

SPECIFICATION FOR CTP+LCD MODULE

Part No.: JT270TM001-V1

Customer No.:

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Jutouch			Customer
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1 General Specifications

1.1 Definition

The specification is used for capacitive touch module with TFT LCD & Backlight Unit.

1.2 Features and General Description

General	Specification	Unit	Note
Module Size	27	inch	diagonal
Structure	G+G+LCD, OCR Bonding		
Resolution	1920(RGB) × 1080		
Display Mode	Normally Black. Transmissive		
Pixel Pitch	0.3114(W) × 0.3114(H)	mm	
Pixel Arrangement	RGB Vertical stripe		
Viewing Direction	ALL	O'clock	
Outline Dimensions	658.89(W) × 397.31(H) × 19.85(D)	mm	
Viewing Area	598.89(W) × 337.31(H)		
Active Area	597.888(W) × 336.312(H)	mm	
LCD Interface	LVDS(2ch)		
CTP Interface	USB / I2C / RS232		
CTP IC	EXC81H84		
Touch Point	10		
Surface Hardness	6	H	
Surface Treatment	Etched AG(Gloss: 80 ± 15)		

3 Pin assignment

3.1 LCD Pin assignment

LVDS connector: IS100-L300-C23(UJU).

Pin	Symbol	Description	Note
1	RXO0-	Negative Transmission data of Pixel 0 (ODD)	
2	RXO0+	Positive Transmission data of Pixel 0 (ODD)	
3	RXO1-	Negative Transmission data of Pixel 1 (ODD)	
4	RXO1+	Positive Transmission data of Pixel 1 (ODD)	
5	RXO2-	Negative Transmission data of Pixel 2 (ODD)	
6	RXO2+	Positive Transmission data of Pixel 2 (ODD)	
7	NC	No connection (LCD Self test Pin)	
8	RXOC-	Negative Transmission Clock (ODD)	
9	RXOC+	Positive Transmission Clock (ODD)	
10	RXO3-	Negative Transmission data of Pixel 3 (ODD)	
11	RXO3+	Positive Transmission data of Pixel 3 (ODD)	
12	RXE0-	Negative Transmission data of Pixel 0 (EVEN)	
13	RXE0+	Positive Transmission data of Pixel 0 (EVEN)	
14	GND	Ground	
15	RXE1-	Negative Transmission data of Pixel 1 (EVEN)	
16	RXE1+	Positive Transmission data of Pixel 1 (EVEN)	
17	GND	Ground	
18	RXE2-	Negative Transmission data of Pixel 2 (EVEN)	
19	RXE2+	Positive Transmission data of Pixel 2 (EVEN)	
20	RXEC-	Negative Transmission Clock (EVEN)	
21	RXEC+	Positive Transmission Clock (EVEN)	
22	RXE3-	Negative Transmission data of Pixel 3 (EVEN)	
23	RXE3+	Positive Transmission data of Pixel 3 (EVEN)	
24	GND	Ground	
25	NC	No connection (LCD Self test Pin)	
26	NC	No connection (LCD Self test Pin)	
27	NC	No connection (LCD Self test Pin)	
28	LCD_VDD	LCD Power Supply: +5V	
29	LCD_VDD	LCD Power Supply: +5V	
30	LCD_VDD	LCD Power Supply: +5V	

Note : Input Level of LVDS signal is based on the EIA-644 Standard

LED connector: CI1406M1VL0-NH(CviLux) or equivalent

Pin	Symbol	Description
1	IRLED1	LED current sense for channel 1
2	IRLED2	LED current sense for channel 2
3	VLED	LED power supply
4	VLED	LED power supply
5	IRLED3	LED current sense for channel 3
6	IRLED4	LED current sense for channel 4

3.2 CTP Pin assignment

USB connector: JP1

Pin	Symbol	Description
1	GND_E	Ground
2	VDD	CTP Power Supply : 5V
3	GND	Ground
4	D+	CTP USB data port plus
5	D-	CTP USB data port minus

I2C connector: JP5

Pin	Symbol	Description
1	GND	Ground
2	I2C_SDA	CTP I2C SDA signal
3	I2C_SCL	CTP I2C SCL signal
4	VDD	CTP Power Supply : 5V
5	I2C_INT	CTP I2C INT signal

