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Mechanical design



MODEL NO : ET097WX01-VMODEL VERSION: 01SPEC VERSION : 1.0ISSUED DATE: 2017-12-11☒ Preliminary Specification☐ Final Product Specification

Customer : _____

Approved by	Notes

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Record of Revision

[illegible]

1 General Specifications

Feature		Spec
Display Spec.	Size	9.7 inch
	Resolution	1024(RGB)*768
	Technology Type	a-Si
	Pixel Configuration	RGB Vertical Stripe
	Pixel pitch(mm)	0.192(H)*0.192(V)
	Display Mode	Transmissive/Normally Black
	Viewing Direction	Free angle
Mechanical Characteristics	LCM (W x H x D) (mm)	210.2(H)*166.3(V)*3.55(T)
	Active Area(mm)	196.61(H)*147.46(V)
	With /Without TSP	Without TSP
	Weight (g)	TBD
Electrical Characteristics	Interface	6BIT LVDS
	Color Depth	262K

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: Q/S0002

Note 3: LCM weight tolerance: $\pm 5\%$

2 Input/Output Terminals

Pin NO.	Symbol	I/O	Description
1	GND	P	Power Ground
2-3	VCC(3.3)	P	A power supply for digital circuits and IO pads(3.3V)
4	VEEID	-	No connection
5	GSP	-	No connection
6	CLKEEDID	-	No connection
7	Data EEDID	-	No connection
8	RIN 0-	I	LVDS differential data input
9	RIN 0+	I	LVDS differential data input
10	GND	P	Power Ground
11	RIN 1-	I	LVDS differential data input
12	RIN 1+	I	LVDS differential data input
13	GND	P	Power Ground
14	RIN 2-	I	LVDS differential data input
15	RIN 2+	I	LVDS differential data input
16	GND	P	Power Ground
17	CLKIN-	I	LVDS differential clock input
18	CLKIN+	I	LVDS differential clock input
19	GND	P	Power Ground
20	NC	-	No Connection
21-22	LED_A	P	Power supply for LED+ anode
23	NC	-	No Connection
24-29	LEDK1-K6	P	Power supply for LED- cathode
30	NC	--	No Connection

I: Input; O: Output; P: Power

3 Absolute Maximum Ratings

GND=0V

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VDD	-0.3	5	V	Note1
Operating Temperature	Top	0	50	°C	
Storage Temperature	Tst	-20	60	°C	

Table 3 Absolute Maximum Ratings

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

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

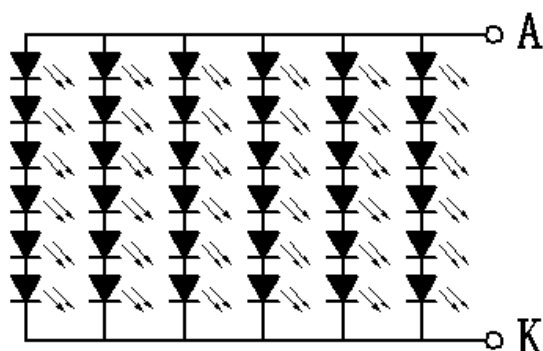
Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power Supply Voltage	VDD	3.0	3.3	3.6	V	
Input high level voltage	V_{IH}	$0.8V_{DDIO}$		VDDIO	V	
Input low level voltage	V_{IL}	GND		$0.2V_{DDIO}$	V	

4.2 Backlight Unit

The backlight system is an edge-lighting type with 36 LEDs. The characteristics of the LED are shown in the following tables.

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Backlight forward voltage	V_F	17.2	19.2	21	V	36 LEDs
Backlight forward current	I_F	-	120	-	mA	
LED life time	--	20000	--	--	Hrs	

Note 1: LED life time (Hr) can be defined as the time in which it continues to operate under the condition: $T_a=25\pm3\text{ }^{\circ}\text{C}$, typical IL value indicated in the above table and the $f_L=50\text{k Hz}$ until the brightness becomes less than 50%.



