

PRODUCT SPECIFICATION

10.1” TN TFT LCD MODULE
MODEL: YDP LCD TN 12 1010 R 001



- < ◇ > 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	2016.11.10	ZFY	Initial Release	
1.1	2018.04.23	ZFY	Modify many details	P6/P24/P25
1.2	2018.07.25	ZDT	Modify Driver IC Modify AC Characteristics Modify Outline Drawing	P4 P13/P14 P26
1.3	2019.08.23	ZJW	Add Current Consumption Modify Reliability Specification Modify Outline Drawing	P5 P21 P25

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.	Touch Screen Panel Specifications.....	6
6.1.	Electrical Characteristics.....	6
6.2.	Mechanical & Reliability Characteristics.....	6
7.	Optical Characteristics.....	7
7.1.	Optical Characteristics.....	7
7.2.	Definition of Response Time.....	7
7.3.	Definition of Contrast Ratio.....	8
7.4.	Definition of Viewing Angles.....	8
7.5.	Definition of Color Appearance.....	9
7.6.	Definition of Surface Luminance, Uniformity and Transmittance.....	9
8.	Block Diagram and Power Supply.....	10
9.	Interface Pins Definition.....	11
10.	AC Characteristics.....	13
10.1.	AC electrical characteristics.....	13
10.2.	Data input format.....	13
10.3.	Parallel RGB input timing table.....	14
11.	Quality Assurance.....	15
11.1.	Purpose.....	15
11.2.	Standard for Quality Test.....	15
11.3.	Nonconforming Analysis & Disposition.....	15
11.4.	Agreement Items.....	15
11.5.	Standard of the Product Visual Inspection.....	15
11.6.	Inspection Specification.....	16
11.7.	Classification of Defects.....	20
11.8.	Identification/marketing criteria.....	20
11.9.	Packing.....	20
12.	Reliability Specification.....	21
13.	Precautions and Warranty.....	22
13.1.	Safety.....	22
13.2.	Handling.....	22
13.3.	Storage.....	22
13.4.	Metal Pin (Apply to Products with Metal Pins).....	22
13.5.	Operation.....	23
13.6.	Static Electricity.....	23
13.7.	Limited Warranty.....	23
14.	Packaging.....	24
15.	Outline Drawing.....	25

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 , RTP and a backlight unit.

2. Module Parameter

Features	Details	Unit
Display Size(Diagonal)	10.1"	
LCD type	TN TFT	
Display Mode	Transmissive /Normally White	
Resolution	1024 RGB x 600	Pixels
View Direction	12 O'CLOCK	Best Image
Gray Scale Inversion Direction	6 O'CLOCK	
Module Outline	235(H) x 143(V) x 6.1(T) (Note1)	mm
Active Area	222.72(H) x125.28(V)	mm
Pixel Pitch	217.5(H) x 208.8(V)	um
Pixel Arrangement	RGB Vertical stripe	
Polarizer Surface Treatment	Anti-glare	
Driver IC	HX8282-A01 & HX8696-A01	
Display Colors	16.7M	
Interface	24bit RGB interface	
With or without the touch panel	With	
Operating Temperature	-20~70	°C
Storage Temperature	-30~80	°C
Weight	330	g

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

3. Absolute Maximum Ratings

V_{SS}=0V, Ta=25°C

Item	Symbol	Min.	Max.	Unit
Digital Supply Voltage	DVDD	-0.5	+3.96	V
	AVDD	-0.5	+14.85	V
	VGH	-0.3	+42.0	V
	VGL	VGH-42	+0.3	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	DVDD	3.0	-	3.6	V
	AVDD	6.5	10.8	13.5	V
	VGH	(16)	21	(26)	V
	VGL	(-13)	-8	(-3)	V
Input signal voltage	VCOM	-	3.7	-	V
Logic Low input voltage	V _{IL}	0	-	0.3*DVDD	V
Logic High input voltage	V _{IH}	0.7*DVDD	-	DVDD	V
Logic Low output voltage	V _{OL}	-	-	GND+0.4	
Logic High output voltage	V _{OH}	DVDD-0.4	-	-	
Current Consumption All Black	Logic Analog	I _{CC} + I _{IN}	-	9	-
					mA