RS232 connector: JP5

Pin	Symbol	Description
1	UR_CTS	CTP RS232 CTS signal
2	UR_TX	CTP RS232 TX signal
3	UR_RX	CTP RS232 RX signal
4	UR_RTS	CTP RS232 RTS signal
5	GND_E	Ground
6	VDD	CTP Power Supply : 5V
7	GND	Ground

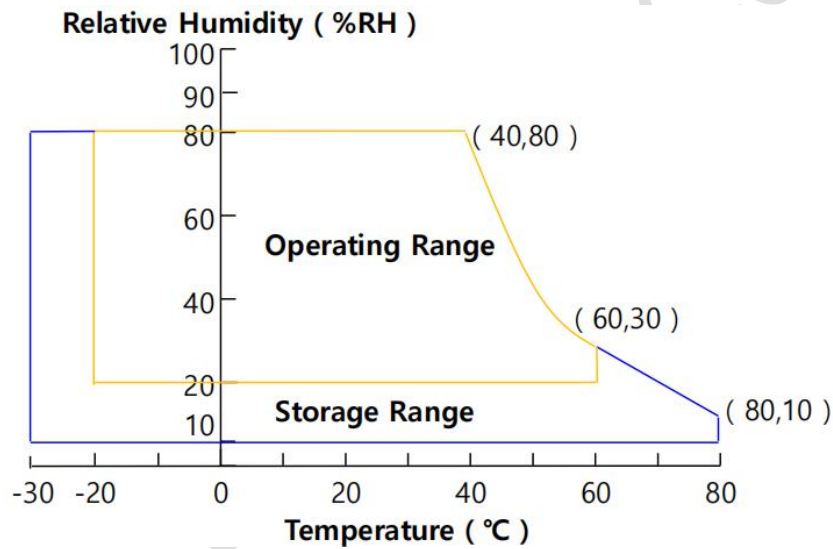
4 Absolute Maximum Rating

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

Parameter	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	LCD_VDD	VSS-0.3	6	V	Ta = 25 °C
Logic Supply Voltage	Vin	Vss-0.3	Vdd+0.3	V	
Operating Temperature	T _{OP}	-20	Tsuf+80	°C	Note 1
Storage Temperature	T _{ST}	-30	+80	°C	

Note 1. Temperature and relative humidity range are shown in the figure below.

Wet bulb temperature should be 39°C max. and no condensation of water.



5 Electrical Characteristic

5.1 TFT LCD Module

Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		LCD_VDD	4.5	5	5.5	Vdc	
Power Supply Ripple Voltage		VRP	-	-	300	mV	
Power Supply Current		IDD	-	1200	2000	mA	Note 1
Power Consumption		PDD	-	6	10	Watt	
Rush current		IRUSH	-		3.0	A	Note 2
LVDS Interface	Differential Input High Threshold Voltage	VLVTH		-	+100	mV	
	Differential Input Low Threshold Voltage	VLVTL	-100	-	-	mV	
	Input Differential Voltage	VID	100	-	600	mV	
	Common Input Voltage	VLVC	0.6	1.2	1.6	V	
CMOS Interface	Input High Threshold Voltage	VIH	2.7	-	3.3		
	Input Low Threshold Voltage	VIL	0	-	0.6	V	

Note :

(1) The supply voltage is measured and specified at the interface connector of LCM.

The current draw and power consumption specified is for VDD=12.0V,

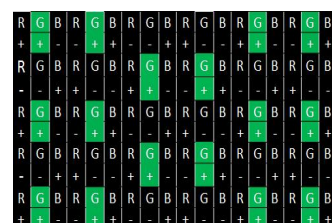
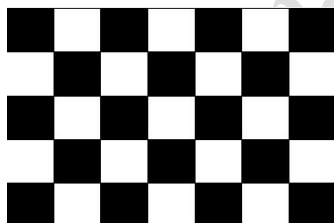
Frame rate $f_v=60\text{Hz}$ and Clock frequency = 74.25MHz.

