

PRODUCT SPECIFICATION

5.6” TN TFT LCD MODULE
MODEL: YDP LCD TN 12 560 R



- < ◇ > 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	2021.09.01	LYH	Initial Release	
1.1	2021.12.03	LQ	Modify Current Consumption Add CIE value	P5 P6

Table of Contents

No.	Item	Page
1.	General Description.....	4
2.	Module Parameter.....	4
3.	Absolute Maximum Ratings.....	4
4.	DC Characteristics.....	5
5.	Backlight Characteristic.....	5
5.1.	Backlight Characteristic.....	5
5.2.	Backlighting circuit.....	5
6.	Optical Characteristics.....	6
6.1.	Optical Characteristics.....	6
6.2.	Definition of Response Time.....	6
6.3.	Definition of Contrast Ratio.....	7
6.4.	Definition of Viewing Angles.....	7
6.5.	Definition of Color Appearance.....	7
6.6.	Definition of Surface Luminance, Uniformity and Transmittance.....	8
7.	Block Diagram and Power Supply.....	9
8.	Interface Pins Definition.....	10
9.	AC Characteristics.....	11
9.1.	Parallel RGB at DE only mode.....	11
9.2.	DE mode timing.....	11
9.3.	Parallel RGB at Sync mode (HV mode).....	12
9.4.	HV mode timing.....	13
10.	Quality Assurance.....	14
10.1.	Purpose.....	14
10.2.	Standard for Quality Test.....	14
10.3.	Nonconforming Analysis & Disposition.....	14
10.4.	Agreement Items.....	14
10.5.	Standard of the Product Visual Inspection.....	14
10.6.	Inspection Specification.....	15
10.7.	Classification of Defects.....	19
10.8.	Identification/marketing criteria.....	19
10.9.	Packing.....	19
11.	Reliability Specification.....	20
12.	Precautions and Warranty.....	21
12.1.	Safety.....	21
12.2.	Handling.....	21
12.3.	Storage.....	21
12.4.	Metal Pin (Apply to Products with Metal Pins).....	21
12.5.	Operation.....	22
12.6.	Static Electricity.....	22
12.7.	Limited Warranty.....	22
14.	Packaging.....	23
15.	Outline Drawing.....	24

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)	5.6"	
LCD type	TN TFT	
Display Mode	Transmissive /Normal white	
Resolution	640 RGB x 480	Pixels
View Direction	12 O'CLOCK	Best Image
Gray scale inversion direction	6 O'CLOCK	
Module Outline	126.5(H) x100 (V) x 5.7(T) (Note1)	mm
Active Area	112.9(H) x84.67(V)	mm
Pixel Size	176.4(W)x176.4(H)	um
Pixel Arrangement	RGB-Stripe	
Polarizer Surface Treatment	Anti-glare	
Display Colors	262K	
Interface	18 bit RGB Interface	
With or Without Touch Panel	Without	
Operating Temperature	-20~70	°C
Storage Temperature	-30~80	°C
Weight	(83.1)	g

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

3. Absolute Maximum Ratings

GND=0V, Ta=25°C

Item	Symbol	Min.	Max.	Unit
Power Voltage	VCC	-0.3	4	V
	VLED	-0.3	6.5	V
Storage temperature	T _{stg}	-30	+80	°C
Operating temperature	T _{op}	-20	+70	°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	VCC	3.1	3.3	3.5	V
Backlight Power Supply	VLED	4.8	5	5.2	V
Logic Low input voltage	V _{IL}	0	-	0.3*VCC	V
Logic High input voltage	V _{IH}	0.7*VCC	-	VCC	V
Current Consumption	I _{VCC}	-	62	-	mA

5. Backlight Characteristic

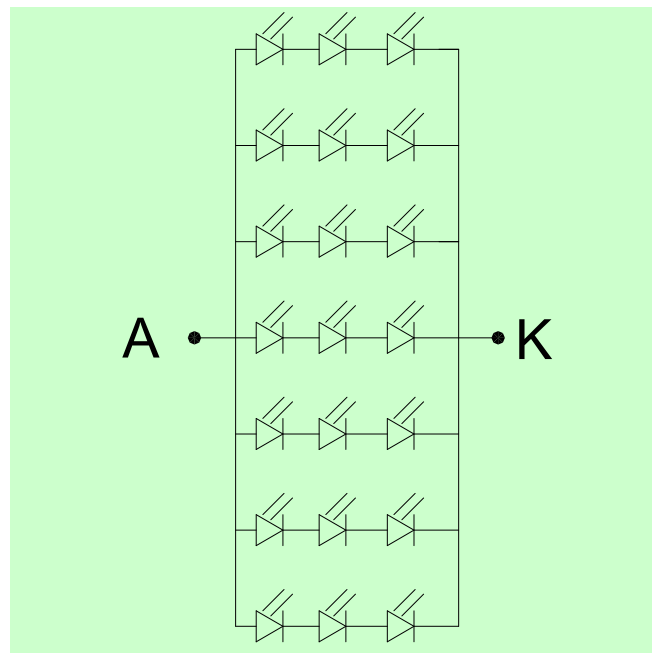
5.1. Backlight Characteristic

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V _F	Ta=25 °C, I _F =20mA/LED	8.4	9.6	10.2	V
Forward Current	I _F	Ta=25 °C, V _F =3.2V/LED	-	140	-	mA
Power dissipation	P _d		-	1344	-	mW
Uniformity	Avg		70	75	-	%
LED working life(25°C)	-		20000	-	-	Hrs
Drive method	Constant current					
LED Configuration	21 White LEDs(3 LEDs in one string and 7 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_F=20mA/LED.

