SPECIFICATIONS

Version: V0
This module uses ROHS material

PRODUCT: **TFT LCD MODULE**

MODEL NO: **HT0700EI04AC1**

SUPPLIER: **HTDisplay**

ISSUED DATE: **2019-12-24**

■ **Preliminary Specification**
☐ **Final Product Specification**

HT display		Customer
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Revision Record

REV No.	REV Date	Contents	Editor	Remarks
V0	2019-12-24	First release	Yuan he	Preliminary

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1. General information

Feature	Spec	Unit
LCD size	7.0	inch
Resalution	1024RGB x 600 Dots	---
Pixel pitch (HxV)	0.0502x0.1432	mm
Active area	154.21 (W) x 85.92 (H)	mm
Viewing area	TFT LCD：155.08 x 86.92	mm
Display Mode	IPS,NB	---
LCM Outline(with TP) (WxHxT)	164.80 × 99.84 × 4.57	mm
With/Without TP	With CTP	---
Weight (g)	151	g
TFT Driver IC	Source:EK79001HN+ Gate:EK73215BCGA	---
TFT Interface	LVDS	---
TFT Input voltage	3.3	V
TFT Power consumption	224	mW
Backlight Power consumption	1960	mW
Number of simultaneous touches	5	---
Sensor structure	Glass/DITO	---
CTP touch method	Finger	---
TP driver	GT911	---
TFT&TP Connector Type	FPC	---