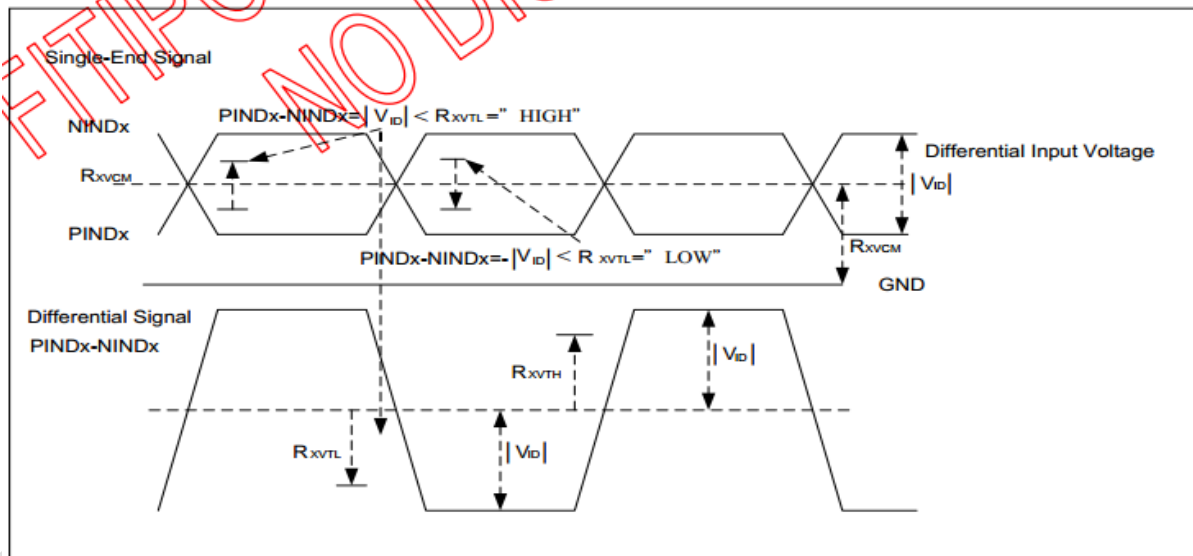
Backlight LED Circuit

5 Timing Chart

5.1 DC CHARACTERISTICS

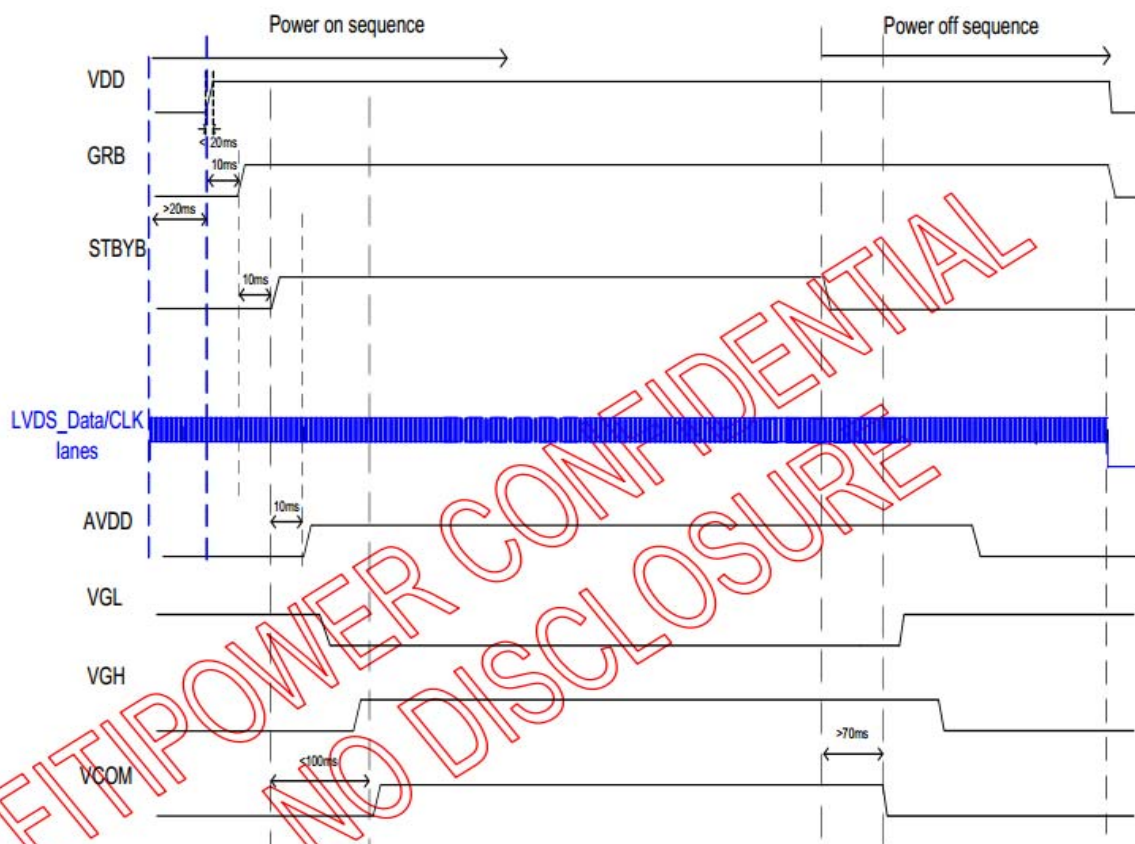
LVDS DC characteristic

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	RxVTH			+0.1V	V	RxVCM=1.2V
Differential input low threshold voltage	RxVTL	-0.1			V	
Input voltage range(single-end)	RxVIN	0		2.4	V	
Differential input common mode voltage	RxVCM	$ V_{ID} /2$		$2.4 - V_{ID} /2$	V	
Differential input voltage	$ V_{ID} $	0.2		0.6	V	
Differential input leakage current	RxVTH	-10		+10	μ A	
LVDS Digital Operating Current	Iddlvds	-	40(TBD)	50	mA	Fclk=65Mhz, VDD=3.3V
LVDS Digital Standby Current	Istlvds	-	10(TBD)	50	μ A	Clock & all functions are stop