5.2. Backlighting circuit



6. Optical Characteristics

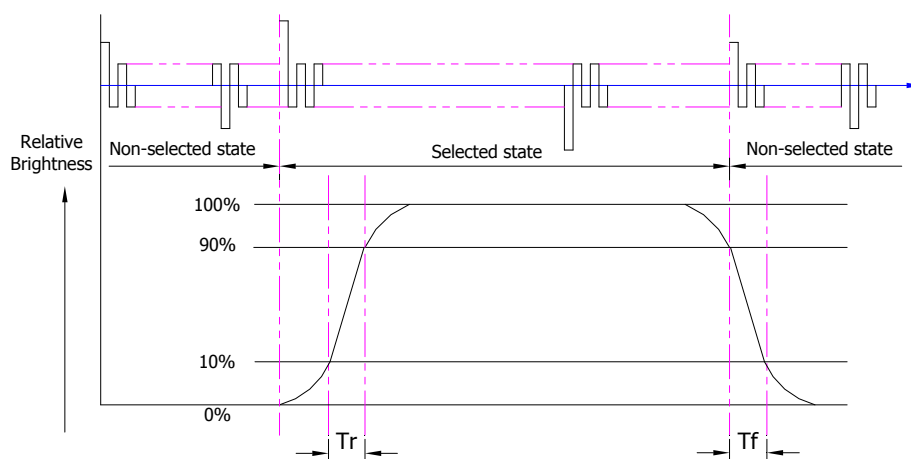
6.1. Optical Characteristics

Ta=25°C, V_{CC}=3.3V

	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
Backlight On (Transmissive Mode)	Luminance on TFT ($I_f=20\text{mA/LED}$)		L _v	Normally viewing angle $\theta_x = \phi_y = 0^\circ$	360	450	-	cd/m ²
	Contrast ratio(See 6.3)		CR		400	500	-	
	Response time (See 6.2)		T _R		-	10	20	ms
			T _F		-	15	30	ms
	Chromaticity Transmissive (See 6.5)	Red	X _R		0.540	0.590	0.640	
			Y _R		0.319	0.369	0.419	
		Green	X _G		0.281	0.331	0.381	
			Y _G		0.557	0.607	0.657	
		Blue	X _B		0.093	0.143	0.193	
			Y _B		0.034	0.084	0.134	
		White	X _W		0.254	0.304	0.354	
			Y _W		0.289	0.339	0.389	
	Viewing Angle (See 6.4)	Horizontal	θ_{x+}	Center CR≥10	60	70	-	Deg.
			θ_{x-}		60	70	-	
		Vertical	ϕ_{y+}		40	50	-	
			ϕ_{y-}		60	70	-	

6.2. Definition of Response Time

6.2.1. Normally Black Type (Negative)

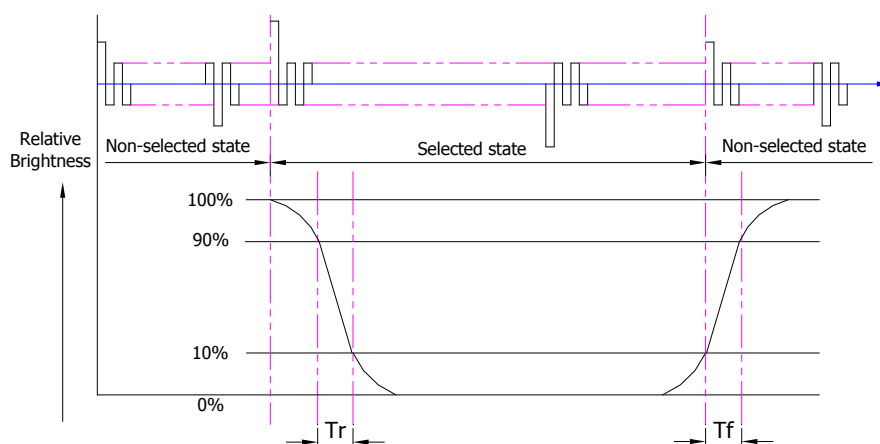


T_r is the time it takes to change from non-selected state with relative luminance 10% to selected state with relative luminance 90%;

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)



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

T_f 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

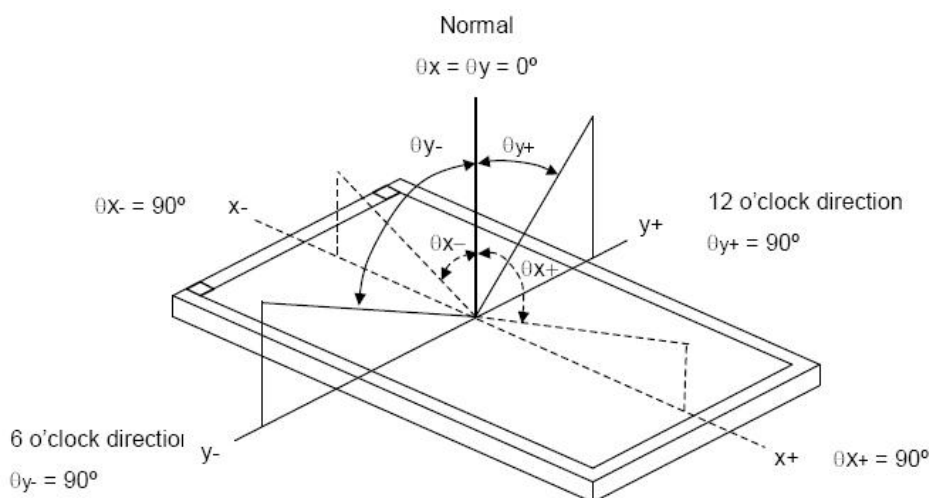
Contrast is measured perpendicular to display surface in reflective and transmissive mode.