2. Mechanical drawing
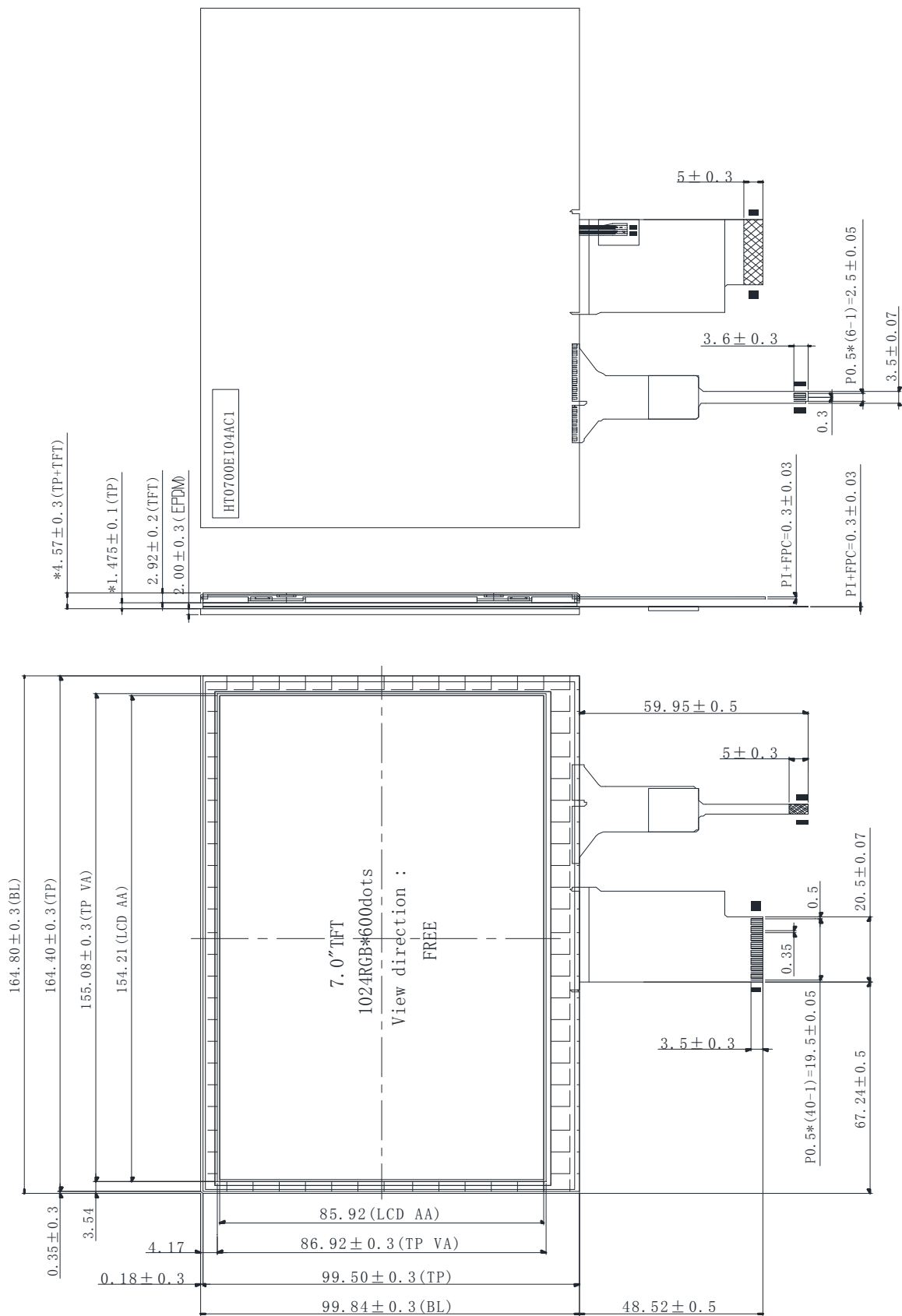
3. Absolute maximum ratings

Item	Symbol	Min.	Max.	Unit
Supply voltage for logic	VDD	-0.5	5.0	V
Input voltage	VIN	-0.3	VDD+0.3	V
Operating temperature	TOP	-20	70	°C
Storage temperature	TST	-30	80	°C
Humidity	RH	--	90%(Max60 °C)	RH

4. Electrical characteristics

Item	Symbol	Min.	Typ.	Max.	Unit
Supply voltage for logic	VDD	2.3	3.3	3.6	V
Input Current	Idd	--	68	--	mA
Input voltage 'H' level	VIH	0.7VDD	--	VDD	V
Input voltage 'L' level	VIL	VSS	--	0.3VDD	V
Output voltage 'H' level	VOH	VDD-0.4	--	--	V
Output voltage 'L' level	VOL	VSS	--	VSS+0.4	V

5. Backlight characteristics

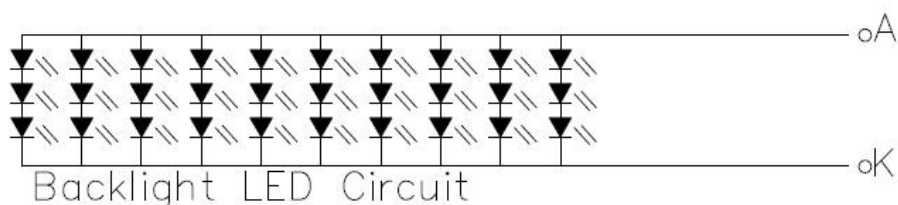| Item	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward Current	If	--	200	--	mA	
Forward Voltage	Vf	8.4	9.8	11	V	
Luminous Intensity	--	580	650	--	Cd/m2	
LED Life Time	LL	20000	30000	--	Hrs	Ta=25°C

Backlight LED Circuit

Figure   2

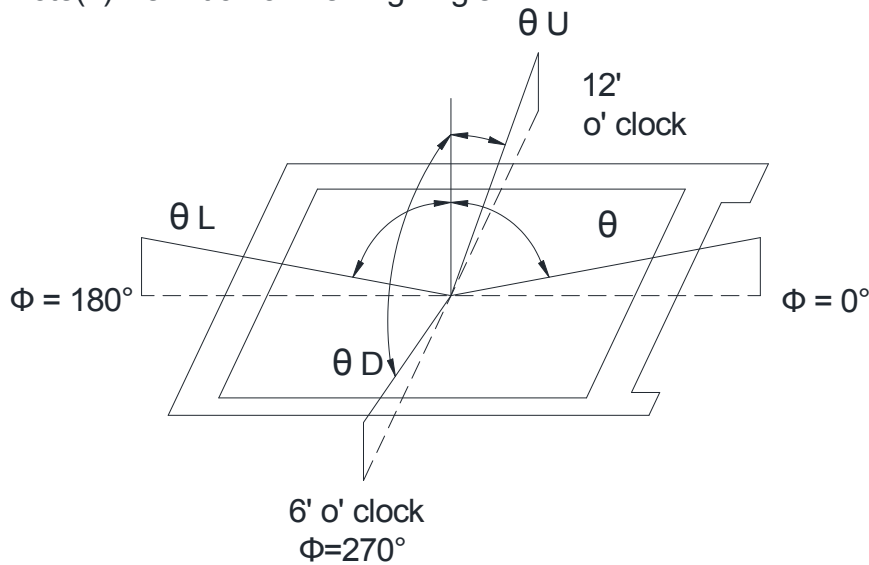Note1: Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.