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

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

5. Backlight Characteristic

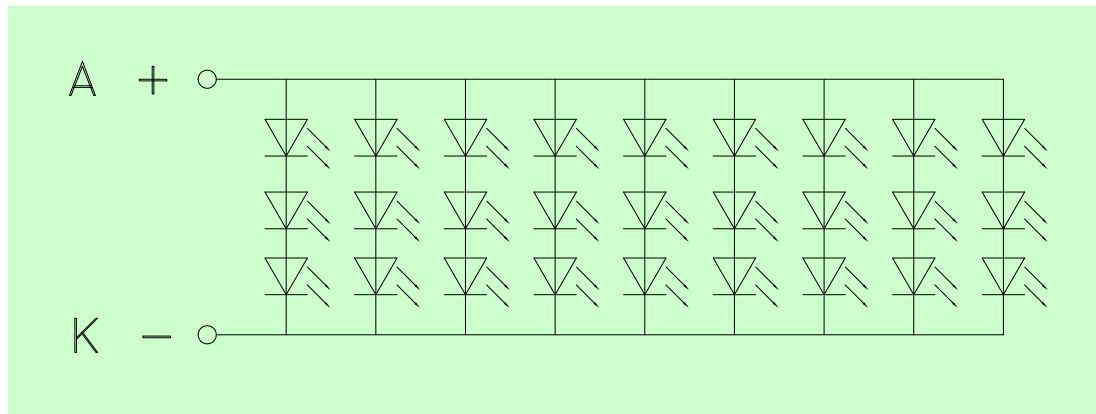
5.1. Backlight Characteristic

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	V _F	T _a =25 °C, I _F =20mA/LED	8.4	9.4	10.2	V
Forward Current	I _F	T _a =25 °C, V _F =3.1V/LED	-	180	-	mA
Power dissipation	P _d	-	-	1692	1836	mW
Uniformity	Avg	-	-	80	-	%
LED working life(25°C)	-	-	-	20,000	-	Hrs
Drive method	Constant current					
LED Configuration	27 White LEDs (3 LEDs in one string and 9 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 T_a=25±2 °C, 60%RH±5%, I_F=20mA.

5.2. Backlighting circuit



6. Touch Screen Panel Specifications

6.1. Electrical Characteristics

Item	Min.	Typ.	Max.	Unit	Note
Linearity	-3.0	-	3.0	%	Analog X and Y directions
Terminal resistance	400	-	1100	Ω	Y(Glass side)
	100	-	500	Ω	X (Film side)
Voltage	-	-	5	V	DC
Chattering	-	-	10	ms	
Haze	4	7	10	%	

Caution (1) : Do not operate it with a thing except a polyacetal pen (tip R0.8mm or less) or a finger nail, especially those with hard or sharp tips such as a ball point pen or a mechanical pencil.

Caution (2) : RTP operation must be followed the parameter condition.

Caution (3) : If ask for use glare ITO film , it's will has newton issue

6.2. Mechanical & Reliability Characteristics

Item	Min.	Typ.	Max.	Unit	Note
Activation force	-	-	100	g	(1)
Durability-surface scratching	Write 20,000	-	-	characters	(2)
Durability-surface pitting	1,000,000	-	-	touches	(3)
Surface hardness	3	-	-	H	

Note (1) Stylus pen Input: R0.8mm polyacetal pen or Finger nail

Note (2) Measurement for Surface area

- Force: 150-250gf
- Speed: 60mm/sec
- Stylus: R0.8 polyacetal pen or Finger nail

Note (3) Pit 1,000,000 times on the Film with a R3.75 silicon rubber.