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



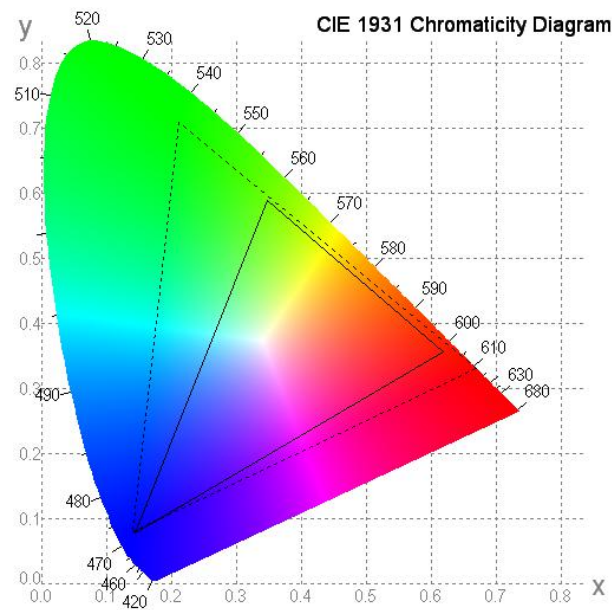
Measuring machine: LCD-5100 or EQUI

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

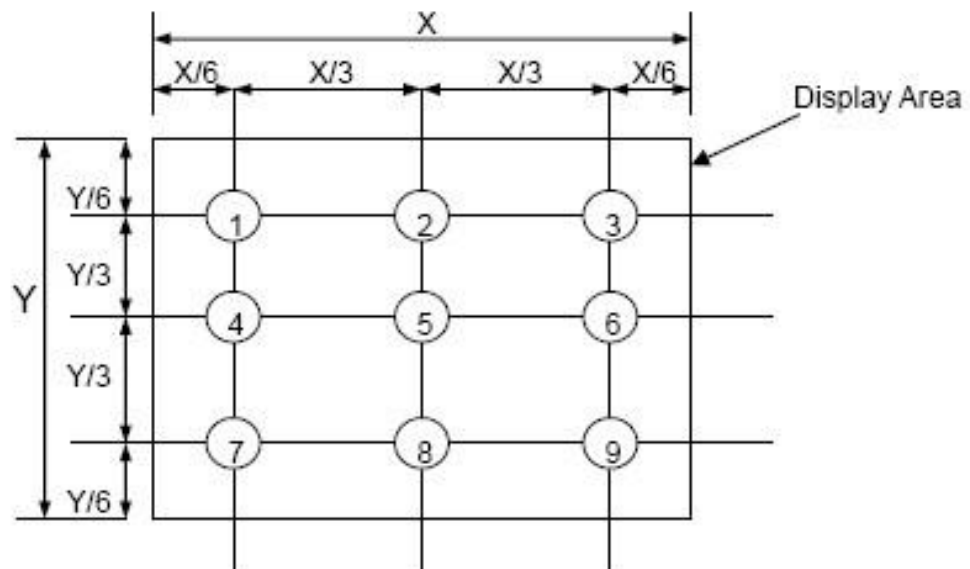
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