Note2: Optical performance should be evaluated at Ta=25℃. if LED is driven by high current, high ambient temperature & Humidity condition. The life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

6. Electro-optical characteristics

Optical Specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Transmittance (with Polarizer)		$T(\%)$	Θ=0 Normal Viewing angle	4.8	5.0	—	%	Measuring with normal polarizer
Contrast Ratio		CR		—	800	—	—	(1)(2)
Response Time		$T_{ON}+T_{OFF}$		—	30	40	msec	(1)(3)
Color Gamut	(%)			—	50	—	%	C-light
Color Chromaticity (CIE1931)	White	W_x		TYP-0.03	0.308	TYP+0.03	—	(1)(4) CF glass C-light
		W_Y			0.336			
	Red	R_x			0.599		—	
		R_Y			0.338			
	Green	G_x			0.299		—	
		G_Y			0.550			
	Blue	B_x			0.139		—	
		B_Y			0.131			
Viewing Angle	Hor.	$Θ_L$	CR>10	—	85	—	—	(1)(4) Measuring with normal polarizer, Reference Only
		$Θ_R$		—	85	—		
	Ver.	$Θ_U$		—	85	—		
		$Θ_D$		—	85	—		
Optimal View Direction			Free					

Note(1) Definition of Viewing Angle:

Note(2) Definition of Contrast Ratio(CR):
measured at the center point of panel

$$CR = \frac{\text{Luminance with all pixels white}}{\text{Luminance with all pixels black}}$$

Note(3): Definition of Response time: Sum of T_{ON} and T_{OFF}

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%.
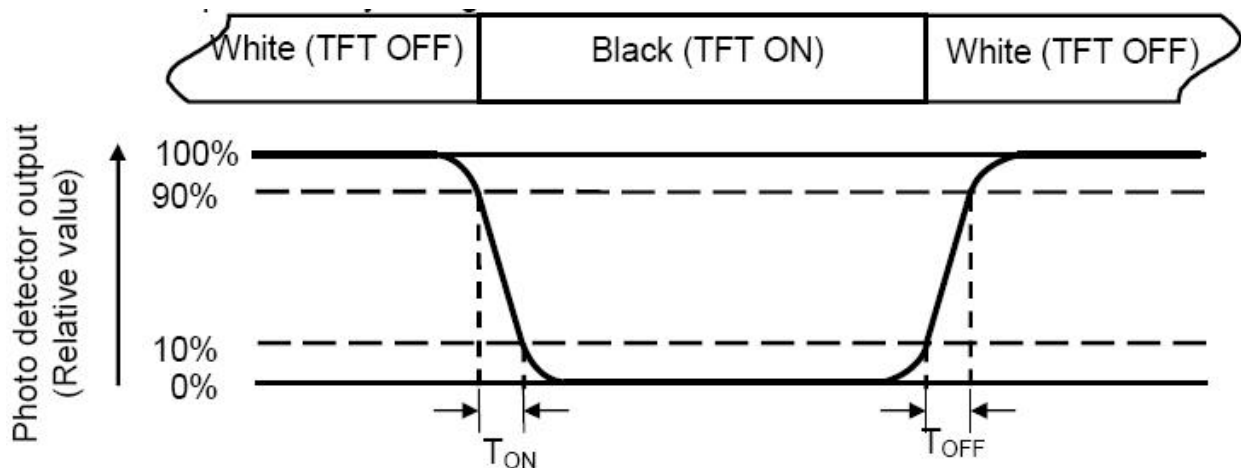

Note (4): Definition of color chromaticity (CIE1931)Color coordinates measured at center point of LCD.

