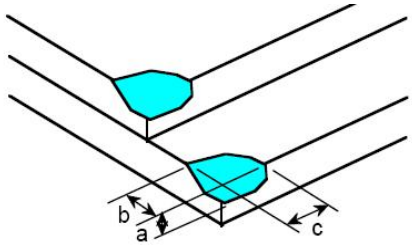
<tr><td>c< 3.0, b< 1.0</td><td>2</td></tr>
<tr><td>c< 3.0, b< 0.5</td><td>4</td></tr>
<tr><td colspan="2">a<Glass Thickness</td></tr>
</table></td>
</tr>
<tr>
<td>08</td>
<td>Glass Corner Chipping:
(Minor defect)
 
</td>
<td><table>
<tr><th>Length and Width</th><th>Acc. Qty</th></tr>
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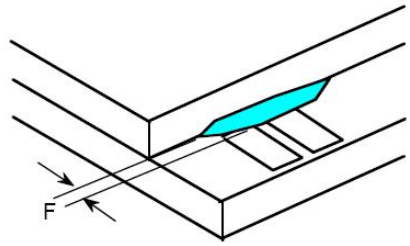
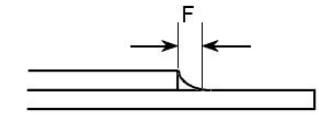
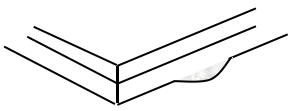
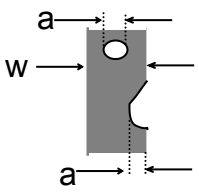
<tr><td colspan="2">a<Glass Thickness</td></tr>
</table></td>
</tr>
<tr>
<td>09</td>
<td>Glass Burr:
(Minor defect)
 

  </td>
<td><table>
<tr><th>Length</th><th>Acc. Qty</th></tr>
<tr><td>F < 1.0</td><td>Ignore</td></tr>
</table>
Glass burr don’t affect assemble and module dimension.</td>
</tr>
</table>

<table>
<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 colspan="2"><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>
<tr><td>12</td><td>Dent on Polarizer
(Minor defect)</td><td colspan="2"><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 colspan="2">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 colspan="2">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>PCB</td><td colspan="2">15.1 No distortion or contamination on PCB terminals.
15.2 All components on PCB must same as documented on the BOM/component layout.
15.3 Follow IPC-A-600F.</td></tr>
<tr><td>16</td><td>Soldering</td><td colspan="2">Follow IPC-A-610C standard</td></tr>
</table>

17	Electrical Defect (Major defect)	The below defects must be rejected. 17.1 Missing vertical / horizontal segment, 17.2 Abnormal Display. 17.3 No function or no display. 17.4 Current exceeds product specifications. 17.5 LCD viewing angle defect. 17.6 No Backlight. 17.7 Dark Backlight. 17.8 Touch Panel no function.

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

11.7. Classification of Defects

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

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

11.8. Identification/marking criteria

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

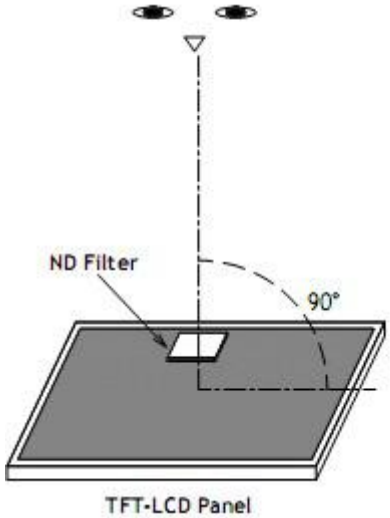
11.9. Packing

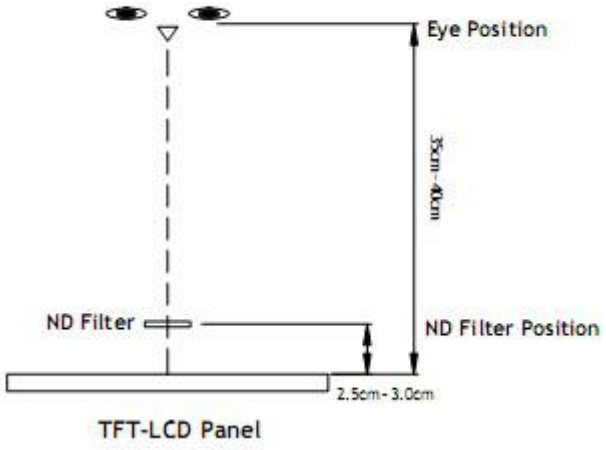
11.9.1. There should be no damage of the outside carton box, each packaging box should have one identical label.