Test Pattern of power supply current

a)Typ : Mosaic 7X5 (L0/L255)

b)Max : Vline Subline (L255))

c)Flicker Pattern



(2) The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

5.2 Backlight Unit

Parameter	Symbol	Min.	Typ.	Max.	Unit
LED forward voltage per channel	VLED	-	69	73.6	V
LED forward current per channel	ILED	-	100	-	mA
LED Power Consumption	P _{BL}	-	55.2	58.9	W
LED Life-Time	N/A	50000	-	-	Hour

Note :

- (1) The lifetime is determined as the time at which luminance of LED become 50% of the initial brightness or not normal lighting at I_F=100mA on condition of continuous operating at 25±2℃
- (2) There are two light bar, and each light bar has 4 channels

5.3 Signal Timing Specification

5.3.1 Timing table

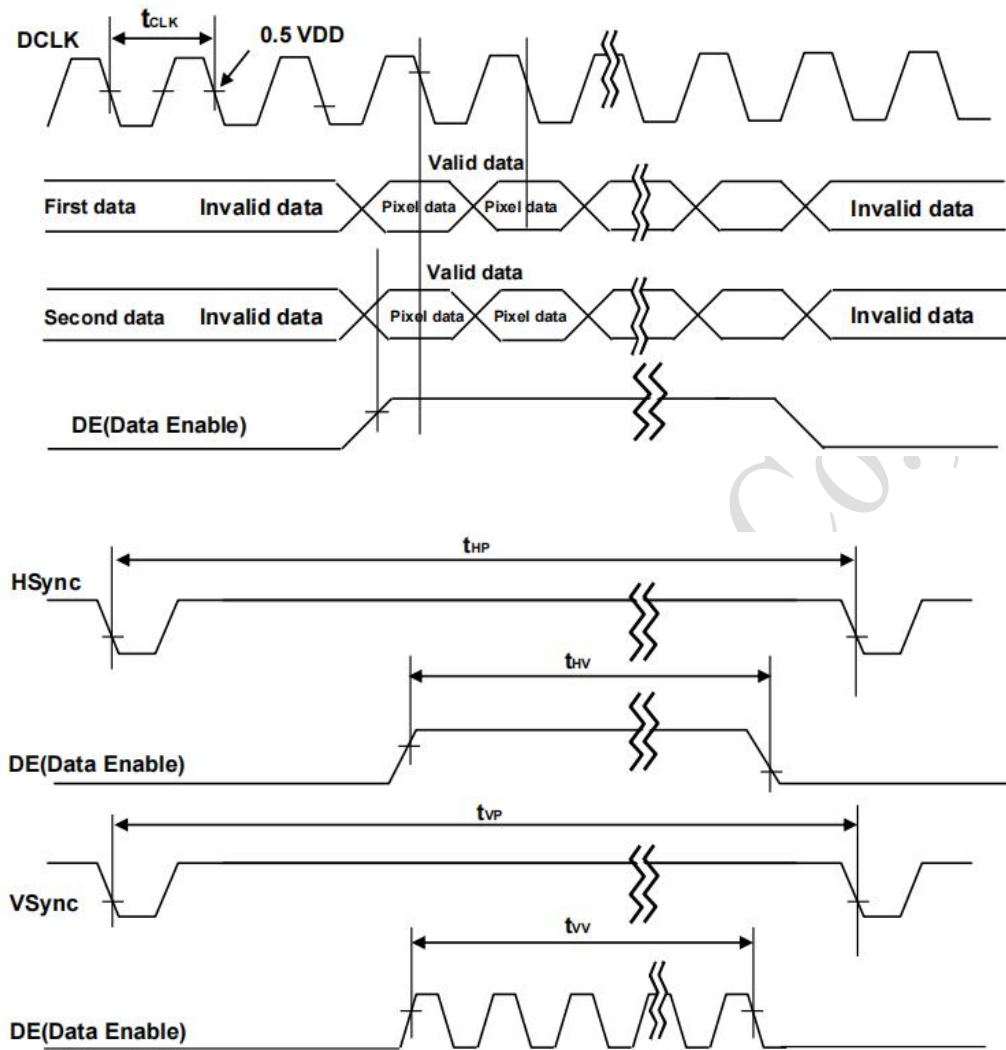
Timing Table (DE only Mode)