7. Read/Write timing

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	V	
LVDS Digital Operating Current	Iddlvsd	-	40(TBD)	50	mA	Fclk=65Mhz, VDD=3.3V
LVDS Digital Standby Current	Istlvds	-	10(TBD)	50	uA	Clock & all functions are stop
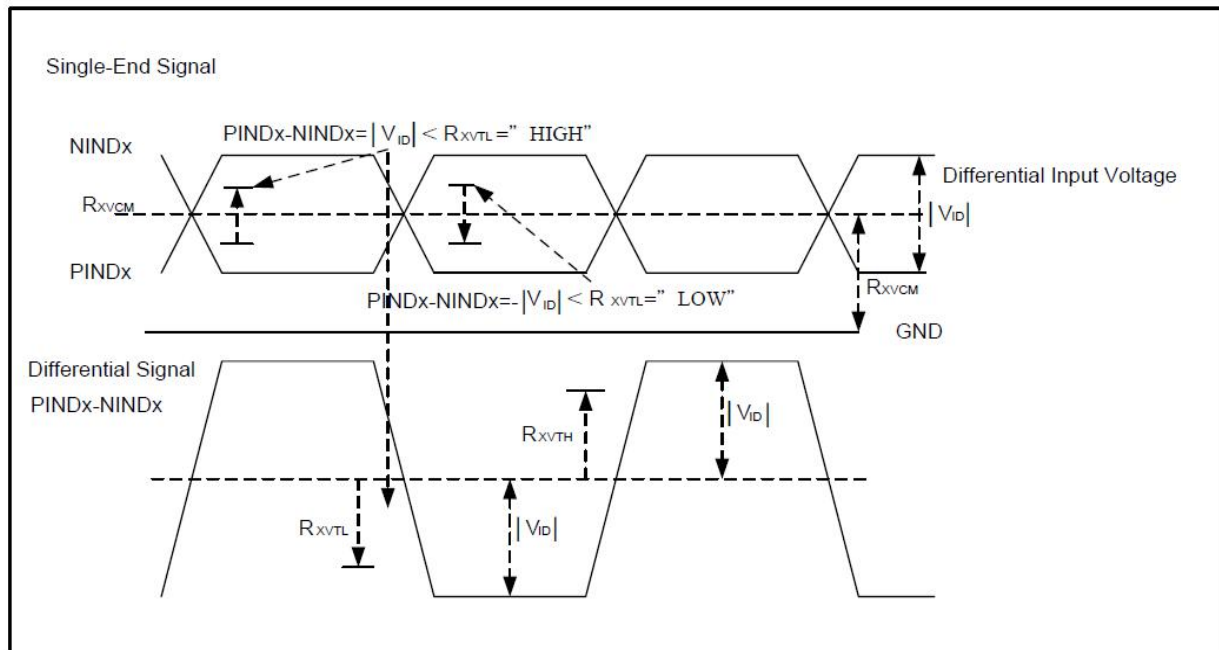
LVDS DC Characteristic

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DE mode

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
DCLK frequency @Frame rate=60hz	fclk	40.8	51.2	67.2	Mhz
Horizontal display area	thd		1024		DCLK
HSYNC period time	th	1114	1344	1400	DCLK
HSYNC blanking	thb+thfp	90	320	376	DCLK
Vertical display area	tvd		600		H
VSYNC period time	tv	610	635	800	H
VSYNC blanking	tvb+tvfp	10	35	200	H

HV mode(1)

HV mode
Horizontal input timing

Parameter		Symbol	Value			Unit
Horizontal display area		thd		1024		DCLK
DCLK frequency@ Frame rate=60hz		fclk	Min.	Typ.	Max.	Mhz
			44.9	51.2	63	
1 Horizontal Line		th	1200	1344	1400	
HSYNC pulse width	Min.	thpw		1		DCLK
	Typ.			—		
	Max.			140		
HSYNC back porch		thbp	160	160	160	
HSYNC front porch		thfp	16	160	216	