7.6.1 Surface Luminance: $L_v = \text{average } (L_{P1}:L_{P9})$

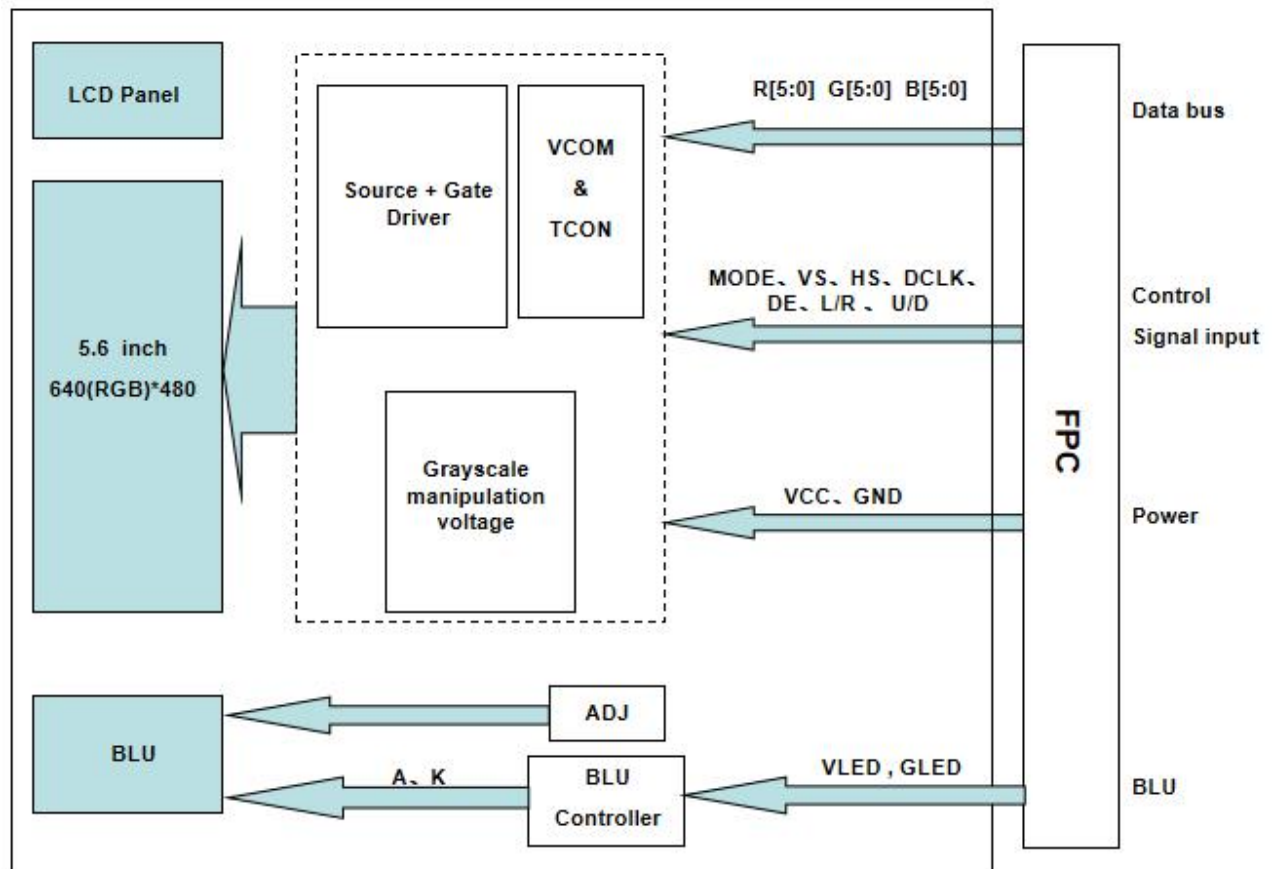
7.6.2 Uniformity = $\text{Minimal } (L_{P1}:L_{P9}) / \text{Maximal } (L_{P1}:L_{P9}) * 100\%$