Item	Symbols		Min	Typ	Max	Unit	Note
DCLK	Period	tCLK	10.77	13.47	16.18	ns	
	Frequency	-	61.8	74.25	92.8	MHz	
Horizontal	Horizontal Period	tHP	1050	1100	1120	tCLK	
	Horizontal Valid	tHV	960			tCLK	
	Horizontal Blank	tHB	90	140	160		
	Frequency	fH	56	67.5	84.5	KHz	
Vertical	Vertical Period	tVP	1110	1125	1251	tHP	
	Vertical Valid	tVV	1080			tHP	
	Vertical Blank	tVB	30	45	171	tHP	
	Frequency	fV	50	60	75	Hz	
LVDS Rx Clock	CLK Jitter	TJitter	-	-	200	ps	

Note :

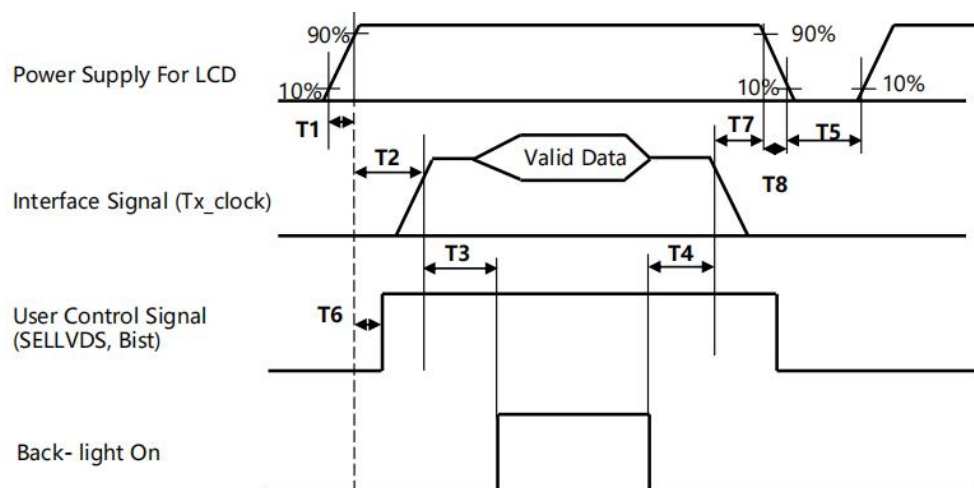
- (1) DE Only Mode, While operation, DE signal should be have the same cycle. The input of HSYNC & VSYNC signal does not have an effect on normal operation.
- (2) Best operation clock frequency is 74.25Mhz.
- (3) Frequency] = [H Total] * [V Total] * [vertical Frame rate]
H Total, V Total and Frame rate should operate within the range between Frequency_Min and Max
- (4) Except Best operation clock frequency, FOS(Flicker & Brightness & Crosstalk, Etc.) are not guaranteed.
- (5) Main frequency Max is 92.8 MHz without spread spectrum

5.3.2 Signal Timing Waveform



Note: While operation, DE signal should be have the same cycle and continuous;

5.4 Power Sequence for LCD



Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0.1	-	T7	ms
T3	400	-	-	ms
T4	200	-	-	ms
T5	1	-	-	s
T6	0.1	-	T2	ms
T7	0.1	-	-	ms
T8	0.5	-	10	Ms

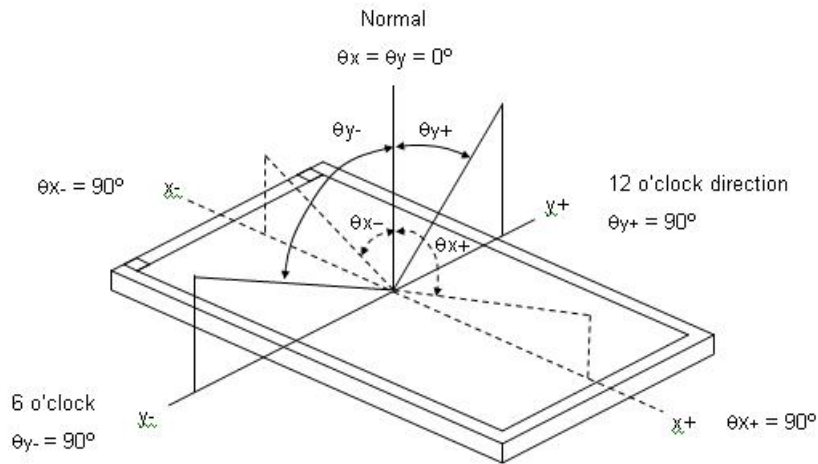
Note :