HV mode(2)

Vertical input timing

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Vertical display area	tvd		600		H
VSYNC period time	tv	624	635	750	H
VSYNC pulse width	tvpw	1	—	20	H
VSYNC back porch	tvb	23	23	23	H
VSYNC front porch	tvfp	1	12	127	H

Parameter	Symbol	Value	Unit	Remarks
Power For Analog Circuit	AVDD	9.6	V	
TFT Gate ON Voltage	VGH	18	V	VGH-VGL <=40V
TFT Gate OFF Voltage	VGL	-6	V	
TFT Common Electrode Voltage	VCOMH	3.3	V	
	VCOML	3.1	V	

Notes :
1. VGH is TFT Gate operating voltage.
2. VGL is TFT Gate operating voltage. The low voltage level of VGL signal must be fluctuates with same phase as Vcom.
3. Vcom must be adjusted to optimize display quality, as Crosstalk and Contrast Ratio etc..
4. The value is just the reference value. The customer can optimize the setting value by the different D-IC.

8. Interface description

8.1 TFT interface

No.	SYMBOL	I/O	Description
1	VCOM	P	TFT Common Electrode Voltage
2	VDD	P	Power supply for digital circuits
3	VDD	P	Power supply for digital circuits
4	NC		-
5	RESET		This signal will reset the device and it must be applied to properly.
6	STBYB	I	Standby mode, Normally pull high. STBYB = "1",normal operation STBYB = "0", timing controller, source driver will turn off, all output are High-Z
7	GND	P	Ground for digital circuits.
8	RXIN0-	I	LVDS data Input.
9	RXIN0+	I	LVDS data Input.
10	GND	P	Ground for digital circuits.
11	RXIN1-	I	LVDS data Input.
12	RXIN1+	I	LVDS data Input.
13	GND	P	Ground for digital circuits.
14	RXIN2-	I	LVDS data Input.
15	RXIN2+	I	LVDS data Input.
16	GND	P	Ground for digital circuits.
17	RXCLKIN-		Clock Input pin for LVDS
18	RXCLKIN+		Clock Input pin for LVDS
19	GND	P	Ground for digital circuits.
20	RXIN3-	I	LVDS data Input.
21	RXIN3+	I	LVDS data Input.
22	GND	P	Ground for digital circuits.
23	NC		-
24	NC		-
25	GND	P	Ground for digital circuits.
26	NC		-
27	DIMO	O	Backlight dimmer signal for external controller. DIMO = "0", Turn off external backlight controller DIMO = "1", Logical control signal to turn on external backlight controller
28	SELB (HSD)	I	Horizontal Sync input for TTL mode. Negative polarity. (In LVDS interface connected HSD to FPC for pin setting HSD=" L" :8 bit HSD=" H" :6 bit)
29	AVDD		Power For Analog Circuit
30	GND	P	Ground for digital circuits.

No.	SYMBOL	I/O	Description
31	LED-K	P	LED power cathode
32	LED-K	P	LED power cathode
33	L/R	I	Source Right or Left sequence control. Normally pull high. SHLR = "L", shift left: last data = S1←S2←S3..........←S1536 = first data. SHLR = „H", shift right: first data = S1→S2→S3........→S1536 = last data.
34	U/D	I	Gate Up or Down scan control. Normally pull low. UPDN = "L", STV2 output vertical start pulse and UD pin output logical "0" to Gate driver. UPDN = "H", STV1 output vertical start pulse and UD pin output logical "1" to Gate driver.
35	VGL		TFT Gate OFF Voltage
36	NC		-
37	NC		-
38	VGH		TFT Gate ON Voltage
39	LED+(A)	P	LED power anode
40	LED+(A)	P	LED power anode

8.2 CTP interface

No.	SYMBOL	I/O	Description
1	INT	O	Interrupt pin
2	SDA	IO	I2C data pin
3	SCL	I	I2C clock input pin
4	RESET	I	Reset pin for touch panel
5	GND	P	Ground
6	VDD	P	Supply voltage for touch panel

