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上海冠显光电科技有限公司
Shanghai Top Display Optoelectronics Co., LTD

**PRODUCTION SPECIFICATION
OF Display MODULE
MODULE NO: TV040HDH02CL**

Customer Name:			
Customer Part Number:			
Approved By:		Date:	2023-12-20

Prepared By	Checked By	Approved By

RECORD OF REVISION

Version	Revised Date	Page	Content
V1.0	2023/12/20	--	First Issued

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1. GENERAL DESCRIPTION

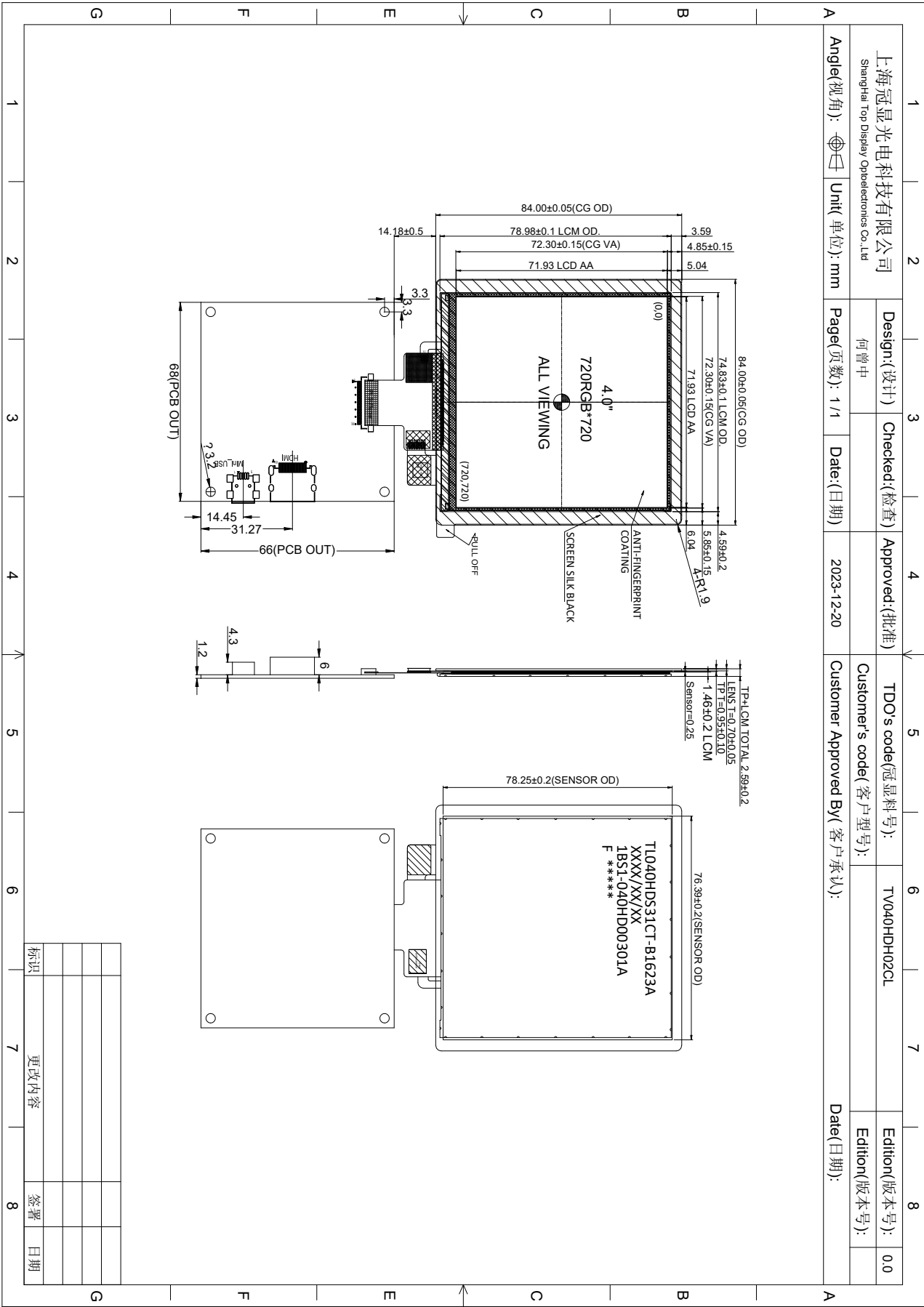
1.1 Description

TV040HDH02CL is a 4.0 inch diagonally measured active display with high resolution 720*720 display. This model is composed of a TFT LCD panel, backlight system and HDMI Converter . It is designed to make Raspberry Pi usage easy. You can simply use this display with your Raspberry Pi, or also you can use this as computer display with any device which has HDMI output.

1.2 Features:

No.	Item	Specification	Unit
1	Panel Size	4.0"	Inch
2	Number of Pixels	720 (W) x RGB x 720 (H)	Pixels
3	Active Area	71.93 (W) × 71.93 (H)	mm
5	Outline Dimension	84.0 (W) ×84.0 (H)	mm
6	Number of Colors	16.7M	- -
7	Display Mode	Normally Black	- -
8	View Direction	Free direction	- -
9	Display Format	RGB vertical stripe	- -
10	Surface Treatment	HC	- -
11	Contrast Ratio	1000 (Typ.)	- -
12	Luminance (cd/m ²)	320 (Typ.)	cd/m2
13	Video Input Interface	HDMI (Compliance HDMI V1.4)	- -
14	Touch panel	With CTP	- -
15	Backlight	White LED	- -
16	Operation Temperature	-20 ~ 70	°C
17	Storage Temperature	-30 ~ 80	°C
18	Weight	(TBD)	g

2. MECHANICAL SPECIFICATION



3. PHYSICAL PICTURE



4. PIN DESCRIPTION

4.1 Power Input —Mini-USB

Pin No.	Symbol	I/O	Function
1	5V	P	Power Supply +5V, Current Max 200mA
2	USB-	P	DM (HID USB for touch panel)
3	USB+	P	DP (HID USB for touch panel)
4	NC	P	Ground
5	GND	P	Ground

4.2 HDMI (CN1)

[HDMI A TYPE:PHD0911A2301E or compatible]

Pin No.	Symbol	I/O	Function	Note
1	TMDS 2+	I	TMDS Data2+	
2	GND	P	TMDS Data2 Shield	
3	TMDS 2-	I	TMDS Data2-	
4	TMDS 1+	I	TMDS Data1+	
5	GND	P	TMDS Data1 Shield	
6	TMDS 1-	I	TMDS Data1-	
7	TMDS 0+	I	TMDS Data0+	
8	GND	P	TMDS Data0 Shield	
9	TMDS 0-	I	TMDS Data0-	
10	TMDS CLK+	I	TMDS Clock+	
11	GND	P	TMDS Clock Shield	
12	TMDS CLK-	I	TMDS Clock-	
13	CEC	I	CEC	
14	N.C.	-	N.C.	
15	DDC_SCL	I	IIC SCL to EDID ROM	
16	DDC_SDA	I/O	IIC SDA to EDID ROM	
17	GND	P	DDC/CEC Ground	
18	HD_5V	P	+5V Power	
19	HPD	O	Hot Plug Detect	