- Force: Force: 2.45N
- Speed: 3times/sec

7. Optical Characteristics

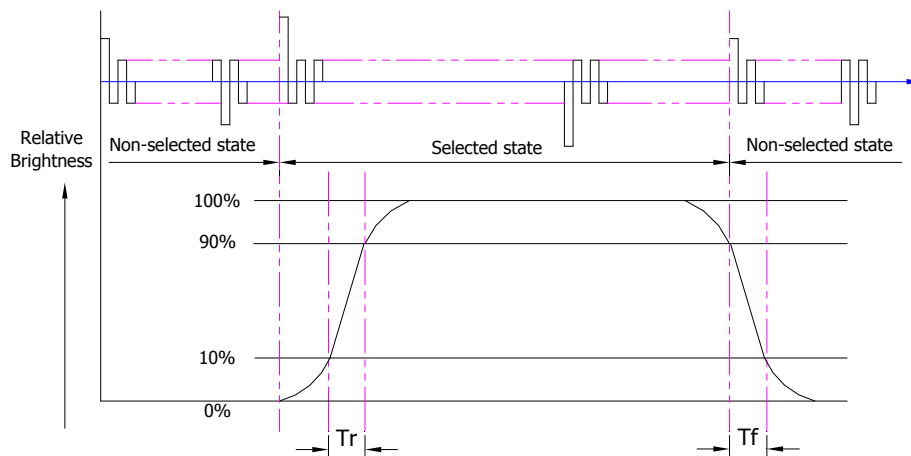
7.1. Optical Characteristics

Ta=25°C, DVDD=3.3V

Backlight On (Transmissive Mode)	Item		Symbol	Condition	Specification			Unit
					Min.	Typ.	Max.	
	Luminance on TFT(I_f =20mA/LED)		Lv		190	240	-	cd/m ²
	Contrast ratio(See 7.3)		CR		300	400	-	
	Response time (See 7.2)		T _R +T _F		-	8	-	ms
	Chromaticity Transmissive (See 7.5)	Red	X _R		0.562	0.612	0.662	
			Y _R		0.298	0.348	0.398	
		Green	X _G		0.277	0.327	0.377	
			Y _G		0.572	0.622	0.672	
		Blue	X _B		0.098	0.148	0.198	
Y _B				0.081	0.131	0.181		
White		X _W		0.253	0.303	0.353		
		Y _W		0.301	0.351	0.401		
Viewing Angle (See 7.4)	Horizontal	θ _{X+}	Center CR≥10	60	70	-	Deg.	
		θ _{X-}		60	70	-		
	Vertical	φ _{Y+}		50	60	-		
		φ _{Y-}		60	70	-		
NTSC ratio (Color gamut)				-	52	-	%	

7.2. Definition of Response Time

7.2.1. Normally Black Type (Negative)

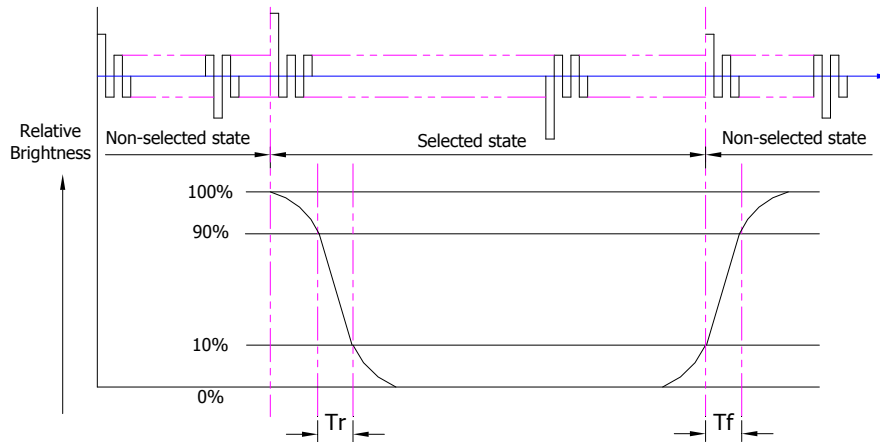


T_r is the time it takes to change from non-selected stage with relative luminance 10% to selected state with relative luminance 90%;

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

Note: Measuring machine: LCD-5100

7.2.2. Normally White Type (Positive)



Tr is the time it takes to change from 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

7.3. Definition of Contrast Ratio

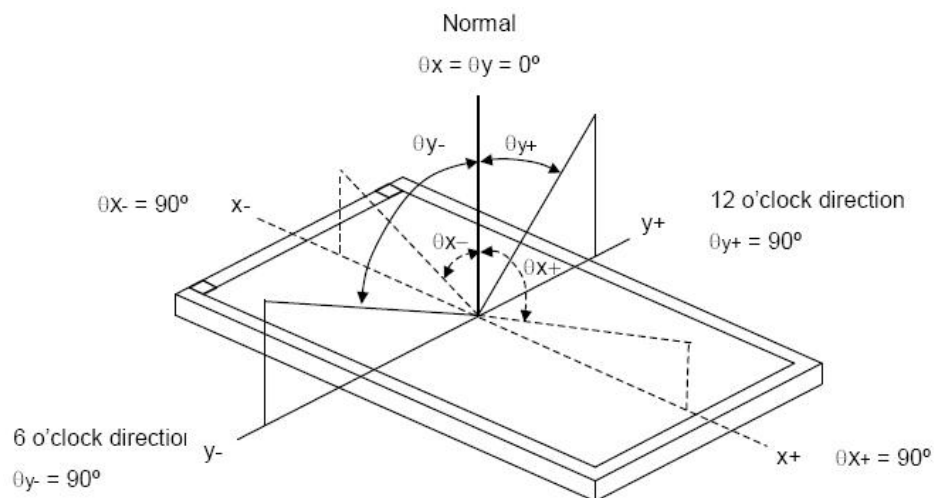
Contrast is measured perpendicular to display surface in reflective and transmissive mode.