9. Reliability test conditions

No.	Test Item	Test condition	Remark
1	High Temperature Storage	80°C±2°C 240H	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Storage	-30°C±2°C 240H	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Operation	70°C±3°C 240H	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Operation	-20°C±3°C 240H	IEC60068-2-1:2007 GB2423.1-2008
5	High Temperature /Humidity Storage	60°C 90%RH 240H	IEC60068-2-78:2007 GB2423.3-2006
6	Temperature Cycle	-30℃/30min←→80℃/30min For a total 100 cycles. Start with cold temperature and end with high temperature.	IEC60068-2-14:1984 GB2423.22-2002
7	Vibration Test	Frequency range:10~55Hz Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2hours for each direction of X,Y,Z. Component handle as note1	IEC60068-2-6:1982 GB/T2423.10 -1995
8	Mechnical shock	100G ±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5 -1995
9	Packing vibration test	$0.015G^2$/Hz from 50~200Hz -6dB/Octave from 200~500Hz 2hours for each direction of X,Y,Z	IEC60068-2-34 GB/T2423.11
10	Dropping test	Height::60cm 1conner ,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8 -1995
11	ESD test	±2kv,human body mode 100pF/1500Ω	IEC61000-4-2:2001 GB/T17626.2 - 2006

Note1:
The component placed on a vibrating platform as it is assembled in the machine, wires included, is subjected to sinusoidal vibration in all directions XYZ
Note2:
After completing the reliability test, leave the samples under the room temperature and for the following inspection items:

1. No clearly visible defects or deterioration of display quality allowed.
2. No function-related abnormalities.
3. Connected parts still connecting tightly.
4. Display characteristics fulfill initial value contrast ratio should be an least 30% of initial value.

10. Storage and use precautions
When storing and using the LCD modules, the following precaution are necessary：

10.1 Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.

10.2 Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C, and keep the relative humidity between 40%RH and 60%RH.

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

10.4 The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped).

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

10.6 Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

10.7 If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be gained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

10.8 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

10.9 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.

10.10 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

10.11 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

10.12 If the display surface is contaminated, 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

10.13 Do not attempt to disassemble the LCD Module.

10.14 If the logic circuit power is off, do not apply the input signals.

10.15 To prevent destruction of the elements by static electricity, be careful to
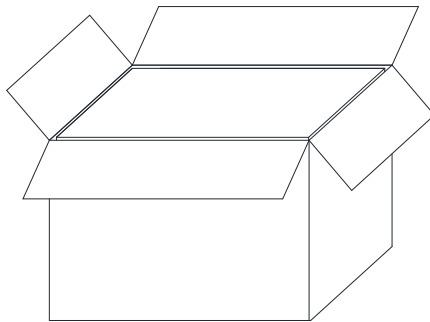
maintain an optimum work environment.

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

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

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

--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.

--Exposed area of the printed circuit board.
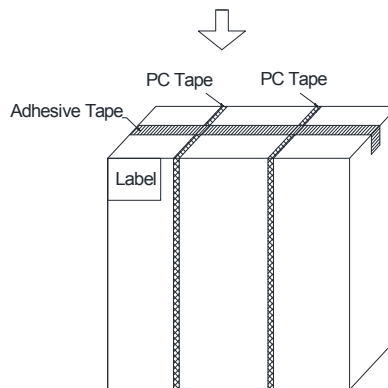
--Terminal electrode sections

11. Packing
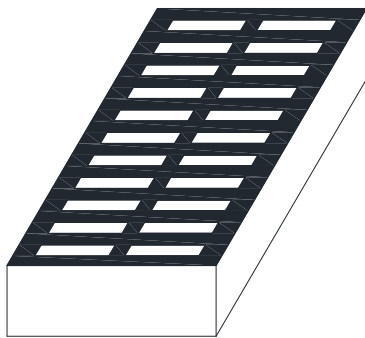
(1) Place the module into the pearl cotton tray.
(2) Place the pear cotton tray into the carton.
(3)   Wrap the carton well.