5. ABSOLUTE MAXIMUM RATINGS

5.1 Electrical Absolute Rating

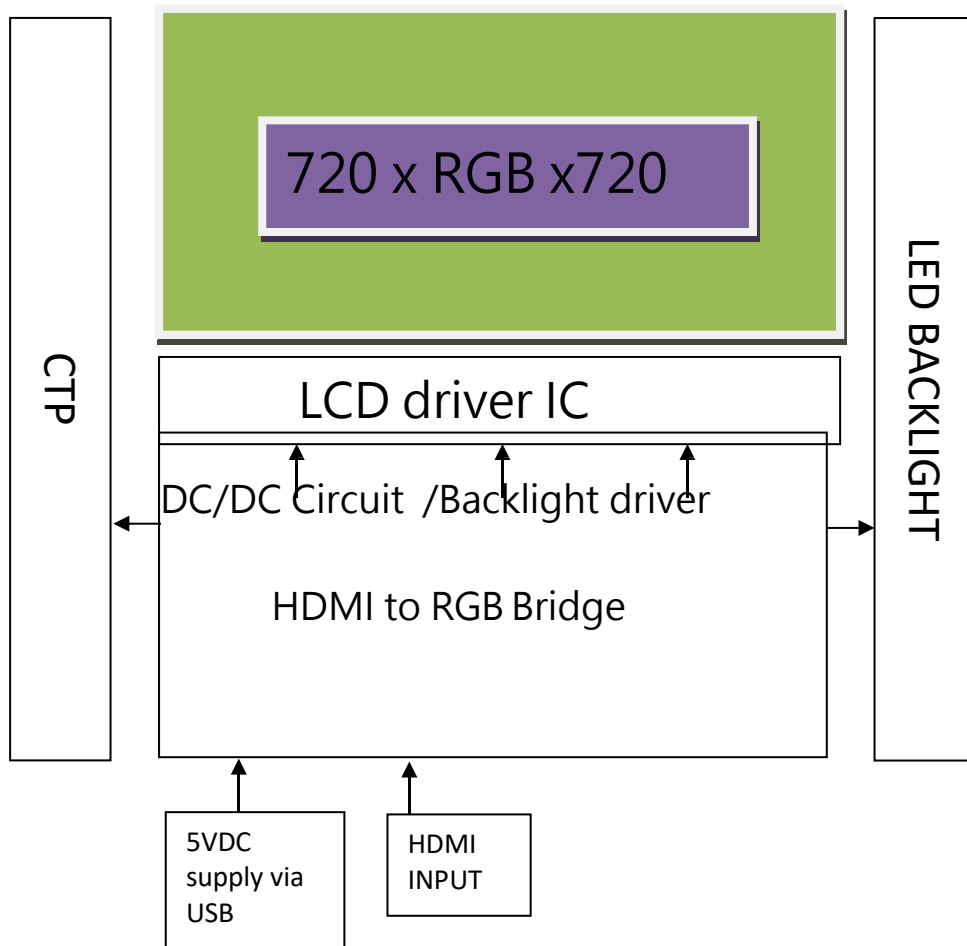
5.1.1 HDMI TFT LCD Module

Item	Symbol	Values		Unit	Note
		Min	Max.		
Power supply voltage	5V	4.5	5.5	V	Mini- USB

5.1.2 Environment Absolute Rating

Item	Symbol	Values			Unit	Note
		Min	Typ	Max.		
Operating Temperature	Top	-20		70	°C	Ambient temperature
Storage Temperature	Tst	-30		80	°C	