- (1) Even though T1 is over the specified value, there is no problem if the rush current is within Spec.
- (2) When the power supply VDD is 0V, keep the level of input signals on the low or high impedance;
 - ※ Please avoid floating state of interface signal at invalid period.
 - ※ When the power supply for LCD (VDD) is off, be sure to pull down the valid and invalid data to 0V.
- (3) The T3 / T4 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.
- (4) T5 should be measured after the Module has been fully discharged between power off and on period
- (5) If the on time of signals (Interface signal and user control signals) precedes the on time of Power (VLCD), it will be happened abnormal display. When T6 is NC status, T6 doesn't need to be measured
- (6) T8: Voltage of VDD must decay smoothly after power-off, there should be none re-bounding voltage.
(customer system decide this value)

6 Optical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle	Horizontal	θ_{X+}	$CR \geq 10$	80	89	-	Deg.	(1), (5)
		θ_{X-}		80	89	-	Deg.	
	Vertical	θ_{Y+}		80	89	-	Deg.	
		θ_{Y-}		80	89	-	Deg.	
Luminance (W/ CTP)		Lv	$\theta_X=0^\circ, \theta_Y=0^\circ$	1100	1250	-	nit	(4), (5)
Uniformity	9 points	$\Delta Y9$		75	-	-	%	(5), (6)
Contrast ratio		CR		700	1000	-		(2), (5)
Color Chromaticity (CIE 1931)	White	W_x	$\theta_X=0^\circ, \theta_Y=0^\circ$ $R=G=B=255$ Gray scale	Typ-0.03	0.313	Typ+0.03	-	(1), (5)
		W_y			0.329		-	
	Red	R_x			-		-	
		R_y			-		-	
	Green	G_x			-		-	
		G_y			-		-	
	Blue	B_x			-		-	
		B_y			-		-	
Response Time	T_R+T_F			-	14	20	ms	(3)

Note (1) Definition of Viewing Angle (θ_x, θ_y):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{255} / L_0$$

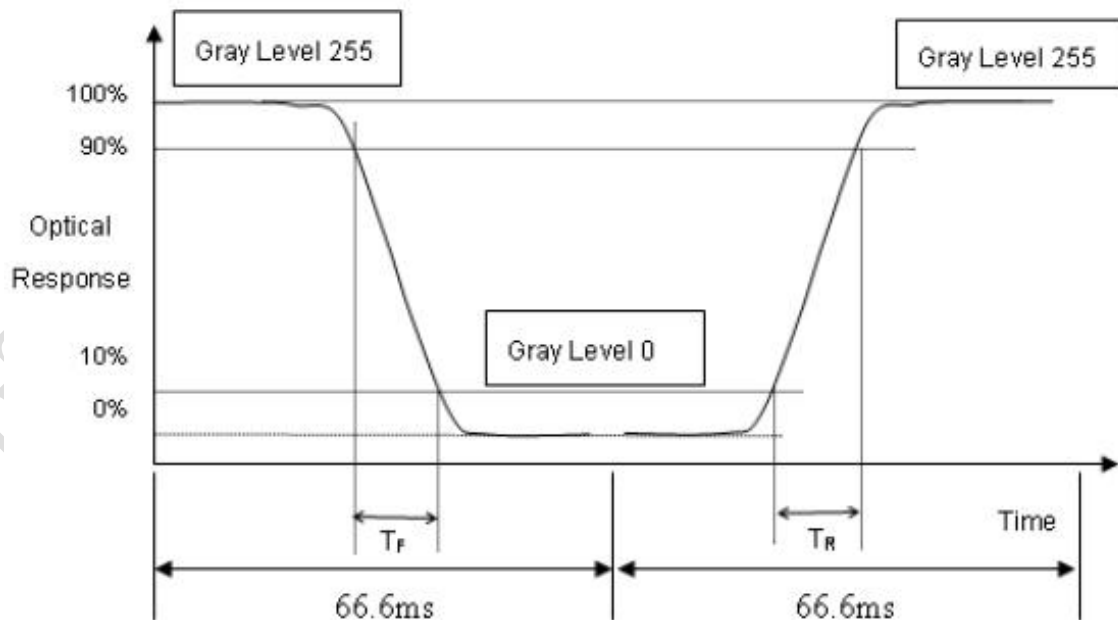
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