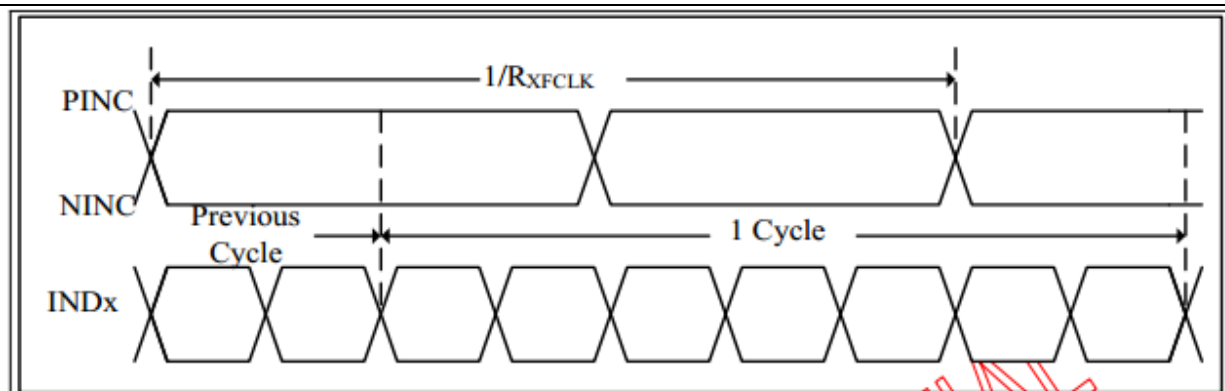
LVDS DC Characteristic

5.2 Power ON/OFF Sequence

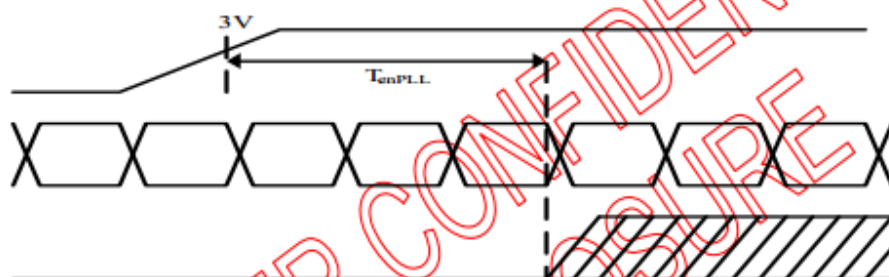


5.3 AC Characteristics

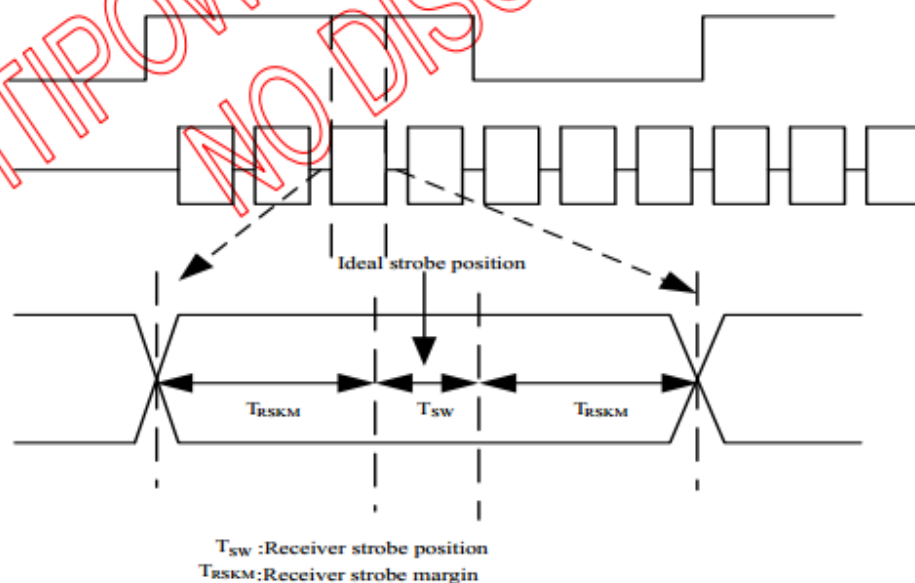
Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Clock Frequency	RxFCLK		20	-	71	MHz
Input data skew margin	TRSKM	V _{IO} =400mV R _x VCM=1.2V RxFCLK=71MHz	500			ps
Clock High Time	TLVCH			4/(7* RxFCLK)		ns
						ns
Clock Low Time	TLVCL			3/(7* RxFCLK)		ns
PLL wake-up-time	T _{en} PLL				150	us



LVDS timing(1)

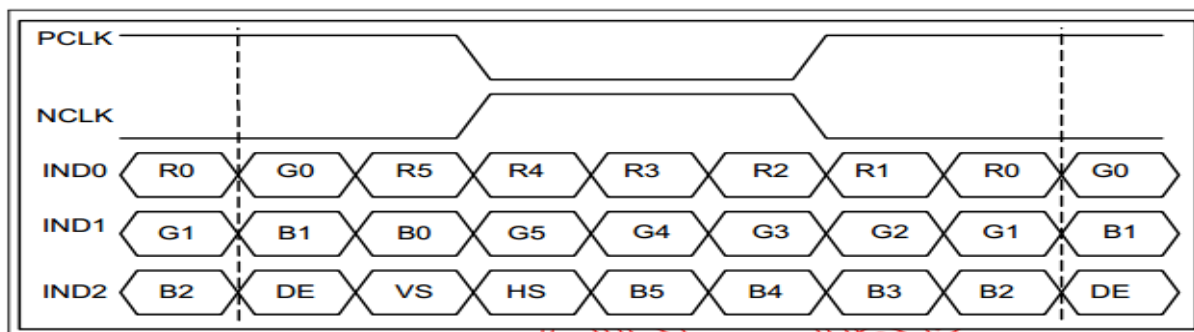


LVDS timing(2)



5.4 Data Input Format for LVDS

6-bit LVDS input(HSD="H")