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

7.4. Definition of Viewing Angles



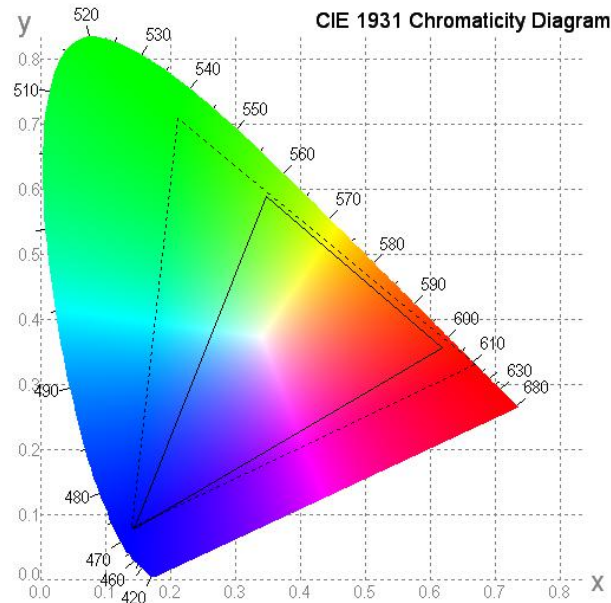
Measuring machine: LCD-5100 or EQUI

7.5. 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)



7.6. Definition of Surface Luminance, Uniformity and Transmittance

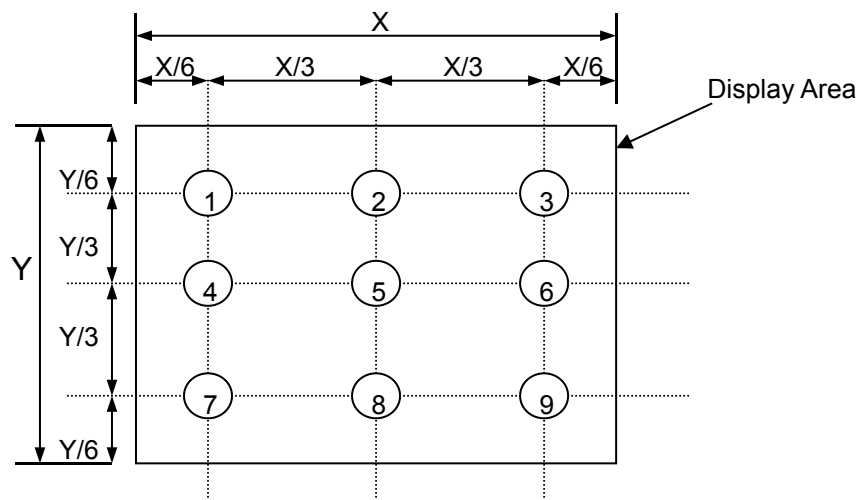
Using the transmissive mode measurement approach, measure the white screen luminance of the display panel and backlight.