11.9.2. Modules inside package box should have compliant mark.

11.9.3. 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.

12. Reliability Specification

No	Item	Condition	Quantity	Criteria
1	High Temperature Operating	**85℃, 240Hrs**	2	
2	Low Temperature Operating	**-30℃,240Hrs**	2	
3	High Humidity	**65℃, 90%RH, 240Hrs**	2	
4	High Temperature Storage	**90℃, 240Hrs**	2	
5	Low Temperature Storage	**-40℃, 240Hrs**	2	
6	Thermal Cycling Test	**-30℃, 60min~85℃, 30min, 100 cycles.**	2	
7	Packing vibration	Frequency range:10Hz~50Hz Acceleration of gravity:5G X,Y,Z 30 min for each direction.	2	
8	Electrical Static Discharge	Air:±15KV 150pF/330Ω 5 times	2	
		Contact:±8KV 150pF/330Ω 5 times		
9	Drop Test (Packaged)	Height:80 cm,1 corner, 3 edges, 6 surfaces.	2	

Note1. No defection cosmetic and operational function allowable.

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

13. Precautions and Warranty

13.1. Safety

13.1.1. 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.

13.1.2. Since the liquid crystal cells are made of glass, do not apply strong impact on them. Handle with care.

13.2. Handling

13.2.1. Reverse and use within ratings in order to keep performance and prevent damage.

13.2.2. 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.

13.3. Storage

13.3.1. Do not store the LCD module beyond the specified temperature ranges.

13.3.2. Strong light exposure causes degradation of polarizer and color filter.

13.4. Metal Pin (Apply to Products with Metal Pins)

13.4.1. 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

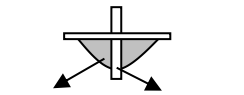
Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

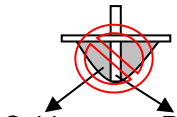
Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

13.4.1.3. Solder Wetting



Recommended



Not Recommended

13.4.2. 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℃

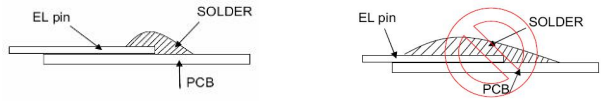
Typical Soldering Time: ≤2s

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

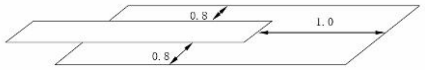


Recommended Not Recommended

13.4.2.7. The type of the solder iron:

Recommended Not Recommended

13.4.2.8. Solder Pad



13.5. Operation

13.5.1. Do not drive LCD with DC voltage

13.5.2. Response time will increase below lower temperature

13.5.3. Display may change color with different temperature

13.5.4. Mechanical disturbance during operation, such as pressing on the display area, may cause the segments to appear “fractured”.

13.5.5. Do not connect or disconnect the LCM to or from the system when power is on.

13.5.6. Never use the LCM under abnormal condition of high temperature and high humidity.

13.5.7. 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.

13.5.8. 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.

13.6. Static Electricity

13.6.1. CMOS LSIs are equipped in this unit, so care must be taken to avoid the electro-static charge, by ground human body, etc.

13.6.2. The normal static prevention measures should be observed for work clothes and benches.

13.6.3. The module should be kept into anti-static bags or other containers resistant to static for storage.

13.7. Limited Warranty

13.7.1. Our warranty liability is limited to repair and/or replacement. We will not be responsible for any consequential loss.