$$CR = CR(5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R, T_F):



Note (4) Definition of Luminance of White (LC):

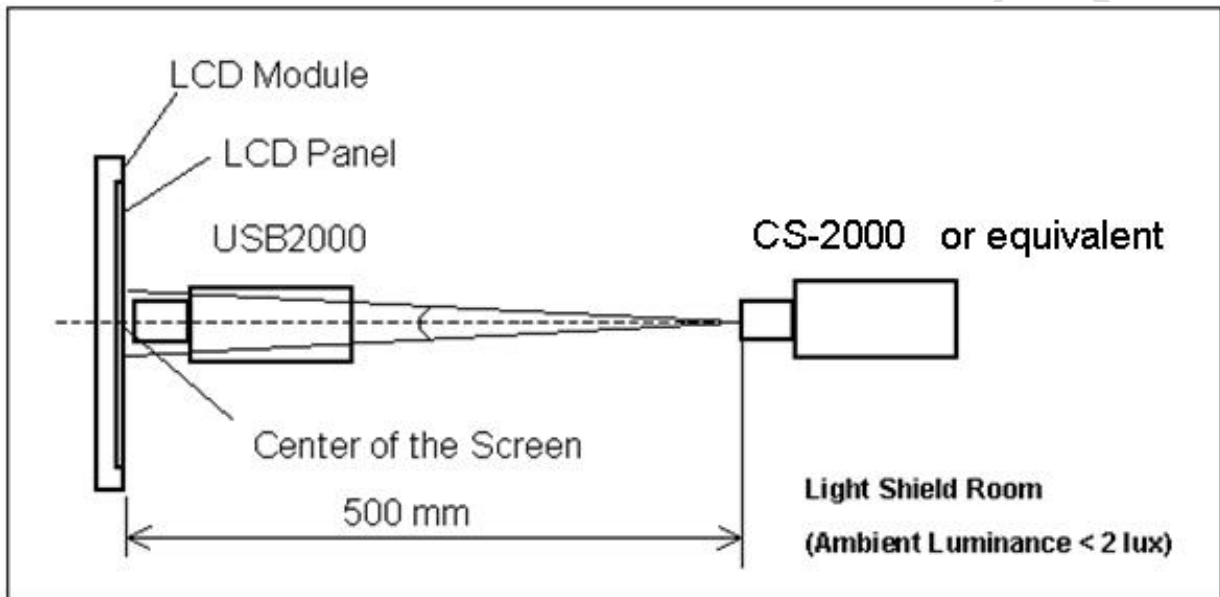
Measure the luminance of gray level 255 at center point