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

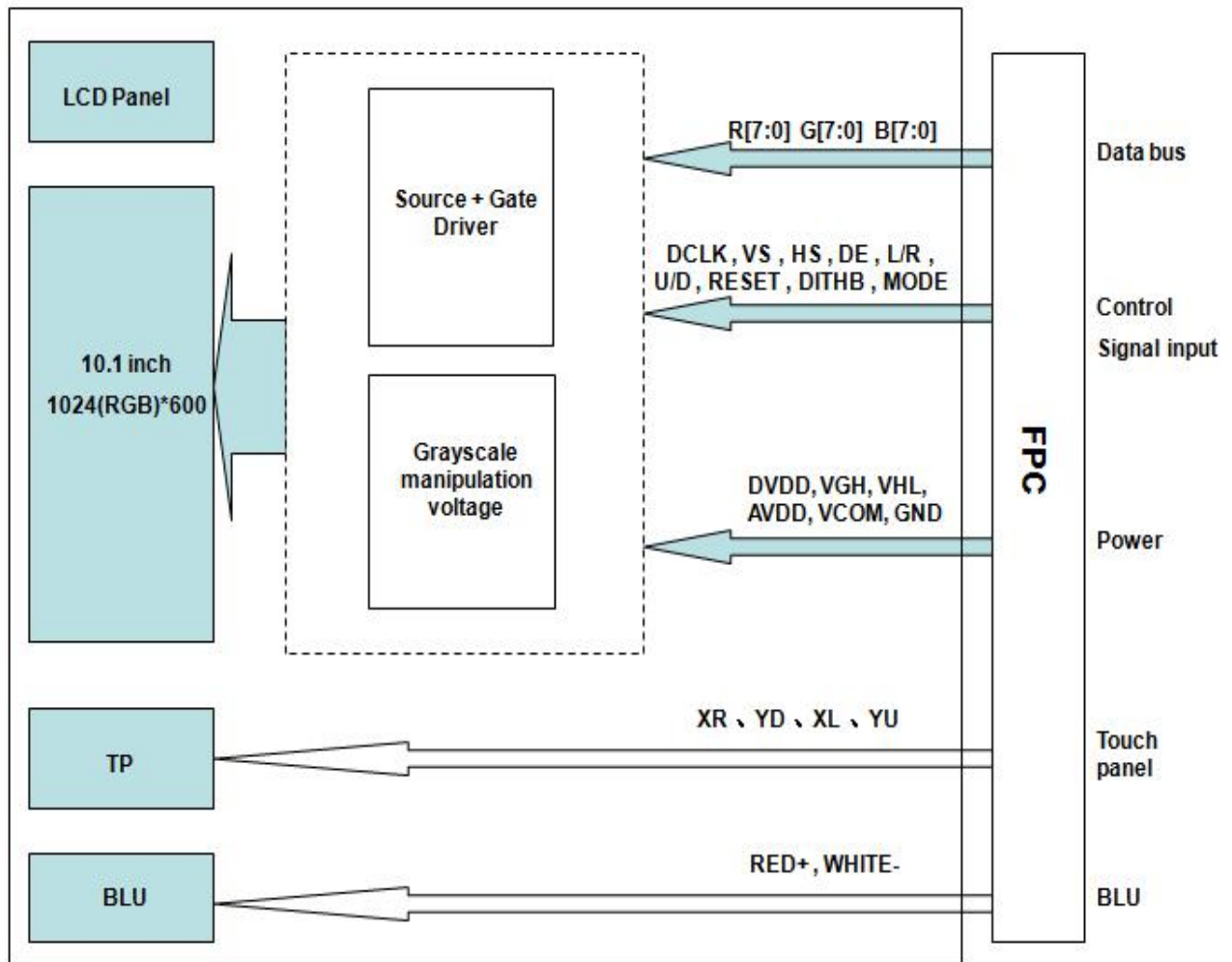
7.6.2. Uniformity = Minimal ($L_{P1}:L_{P9}$) / Maximal ($L_{P1}:L_{P9}$) * 100%

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

Note: Measuring machine: BM-7



8. Block Diagram and Power Supply



9. Interface Pins Definition

No.	Symbol	Function
1	VLED+	NC
2	VLED+	NC
3	VLED-	NC
4	VLED-	NC
5	GND	Ground
6	VCOM	Comman voltage
7	DVDD	Power Voltage for digital circuit
8	MODE	DE/SYNC Mode selection.Normally pull high When Mode=H,DE Mode When Mode=L,SYNC Mode
9	DE	Data input enable for TTL mode
10	VS	Vertical sync. Signal in RGB I/F mode
11	HS	Horizontal sync. Signal in RGB I/F mode
12	B7	Blue data
13	B6	Blue data
14	B5	Blue data
15	B4	Blue data
16	B3	Blue data
17	B2	Blue data
18	B1	Blue data
19	B0	Blue data
20	G7	Green data
21	G6	Green data
22	G5	Green data
23	G4	Green data
24	G3	Green data
25	G2	Green data
26	G1	Green data
27	G0	Green data
28	R7	Red data
29	R6	Red data
30	R5	Red data
31	R4	Red data
32	R3	Red data
33	R2	Red data
34	R1	Red data
35	R0	Red data
36	GND	Ground
37	DCLK	In TTL Mode ,DLCK for clock input
38	GND	Ground
39	L/R	Lift/Right scan control

40	U/D	Up/Down scan control
41	VGH	Gate On Voltage
42	VGL	Gate OFF Voltage
43	AVDD	Power for Analog circuit
44	RESET	Reset signal
45	NC	No connection
46	VCOM	Comman voltage
47	DITHB	Dither function enable control. Normally pull Low When DITHB=H,Enable internally Dithering function. When DITHB=L,Disable internally Dithering function.
48	GND	Ground
49	NC	No connection
50	NC	No connection