7.6.3 Transmittance = $L_v \text{ on LCD} / L_v \text{ on Backlight} * 100\%$

Note: Measuring machine:BM-7



7. Block Diagram and Power Supply

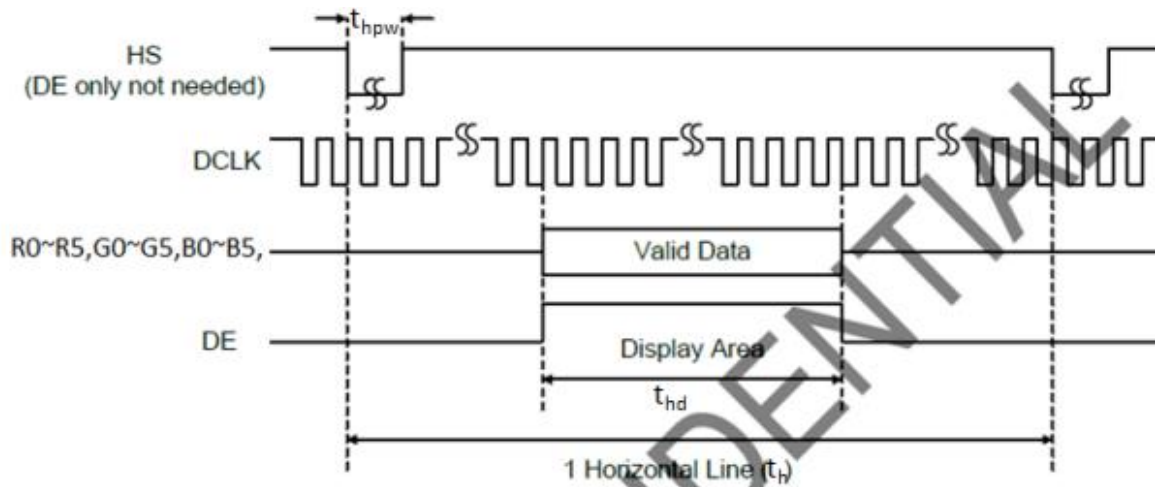


8. Interface Pins Definition

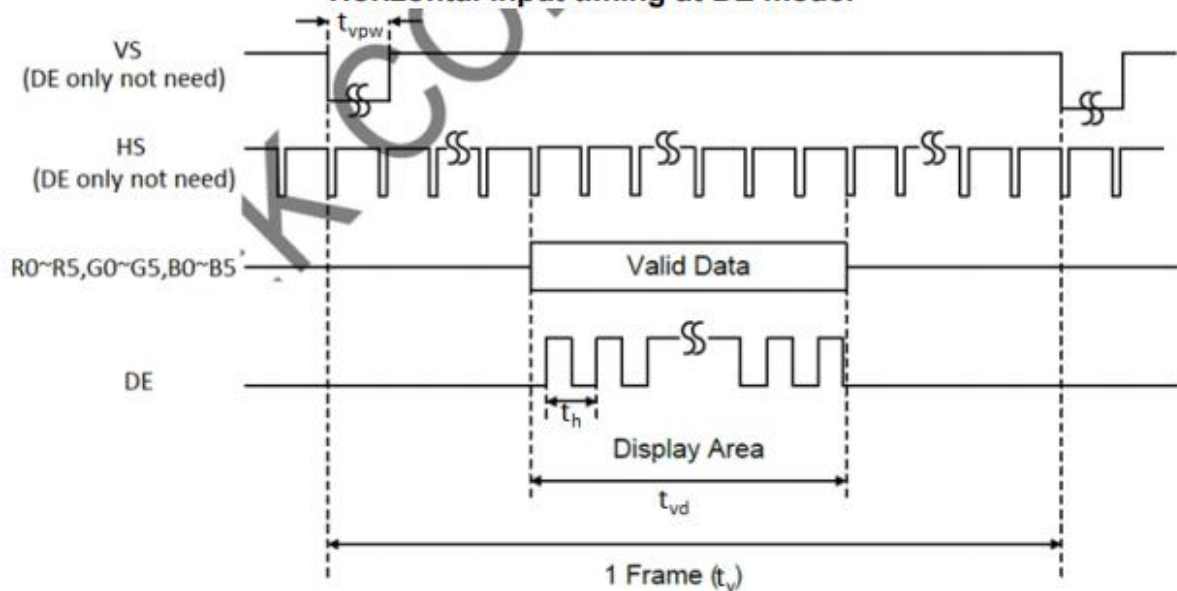
No.	Symbol	Function	Remark
1~2	V _{LED}	Power Voltage for LED circuit(5V)	
3	ADJ	Adjust the LED brightness with PWM Pulse	
4~5	G _{LED}	Ground for LED circuit	
6	V _{CC}	Power Voltage for digital circuit	
7	V _{CC}	Power Voltage for digital circuit	
8	MODE	DE or HV mode control DE Mode, MODE="H",HS floating and VS floating HV Mode, MODE="L" and DE floating	
9	DE	Data enable	
10	VS	Vsync signal input	
11	HS	Hsync signal input	
12	GND	Power ground	
13	B5	Blue data input (MSB)	
14	B4	Blue data input	
15	B3	Blue data input	
16	GND	Power ground	
17	B2	Blue data input	
18	B1	Blue data input	
19	B0	Blue data input(LSB)	
20	GND	Power ground	
21	G5	Green data input(MSB)	
22	G4	Green data input	
23	G3	Green data input	
24	GND	Power ground	
25	G2	Green data input	
26	G1	Green data input	
27	G0	Green data input (LSB)	
28	GND	Power ground	
29	R5	Red data input(MSB)	
30	R4	Red data input	
31	R3	Red data input	
32	GND	Power ground	
33	R2	Red data input	
34	R1	Red data input	
35	R0	Red data input(LSB)	
36	GND	Power ground	
37	DCLK	Sample clock	
38	GND	Power ground	
39	L/R	Select left to right scanning direction	
40	U/D	Select up or down scanning direction	

9. AC Characteristics

9.1. Parallel RGB at DE only mode



Horizontal input timing at DE mode.

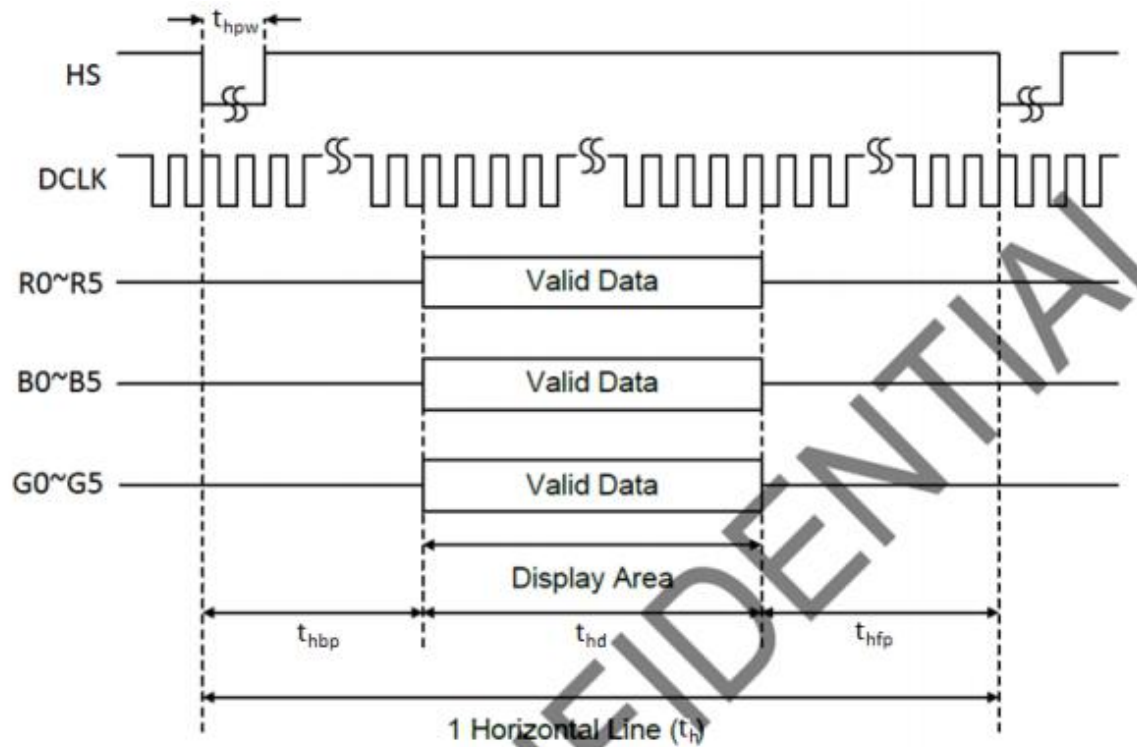


Vertical input timing at DE mode.