6-bit LVDS Input Timing chart

Input Timing Of Connector

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	fclk	52	65	71	MHZ	
Hsync	thd	1024			tclk	
	th	1114	1344	1400	tclk	
	thb+thfp	90	320	376	tclk	
Vsync	tvd	768			thp	
	tv	778	806	845	thp	
	tvbp+tvfp	10	38	77	thp	

6 Optical Characteristics

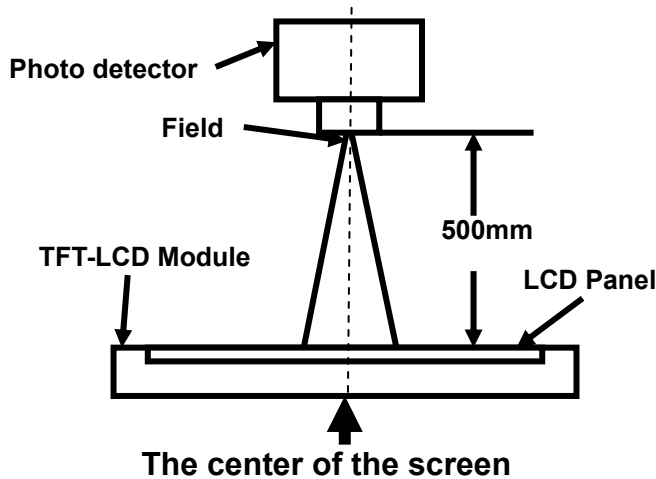
Item		Symbol	Condition	Mi	Typ	Max	Unit	Remark
View Angles		θT	CR≥ 10	-	89	-	Degree	Note2,3
		θB		-	89	-		
		θL		-	89	-		
		θR		-	89	-		
Contrast Ratio		CR	θ=0°	-	900	-		Note 3
Response Time		T _{ON}	25℃	-	25	30	ms	Note 4
		T _{OFF}						
Chromaticity	White	x	Backlight is on	0.266	0.296	0.326		Note 1,5
		y		0.306	0.336	0.366		
	Red	x						Note 1,5
		y						
	Green	x						Note 1,5
		y						
	Blue	x						Note 1,5
		y						
Uniformity		U		80	85	--	%	Note 6
Luminance		L		300	350	-	cd/m ²	Note 7

Test Conditions:

1. $I_F = 20$ mA, and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

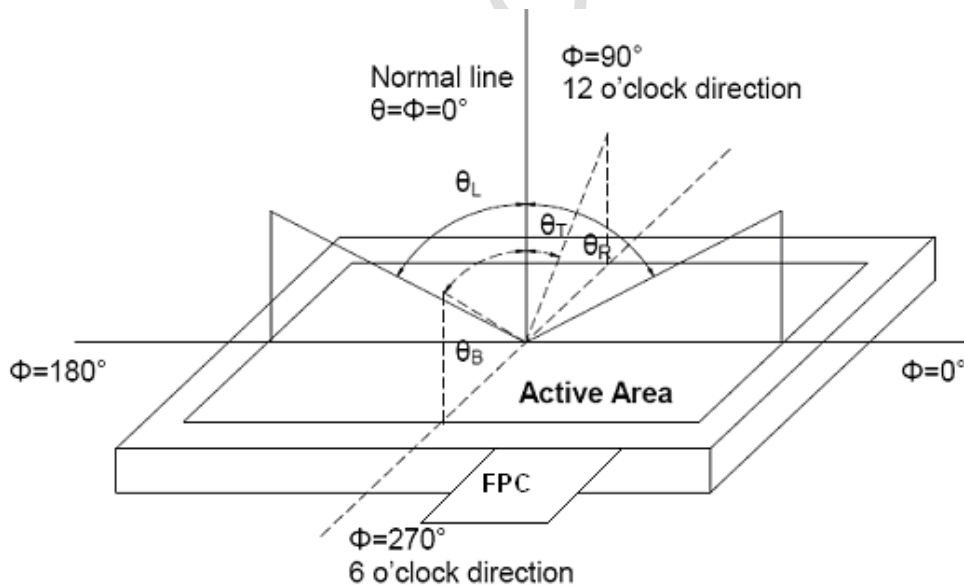
Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD.



Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

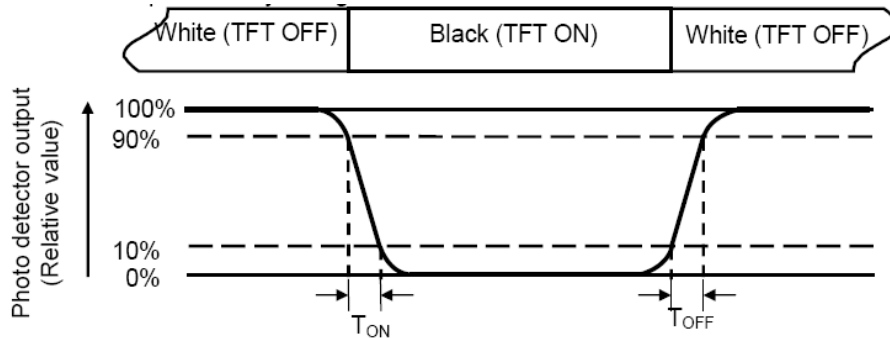
"White state ": The state is that the LCD should drive by V_{white} .

"Black state": The state is that the LCD should drive by V_{black} .

V_{white} : To be determined V_{black} : To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.



Note 5: Definition of color chromaticity (CIE1931)

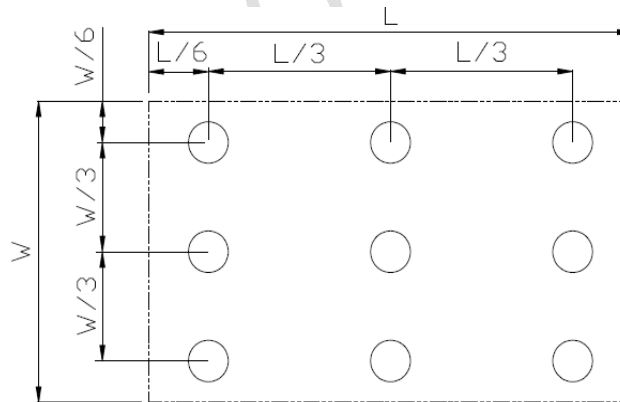
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

$$\text{Luminance Uniformity (U)} = L_{\min} / L_{\max}$$

L-----Active area length W----- Active area width



$L_{\max}$: The measured Maximum luminance of all measurement position.

$L_{\min}$: The measured Minimum luminance of all measurement position.

Note 7: Definition of Luminance:

Measure the luminance of white state at center point.

7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	50°C / 24Hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	0°C / 24Hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	60°C / 24Hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	-20°C / 24Hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	60°C x 90%RH / 24H	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	0°C $\leftrightarrow$ 50°C x 10cycles (30min) (5min) (30min)	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,G B2423.22-2002
7	ESD	Contact: ± 6 KV Air: ± 10 KV 150PF/330 Ω ,5Points/panel,5times	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test	Frequency: 10Hz~55Hz~10Hz Amplitude:1.5mm, 2 hours for each direction of X, Y, Z	IEC60068-2-6:1982 GB/T2423.10—1995
10	Package Drop Test	Drop to the ground from 1m height, 1 corner, 3 edges, 6 surfaces.	IEC60068-2-32:1990 GB/T2423.8—1995

Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note 4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

8. Outline Dimension

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9 Packing Drawing

TBD

10 Precautions for Use of LCD Modules

a) Handling Precautions

- i. The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- ii. If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.
- iii. Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- iv. The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- v. If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:
 - Isopropyl alcohol
 - Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
 - Ketone
 - Aromatic solvents
- vi. Do not attempt to disassemble the LCD Module.
 - vii. If the logic circuit power is off, do not apply the input signals.
 - viii. To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1 Be sure to ground the body when handling the LCD Modules.

10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

b) Storage precautions

- i. When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

ii. The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ~ 40℃ Relatively humidity: ≤80%

- iii. The LCD modules should be stored in the room without acid, alkali and harmful gas.

c) Transportation Precautions

- i. The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.