$LC = L(5)$

$L(x)$ is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

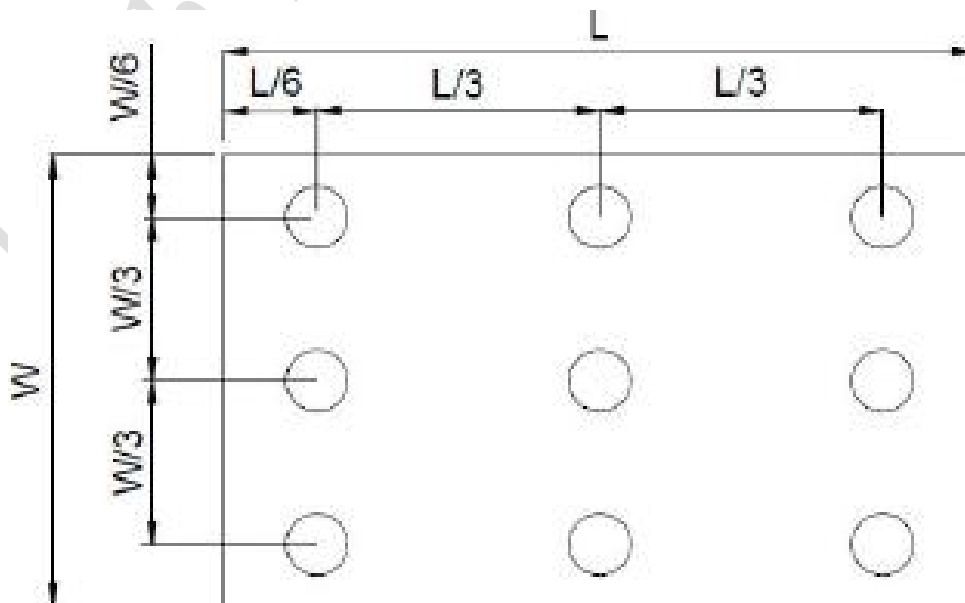
The LCD module should be stabilized at given temperature for 30 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 30 minutes in a windless room.



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 9 points

$\delta W = (\text{Minimum} [L(1) \sim L(9)] / \text{Maximum} [L(1) \sim L(9)]) * 100\%$



7 Reliability Test

Test Item	Condition
High Temperature Storage Test	80°C, 240 hrs
Low Temperature Storage Test	-30°C, 240 hrs
High Temperature Operation Test	60°C, 240 hrs
Low Temperature Operation Test	-20°C, 240 hrs
High temperature & high humidity operation Test	50°C, 80%RH, 240 hrs
Thermal shock(non-operating)	-20°C ↔ 60°C (0.5 hrs), 100 cycle
Electro-static discharge test (non-operating)	Air : 150 pF, 330Ω, 15 KV Contact : 150 pF, 330Ω, 8 KV

Note :

- (1) There should be no condensation on the surface of panel during test.
- (2) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.
- (3) In the standard conditions, there is no function failure issue occurred. All the cosmetic specification is judged before reliability test.
- (4) Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

8 Appearance Inspection

8.1 Inspection Sampling Method:

Unless there is other agreement, the sampling plan for incoming inspection shall follow GB2828.1-2012.

- (1) Lot size: Quantity per shipment as one lot (different model as different lot).
- (2) Sampling type: Normal inspection, single sampling.
- (3) Sampling level: Level II.

8.2 Inspection Conditions

The environmental condition and visual inspection shall be conducted as below:

- (1) Light: 800~1400Lux;
- (2) Vision requirement: Naked or corrected vision of at least 1.0 and no color blindness;
- (3) Inspection background: black and white board is used as the background below the product;
- (4) Inspection distance: 30~40cm from human eyes to the measured surface;
- (5) Inspection Angle: the detected surface is 90 degree from to line of sight, and the measured Object should be rotated 45 degree from side to side;
- (6) Inspection time: 5~10s;

8.3 Inspection equipment

Secondary elements, calipers, feelers, filinka, petroleum ether, ND filter

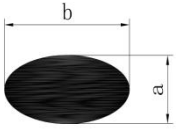
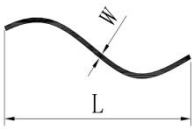
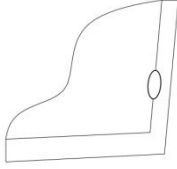
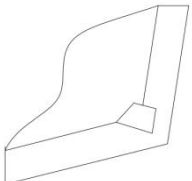
8.4 Defect code comparison table

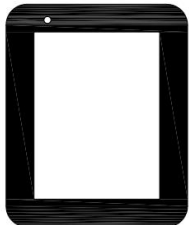
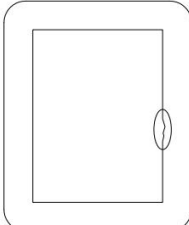
Code	Name (Unit)	Code	Name (Unit)
N	Number	D	Diameter (mm)
L	Length (mm)	H	Depth (mm)
W	Width (mm)	S	Distance (mm)
S	Area (mm ²)		

8.5 Inspection precautions

- (1) Inspectors must wear finger gloves and electrostatic bracelets.
- (2) Place the inspected product in front of the inspector, and hold the edge of the product with both hands carefully. Do not bend the product.