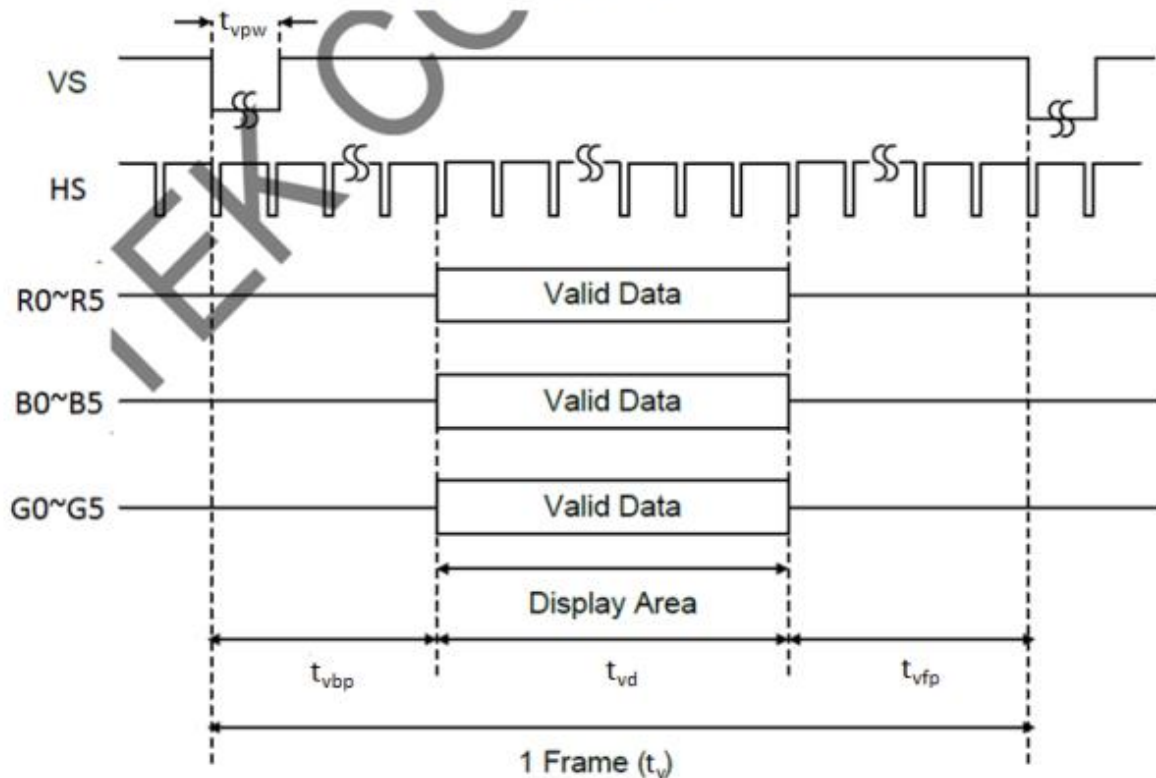
9.2. DE mode timing

Parameter	Symbol	Panel Resolution			Unit
		1 port 640xRGBx480			
		Min.	Typ.	Max.	
DCLK frequency	F _{DCLK}	20.0	23.0	31.2	MHz
Horizontal display area	t _{hd}	640	640	640	DCLK
1 horizontal line	t _h	669	776	832	DCLK
Vertical display area	t _{vd}	480	480	480	H
1 vertical field	t _v	487	493	624	H
Frame rate	FR	-	60	-	Hz

9.3. Parallel RGB at Sync mode (HV mode)



Horizontal input timing at sync mode.



9.4. HV mode timing

Parameter	Symbol	Panel Resolution			Unit
		1 port 640xRGBx480			
		Min.	Typ.	Max.	
DCLK frequency	F _{DCLK}	20.0	23.0	31.2	MHz
Horizontal display area	t _{hd}	640	640	640	DCLK
Hsync pulse Width	t _{h_{pw}}	10	12	255	DCLK
Hsync back porch	t _{h_{bp}}	5	16	255	DCLK
Hsync front porch	t _{h_{fp}}	24	120	260	DCLK
1 horizontal line	t _h	669	776	832	DCLK
Vertical display area	t _{vd}	480	480	480	H
Vsync pulse width	t _{v_{pw}}	1	3	20	H
Vsync back porch	t _{v_{bp}}	2	5	255	H
Vsync front porch	t _{v_{fp}}	5	8	260	H
1 vertical field	t _v	487	493	624	H
Frame rate	FR	-	60	-	Hz

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.

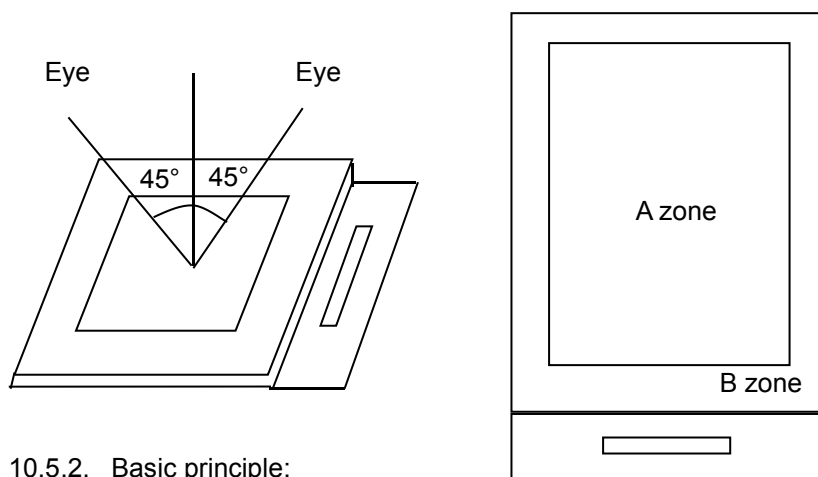
10.5.Standard of the Product Visual Inspection