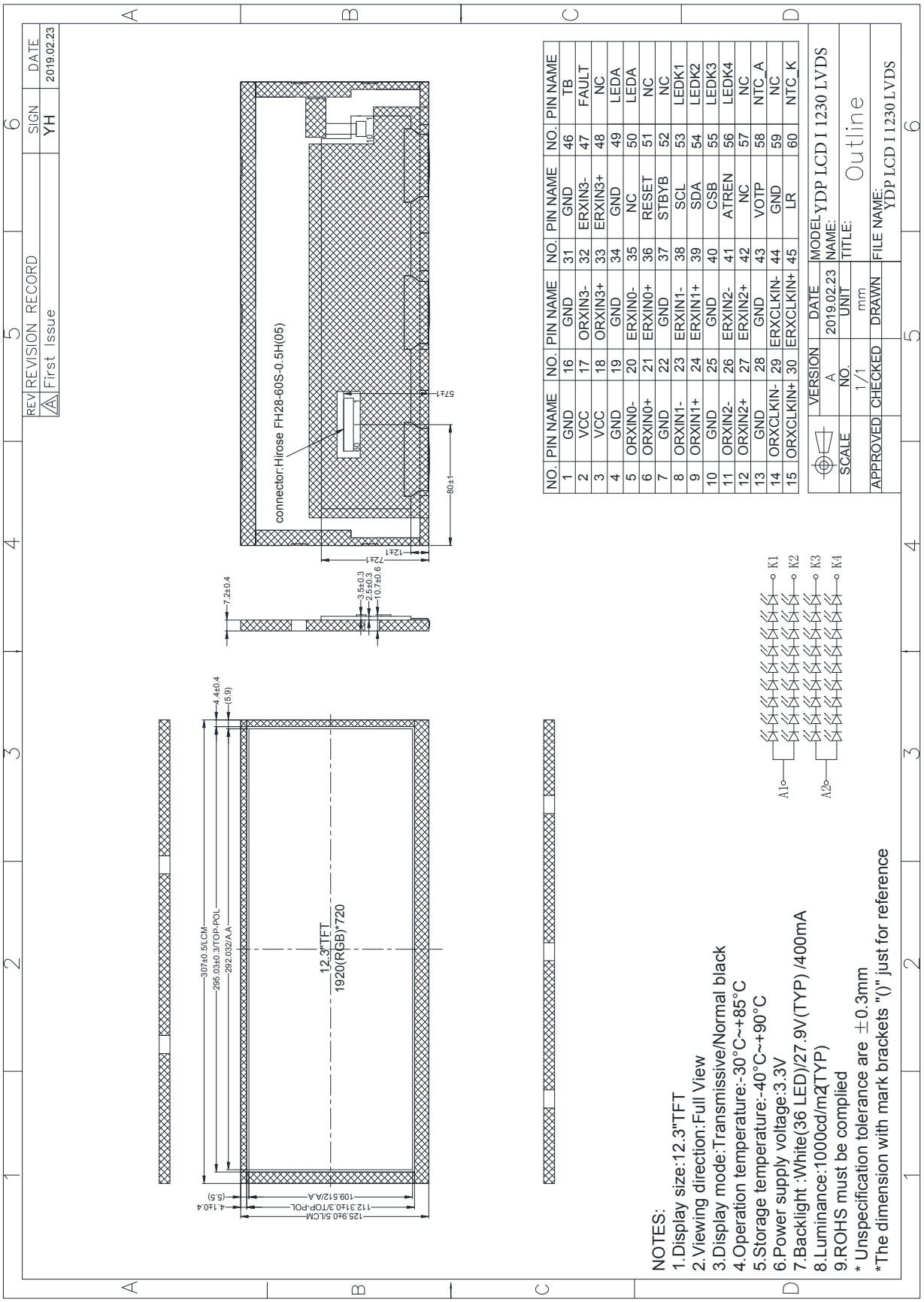
13.7.2. If possible, we suggest customer to use up all modules in six months. If the module storage time over twelve months, we suggest that recheck it before the module be used.

13.7.3. 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.

14. Packaging

TBD

15. Outline Drawing



NO.	PIN NAME	NO.	PIN NAME	NO.	PIN NAME	NO.	PIN NAME
1	GND	16	GND	31	GND	46	TB
2	VCC	17	ORXIN3-	32	ERXIN3-	47	FAULT
3	VCC	18	ORXIN3+	33	ERXIN3+	48	NC
4	GND	19	GND	34	GND	49	LEDA
5	ORXIN0-	20	ERXIN0-	35	NC	50	LEDA
6	ORXIN0+	21	ERXIN0+	36	RESET	51	NC
7	GND	22	GND	37	STBYB	52	NC
8	ORXIN1-	23	ERXIN1-	38	SCL	53	LEDK1
9	ORXIN1+	24	ERXIN1+	39	SDA	54	LEDK2
10	GND	25	GND	40	CSB	55	LEDK3
11	ORXIN2-	26	ERXIN2-	41	ATREN	56	LEDK4
12	ORXIN2+	27	ERXIN2+	42	NC	57	NC
13	GND	28	GND	43	VOTP	58	NTC_A
14	ORXCLKIN-	29	ERXCLKIN-	44	GND	59	NC
15	ORXCLKIN+	30	ERXCLKIN+	45	LR	60	NTC_K

VERSION	DATE
A	2019.02.23

SCALE	NO.	UNIT
	1/1	mm

APPROVED	CHECKED	DRAWN