6. BLOCK DIAGRAM

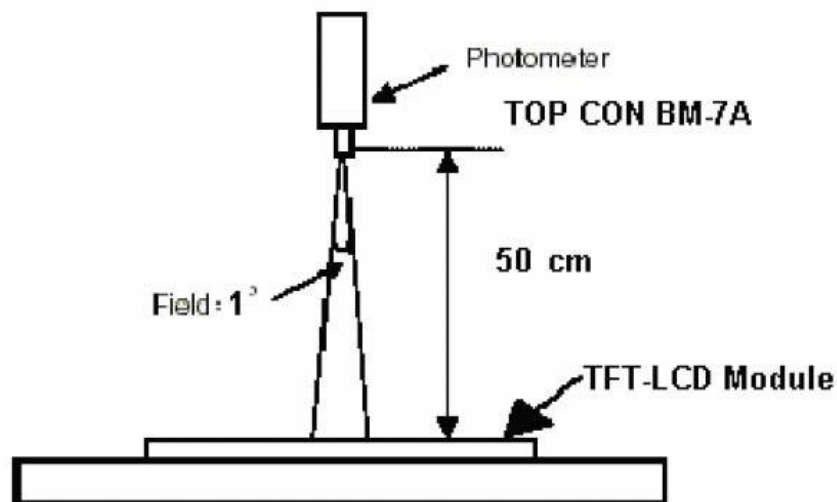


7. OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	$CR \geq 10$	80	85	-	Degree	Note 2
	θB		80	85	-		
	θL		80	85	-		
	θR		80	85	-		
Contrast Ratio	CR	$\theta=0^\circ$	800	1000	-	-	Note1 Note3
Response Time	T_{ON}	$25^\circ C$	25	35	-	ms	Note1 Note4
	T_{OFF}						
Uniformity	U	-	80	85	-	%	Note1 Note6
NTSC	-	-	63	68	-	%	Note 5
Luminance	L		-	380	-	cd/m ²	Note1 Note7

Note: The following optical specifications shall be measured in a darkroom or equivalent state (ambient luminance ≤ 1 lux, and at room temperature). The operation temperature is $25^\circ C \pm 2^\circ C$. The measurement method is shown in Note1.

Note1: The method of optical measurement:



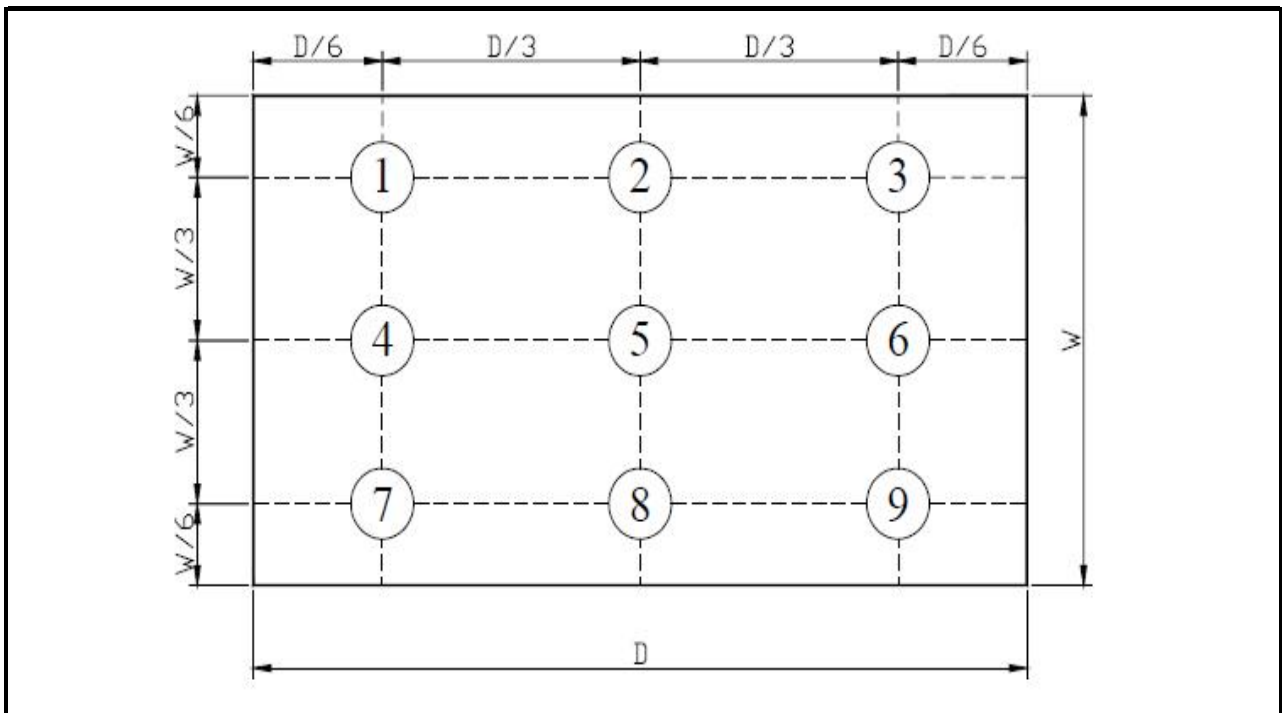
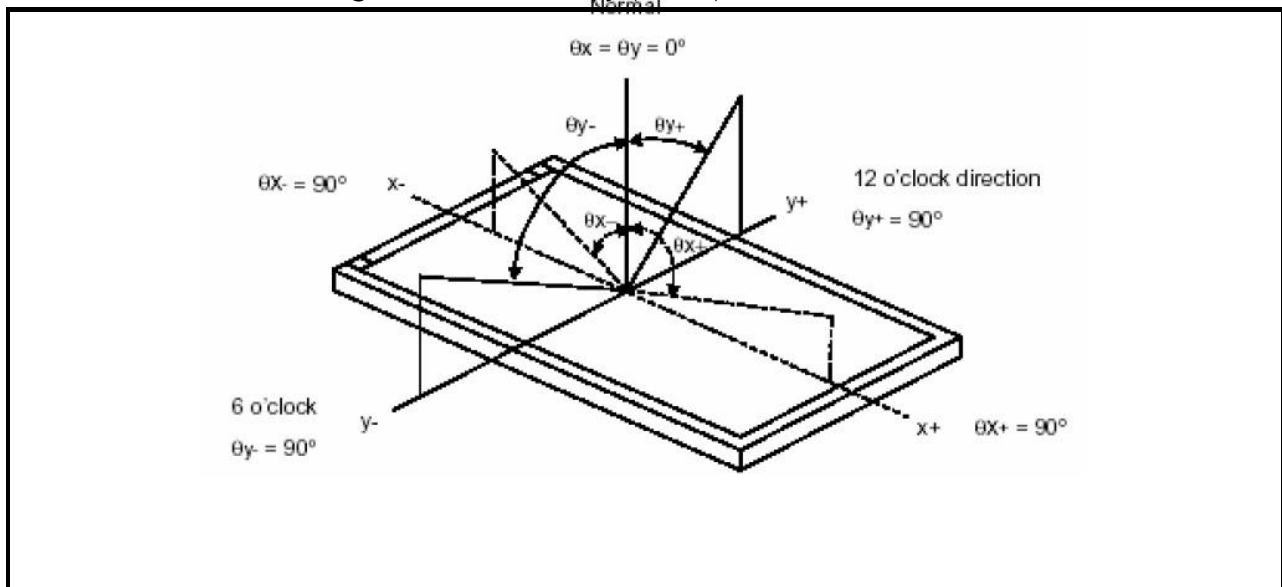
Note2: Measured at the center area of the panel and at the viewing angle of the $\theta_x = \theta_y = 0^\circ$

Note3: Definition of Contrast Ratio (CR):