BLU PIN symbol

Symbol	Color	Function
Red+	Red	LED Anode
White-	Green	LED Cathode

RTP PIN symbol

1	YU	Touch panel terminal	
2	XL	Touch panel terminal	
3	YD	Touch panel terminal	
4	XR	Touch panel terminal	

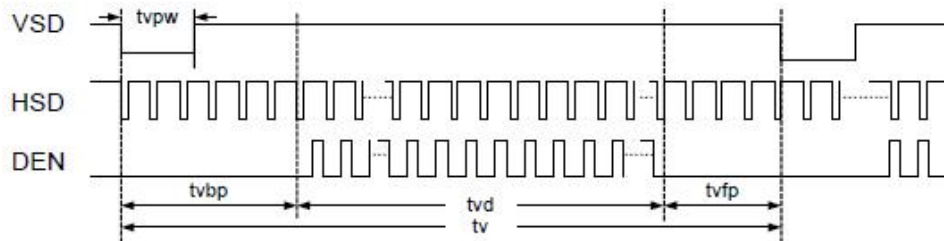
10. AC Characteristics

10.1. AC electrical characteristics

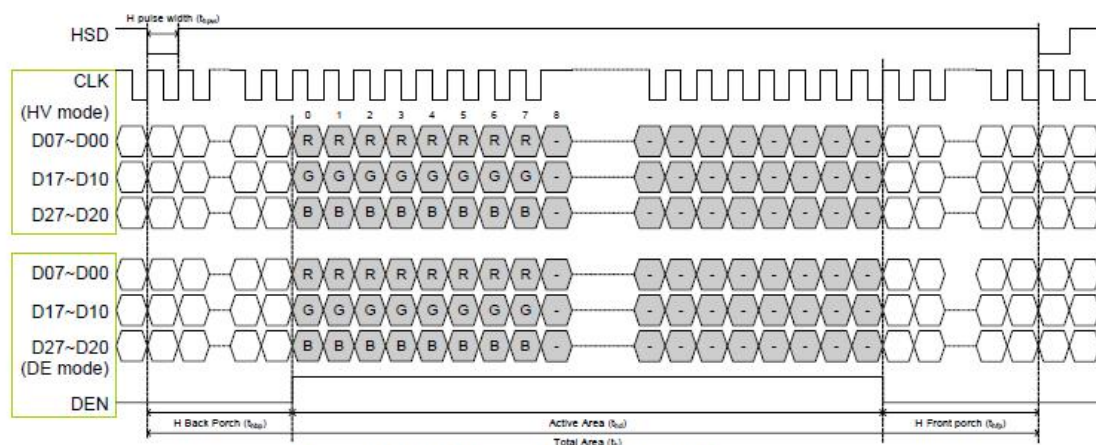
Parameter	Symbol	Spec.			Unit	Condition
		Min.	Typ.	Max.		
VDD Power On Slew rate	T_{POR}	-	-	20	ms	From 0V to 90% VDD
GRB pulse width	T_{Rst}	50	-	-	μs	DCLK=65MHz
DCLK cycle time	T_{cph}	14	-	-	ns	-
DCLK pulse duty	T_{cwh}	40	50	60	%	-
VSD setup time	T_{vst}	5	-	-	ns	-
VSD hold time	T_{vhd}	5	-	-	ns	-
HSD setup time	T_{hst}	5	-	-	ns	-
HSD hold time	T_{hhd}	5	-	-	ns	-
Data set-up time	T_{dsu}	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
Data hold time	T_{dhd}	5	-	-	ns	D0[7:0], D1[7:0], D2[7:0] to DCLK
DE setup time	T_{esu}	5	-	-	ns	-
DE hold time	T_{ehd}	5	-	-	ns	-
Output stable time	T_{sst}	-	-	6	μs	10% to 90% target voltage. CL=90pF, R=10K ohm (Cascade) Dual gate
				3		

10.2. Data input format

Vertical timing



Horizontal timing



10.3. Parallel RGB input timing table

DE mode

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	40.8	51.2	67.2	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1114	1344	1600	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd	600			T _H
VSD Period	tvbp	610	635	800	T _H
VSD Blanking	tvbp+ tvfp	10	35	200	T _H

HV mode

Horizontal timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	44.9	51.2	63	MHz
Horizontal Display Area	thd	1024			DCLK
HSD Period	th	1200	1344	1400	DCLK
HSD Pulse Width	thpw	1	-	140	DCLK
HSD Back Porch	thbp	160			DCLK
HSD Front Porch	thfp	16	160	216	DCLK

Vertical Timing

Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
Vertical Display Area	tvd	600			T _H
VSD Period	tv	624	635	750	T _H
VSD Pulse Width	tvpw	1	-	20	T _H
VSD Back Porch	tvbp	23			T _H
VSD Front Porch	tvfp	1	12	127	T _H

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.