8.6 Inspection items and standards

Items	Standard	Conclusion	Inspection tools
Dot (white, black, heterochromatic)  $D=(a+b)/2$	$D \leq 0.3$	Ignore, dense density is not allowed	Visual inspection
	$0.3 < D \leq 0.8$	The distance with another dot is more than 10 mm, Transparent areas : $N \leq 5$, Ink areas : $N \leq 6$	
	$D > 0.8$	Not allow	
Linear defects (fibers/foreign bodies/ scratches, etc.) 	$W \leq 0.08$	Ignore, dense density is not allowed	Visual inspection
	$0.08 < W \leq 0.2$	$L \leq 15$, the distance with another scratch or impurity is more than 5mm Transparent areas : $N \leq 5$, Ink areas : $N \leq 5$	
	$W > 0.2, L > 15$	Not allow	
Bubble	According to the point standard		Visual inspection
Edge broken loss 	1. The sensor edge creaks, without damaging the line. The function test is OK for reception, and the front side is not visible after fitting. 2. Edge creak on front of cover plate: NG. 3. Back $X < 0.5\text{mm}$; $Y < 0.5\text{mm}$; $Z < 1/3\text{GT}$ (GT= glass thickness), without affecting the functionality of the product, each side is allowed three		Visual inspection
Corner broken loss 			

Items	Standard	Conclusion	Inspection tools
Creak	Creaks found at any location are not allowed		Visual inspection
Size	Meet the requirements of finished product inspection drawings		
Ink pinhole 	D≤0.2	Ignore, dense density is not allowed	
	0.2<D≤0.3	N≤6 DS≥10mm, Repair with a paint pen of the same color as the cover plate	
Ink sawtooth 	W≤0.2mm	Ignore, dense density is not allowed	
Newton’s rings	No more than 1/6 of the display area, light up invisible. If there are special requirements, the limited sample shall prevail.		
FPC 	1. Oxidation, breakage, residual glue, coating peeling, cracking and other phenomena of FPC gold fingers are not allowed. 2. Less components, false welding, deformation are not allowed.		
Color	Consistent with the sample, no serious color difference		
Mura/Waving/ Hot spot	Not visible through 5% ND filter		

9 Notices

9.1 Cautions for storage

Store the module in a dark room where must keep at $25\pm 10^{\circ}\text{C}$ and 65%RH or less. Don't expose the products to the direct sunlight or stresses.

9.2 Cautions for operation

- (1) Do not put a heavy, hard or sharp object on the product.
- (2) Do not bend the product in order to assure the reliability.
- (3) Do not put one product on the other. Otherwise, the product to may be scratched or be changed.
- (4) Do not oile the touch panel, Do not put heavy goods on the touch panel.
- (5) Do not use any organic solvent acid or alkali solution to clean the surface of the product. Please use dry clothes or soft clothes with ethanol to clean the surface.

9.3 Cautions for operation

Light transmission is an important factor for the product. So, please wear clean finger sacks, gloves and mask to protect the products from fingerprint or stain attach, and also must ensure the area where your finger touches is outside the view area when handing the panel.

9.4 Others

- (1) Please note that dew gathering in the panel due to abrupt temperature or humidity change, etc. Which may cause deterioration of performance.
- (2) When this product was built into the package, if there is vulcanization material such as vulcanized rubber which has a possibility of generating the salutation gas near the package since abnormalities will be caused to wring of the product and it will become the cause if functional degradation, please give a constitutional cations.
- (3) Cation for product safety set

Although full care is taken to ensure product quality, failure modes such as degradation, short circuits, or open circuits might be caused, Therefore, to design a product set, please study the effects of any single failure of the panel in advance and consider the safety of product configuration.

Quality function livers for on year, outward appearance haves non-color variation in six months.