CR = Luminance with all pixels in white state $\div$ Luminance with all pixels in Black state

Note 4: Definition of Viewing Angle:

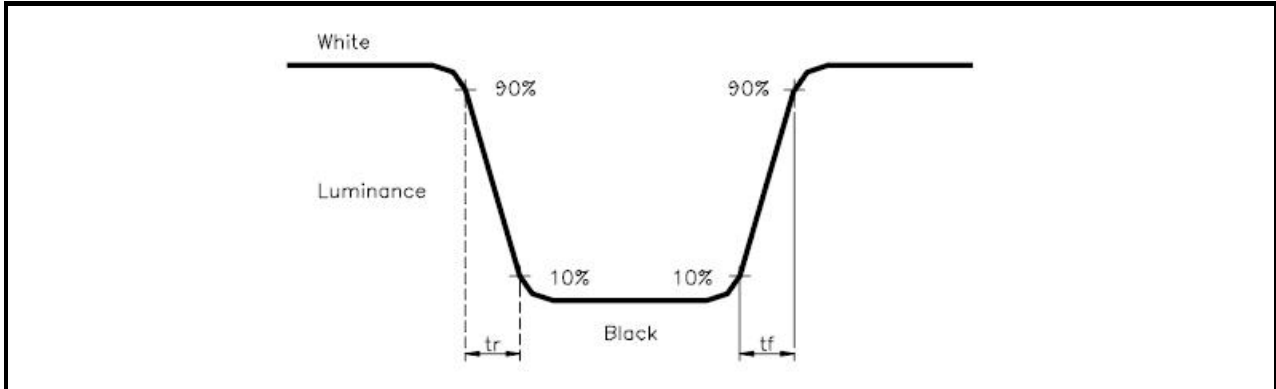
Note 5: Definition of Brightness Uniformity (B-uni):