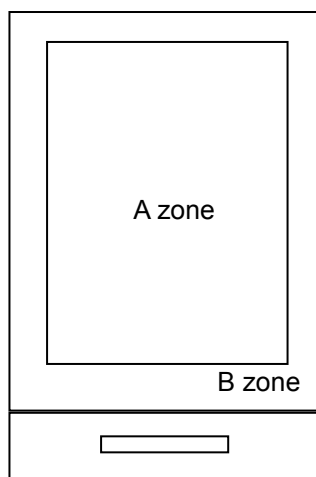
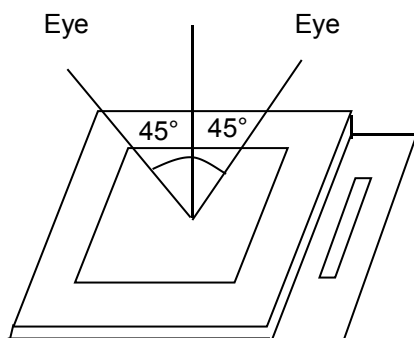
11.5. Standard of the Product Visual Inspection

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,

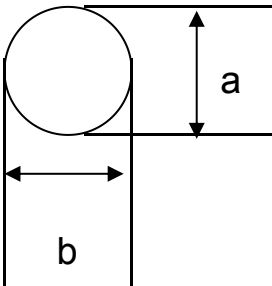


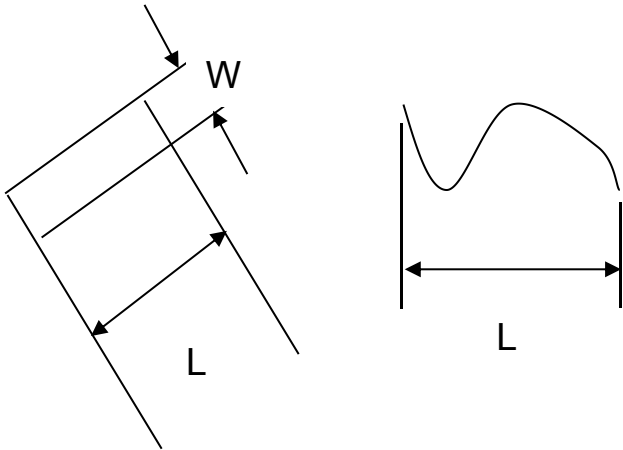
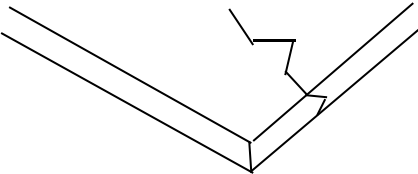
11.5.2. Basic principle:

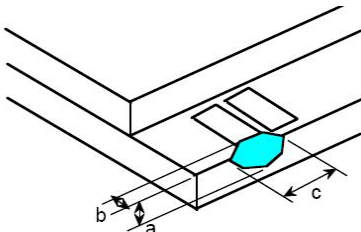
11.5.2.1. A set of sample to indicate the limit of acceptable quality level must be discussed by both us and customer when there is any dispute happened.

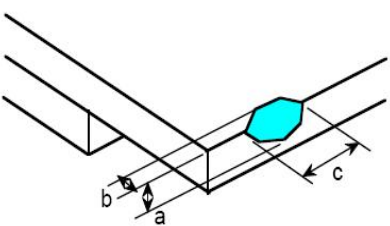
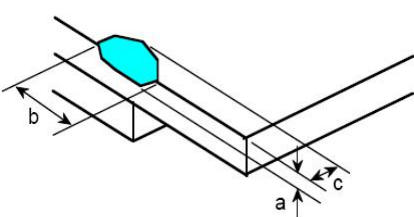
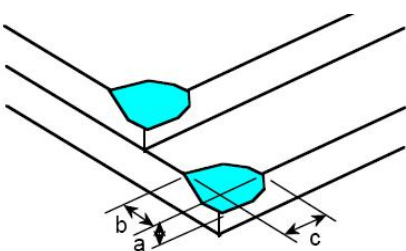
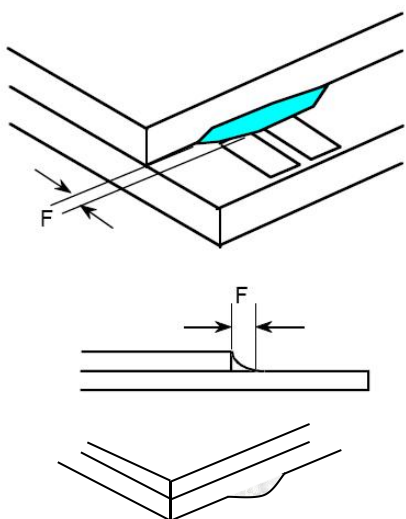
11.5.2.2. New item must be added on time when it is necessary.