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,

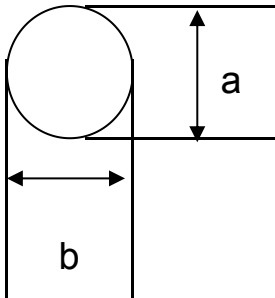


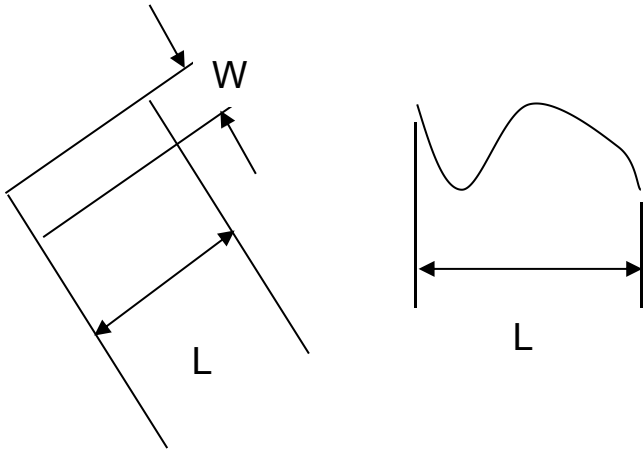
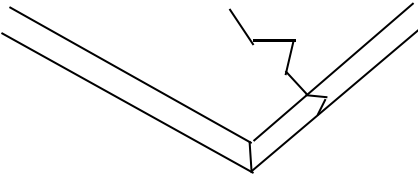
10.5.2. Basic principle:

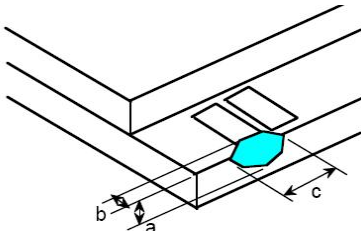
10.5.2.1. A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.

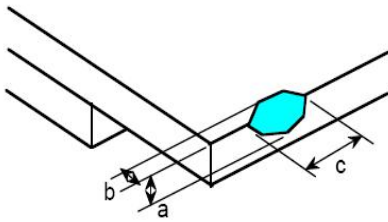
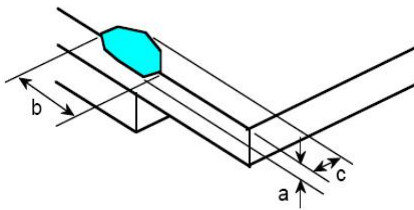
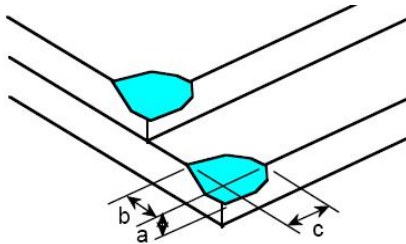
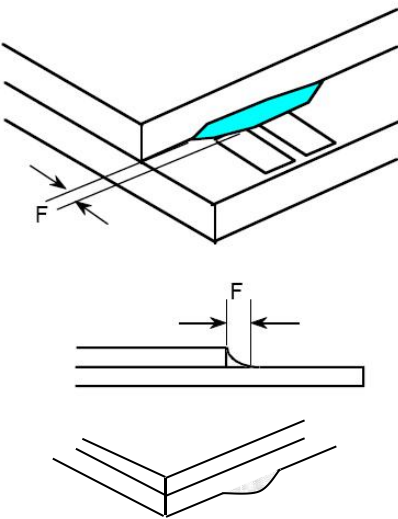
10.5.2.2. New item must be added on time when it is necessary.

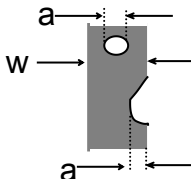
10.6. Inspection Specification

No.	Item	Criteria (Unit: mm)																		
01	Black / White spot Foreign material (Round type) Pinholes Stain Particles inside cell. (Minor defect)		<table><tr><th>Size \ Area</th><th>Acc. Qty</th></tr><tr><td>$\varphi \leq 0.20$</td><td>Ignore</td></tr><tr><td>$0.20 < \varphi \leq 0.50$</td><td>$N \leq 3$</td></tr><tr><td>$0.50 < \varphi$</td><td>0</td></tr></table>			Size \ Area	Acc. Qty	$\varphi \leq 0.20$	Ignore	$0.20 < \varphi \leq 0.50$	$N \leq 3$	$0.50 < \varphi$	0							
						Size \ Area	Acc. Qty													
$\varphi \leq 0.20$	Ignore																			
$0.20 < \varphi \leq 0.50$	$N \leq 3$																			
$0.50 < \varphi$	0																			
		$\varphi = (a + b) / 2$ 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="4">Note1</td></tr><tr><td>$N \leq 2$</td><td>$N \leq 2$</td></tr><tr><td>Dark dot</td><td>$N \leq 4$</td><td>$N \leq 4$</td></tr><tr><td>Total dot</td><td>$N \leq 4$</td><td>$N \leq 4$</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="564 705 1190 969"> <thead> <tr> <th>Length</th><th>Width</th><th>Acc. Qty</th></tr> </thead> <tbody> <tr> <td>/</td><td>$W \leq 0.1$</td><td>Ignore</td></tr> <tr> <td>$L \leq 2.5$</td><td>$0.1 < W \leq 0.2$</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> </tbody> </table> Distance between 2 defects should more than 3mm apart. Scratches not viewable through the back of the display are acceptable.	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)	 Crack is potential to enlarge, any type is not allowed.															