B-uni = (Minimum luminance of 9 points ÷ Maximum luminance of 9 points) X 100%

Note 6: Definition of Response Time:

The Response Time is set initially by defining the “Rising Time (T_r)” and the “Falling Time (T_f)” respectively. T_r and T_f are defined as following figure



Note 7: Definition of Chromaticity:

The color coordinates (W_x, W_y), (R_x, R_y), (G_x, G_y), and (B_x, B_y) are obtained with all pixels in the viewing field at white, red, green, and blue states, respectively.

8. RELIABILITY

8.1 Test Condition

- 8.1.1** Temperature and Humidity(Ambient Temperature) Temperature : $25 \pm 5^{\circ}\text{C}$
Humidity : $65 \pm 5\%$
- 8.1.2** Operation
Unless specified otherwise, test will be conducted under function state.
- 8.1.3** Container
Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.
- 8.1.4** Test Frequency
In case of related to deterioration such as shock test. It will be conducted only once.

8.2 TESTS

Item	Condition	Time (hrs)	Assessment
High temp. Storage	80°C	240	No abnormalities in functions and appearance
High temp. Operating	70°C	240	
Low temp. Storage	-30°C	240	
Low temp. Operating	-20°C	240	
Humidity	60°C/ 90%RH	240	
Thermal Shock(Non-operation)	-30°C ← 25°C → 70°C (0.5 hour ← 5 min → 0.5 hour)	10cycles	

8.3 JUDGMENT STANDARD

The judgment of the above test should be made as follow:

Pass: Normal display image with no obvious non-uniformity and no line defect. Partial transformation of the module parts should be ignored.

Fail: No display image, obvious non-uniformity, or line defects.

9. RECAUTION RELATING PRODUCT HANDLING

9.1 SAFETY

- 9.1.1** If the LCD panel breaks , be careful not to get the liquid crystal to touch your skin.
- 9.1.2** If the liquid crystal touches your skin or clothes , please wash it off immediately by using soap and water.

9.2 HANDLING

- 9.2.1** Avoid any strong mechanical shock which can break the glass.
- 9.2.2** Avoid static electricity which can damage the CMOS LSI—When working with the module, be sure to ground your body and any electrical equipment you may be using.
- 9.2.3** Do not remove the panel or frame from the module.
- 9.2.4** The polarizing plate of the display is very fragile. So , please handle it very carefully, Do not touch, push or rub the exposed polarizing with anything harder than an HB pencil lead (glass , tweezers , etc.)
- 9.2.5** Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- 9.2.6** Do not touch the display area with bare hands , this will stain the display area.
- 9.2.7** Do not use ketonics solvent & aromatic solvent. Use with a soft cloth soaked with a cleaning naphtha solvent.
- 9.2.8** To control temperature and time of soldering is $280 \pm 10^{\circ}\text{C}$ and 3-5 sec.
- 9.2.9** To avoid liquid (include organic solvent) stained on LCM.

9.3 STORAGE

- 9.3.1** Store the panel or module in a dark place where the temperature is $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and the humidity is below 65% RH.
- 9.3.2** Do not place the module near organics solvents or corrosive gases. Do not crush, shake, or jolt the module