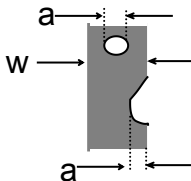
11.6. Inspection Specification

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

03	Black and White line Scratch Foreign material (Line type) (Minor defect)	 <table border="1" data-bbox="608 705 1233 969"> <thead> <tr> <th>Length</th><th>Width</th><th>Acc. Qty</th></tr> </thead> <tbody> <tr> <td>/</td><td>$W \leq 0.1$</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	Touch Panel	D: Diameter W: width L: length 14.1 Spot: $D < 0.25$ is acceptable $0.25 \leq D \leq 0.4$ 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: $W \leq 0.03$, $L \leq 10$ is acceptable, $0.03 < W \leq 0.10$, $L \leq 10$ is acceptable Distance between 2 defects should more than 10 mm. $W > 0.10$ is unacceptable.								
15	LCD Ripple	Touch the touch panel, cannot see the LCD ripple. Pen: R 0.8mm silicon rubber. Operation Force:120g								
16	PCB	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.								

17	Soldering	Follow IPC-A-610C standard
18	Electrical Defect (Major defect)	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.

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/marketing criteria

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

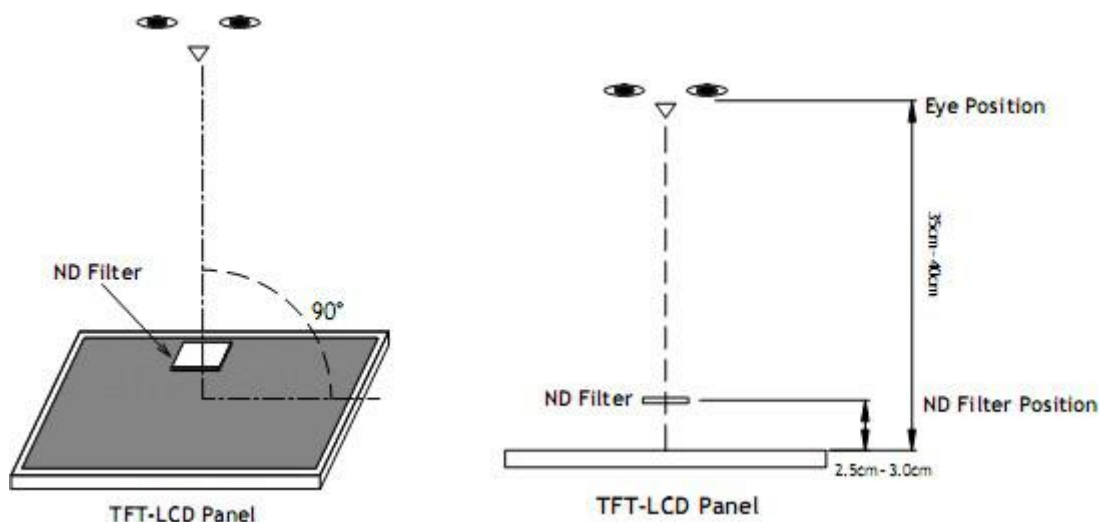
11.9. Packing

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 $350\text{mm} \pm 50\text{mm}$.

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.

12. 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	50°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	-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.	2	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.	2	GB/T2423.8-1995

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

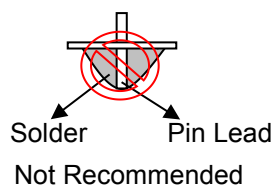
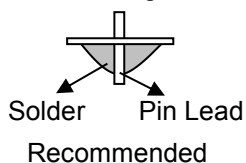
Maximum Solder Temperature: 370℃

Maximum Solder Time: 3s at the maximum temperature

Recommended Soldering Temp: 350±20℃

Typical Soldering Time: ≤3s

13.4.1.3 Solder Wetting



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℃

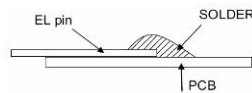
Typical Soldering Time: ≤2s

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

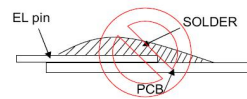
- 13.4.2.4 No horizontal press on the EL leads during soldering.

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

13.4.2.6 Solder Wetting

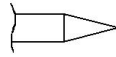


Recommended

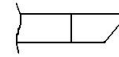


Not Recommended

13.4.2.7 The type of the solder iron:

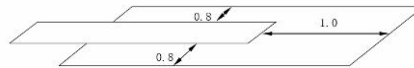


Recommended



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