05	Glass Chipping Pad Area: (Minor defect)		<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">$a < \text{Glass Thickness}$</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	Glass Chipping Rear of Pad Area: (Minor defect) 	<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>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</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	Glass Chipping Except Pad Area: (Minor defect) 	<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>2</td></tr><tr><td>$c < 3.0, b < 0.5$</td><td>4</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</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	Glass Corner Chipping: (Minor defect) 	<table><tr><th>Length and Width</th><th>Acc. Qty</th></tr><tr><td>$c < 3.0, b < 3.0$</td><td>Ignore</td></tr><tr><td colspan="2">$a < \text{Glass Thickness}$</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	Glass Burr: (Minor defect) 	<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.	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>$\varphi \leq 0.30$</td><td>Ignore</td></tr><tr><td>$0.30 < \varphi \leq 0.50$</td><td>$N \leq 2$</td></tr><tr><td>$0.50 < \varphi$</td><td>$N = 0$</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>$\varphi \leq 0.25$</td><td>Ignore</td></tr><tr><td>$0.25 < \varphi \leq 0.50$</td><td>$N \leq 4$</td></tr><tr><td>$0.50 < \varphi$</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.

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.

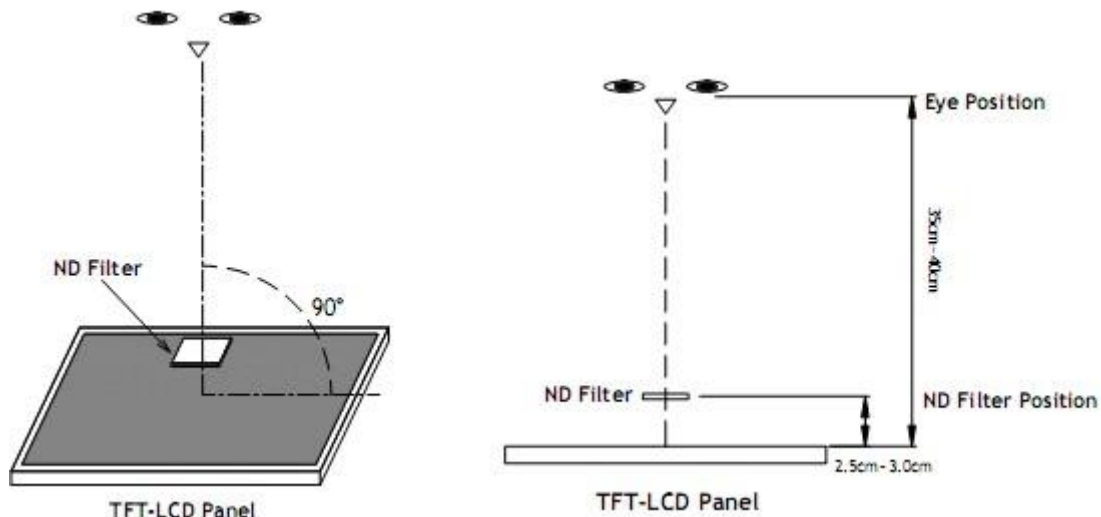
10.9. Packing

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.

11. Reliability Specification

No	Item	Condition	Quantity	Criteria
1	High Temperature Operating	70°C, 96Hrs	2	GB/T2423.2-2008
2	Low Temperature Operating	-20°C, 96Hrs	2	GB/T2423.1-2008
3	High Humidity Storage	40°C, 90%RH, 96Hrs	2	GB/T2423.3-2016
4	High Temperature Storage	80°C, 96Hrs	2	GB/T2423.2-2008
5	Low Temperature Storage	-30°C, 96Hrs	2	GB/T2423.1-2008
6	Thermal Cycling Test Storage	-20°C, 60min~70°C, 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: $\pm 8KV$ 150pF/330 Ω 5 times Contact: $\pm 4KV$ 150pF/330 Ω 5 times	2	GB/T17626.2-2018
9	Drop Test (Packaged)	Height:80 cm,1 corner, 3 edges, 6 surfaces.	-	GB/T2423.8-1995

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

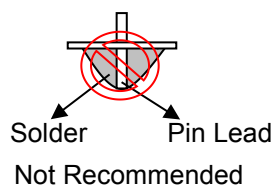
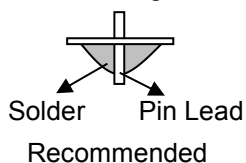
Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

12.4.1.3. Solder Wetting



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℃

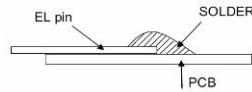
Typical Soldering Time: ≤2s

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

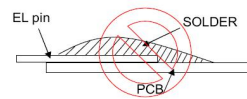
- 12.4.2.4. No horizontal press on the EL leads during soldering.

- 12.4.2.5. 180° bend EL leads three times is not allowed.

12.4.2.6. Solder Wetting

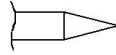


Recommended

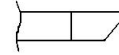


Not Recommended

12.4.2.7. The type of the solder iron:

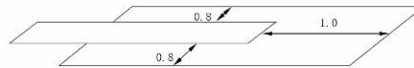


Recommended



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 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.

14. Packaging

TBD

15. Outline Drawing

