MODEL NO. : TM104SCH02

ISSUED DATE: 2009-12-16

VERSION : Ver 2.3

□Preliminary Specification
■Final Product Specification

Customer :

Approved by	Notes

SHANGHAI TIANMA Confirmed :

Prepared by	Checked by	Approved by
2010.1.13	2010-01-13	劉慶全

This technical specification is subjected to change without notice

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Record of Revision

Rev	Issued Date	Description	Editor
1.0	2008-05-07	Preliminary Release	Yebo Gu
1.1	2008-08-13	Add Gamma Voltage, Add Packing Drawing	Zhenying zhang
1.2	2008-08-27	Update Lamp Current to 5.5mA	Zhenying zhang
2.0	2008-10-14	Final Product Specification Update Luminance Minimum Value to 185nits	Zhenying zhang
2.1	2008-11-18	Update Model Name from TS104SAALC01-00 to TM104SCH01	Zhenying zhang
2.2	2008-12-03	Revise Model Name from TM104SCH01 to TM104SCH02 Update Model Name in Mechanical Drawing Update Chromaticity Gx typical value from 0.333 to 0.300	Zhenying zhang
2.3	2009-12-16	Revise Interface to RGB18 bits in page 4 Revise View Angles and Testing invertor in page 10 Update Reliability Test Remarks in page 14	Xing Nie

1 General Specifications

Feature		Spec
Display Spec.	Size	10.4 inch
	Resolution	800(RGB) x 600
	Interface	LVDS 6 bits
	Color Depth	262K
	Technology Type	a-Si
	Pixel Pitch (mm)	0.264x0.264
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	TM with Normally White
	Surface Treatment(Up Polarizer)	Anti-Glare(3H)
	Viewing Direction	12 o'clock
	Gray Scale Inversion Direction	6 o'clock
Mechanical Characteristics	LCM (W x H x D) (mm)	236.00x176.90x5.60
	Active Area(mm)	211.20x158.40
	With /Without TSP	Without TSP
	Weight (g)	288.0

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 : +/- 5%

2 Input/Output Terminals

2.1 TFT LCD Panel

Matching connector of Hirose DF19K-20P-1H (56)

No	Symbol	I/O	Description	Comment
1	VDD	P	Power Supply	
2	VDD	P	Power Supply	
3	GND	P	Ground	
4	GND	P	Ground	
5	IN0-	I	LVDS receiver negative signal channel 0	
6	IN0+	I	LVDS receiver positive signal channel 0	
7	GND	P	Ground	
8	IN1-	I	LVDS receiver negative signal channel 1	
9	IN1+	I	LVDS receiver positive signal channel 1	
10	GND	P	Ground	
11	IN2-	I	LVDS receiver negative signal channel 2	
12	IN2+	I	LVDS receiver positive signal channel 2	
13	GND	P	Ground	
14	CLK-	I	LVDS receiver negative signal clock	
15	CLK+	I	LVDS receiver positive signal clock	
16	GND	P	Ground	
17	NC	-	No connection	
18	NC	-	No connection	
19	GND	P	Ground	
20	GND	P	Ground	

Note: I/O definition:

I-----Input O---Output P----Power/Ground

2.2 CN2 (CCFL connector)

No	Symbol	I/O	Description	Wire Color
1	VL1	P	CCFL power supply(high voltage)	Pink
2	VL2	P	CCFL power supply(GND)	White

3 Absolute Maximum Ratings

3.1 Driving TFT LCD Panel

GND=0V,Ta = 25°C

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD	-0.3	5.0	V	
Input voltage	V_{IN}	-0.3	5.0	V	Note1
Operating Temperature	T_{OPR}	-20	70	℃	
Storage Temperature	T_{STG}	-30	80	℃	

Note1: V_{IN} represent IN0±,IN1±,IN2±,CLK±

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

GND=0V, Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
LVDS Differential input high threshold	V_{TH}	-	-	+100	mV	V_{CMLVDS}=1.2V
LVDS Differential input low threshold	V_{TL}	-100	-	-	mV	V_{CMLVDS}=1.2V
Differential input voltage	$\|V_{ID}\|$	0.1	-	0.6	V	
LVDS input common mode voltage	V_{CMLVDS}	$\|V_{ID}\|/2$	-	1.4-($\|V_{ID}\|$/2)	V	
Input current	I_{IN}	-10	-	10	μA	
Supply Voltage	VDD	3.0	3.3	3.6	V	
Common Electrode Driving Signal	VCOM	-	4.36	-	V	Note1
Sync Frequency	FVD	-	60	70	Hz	
VDD Power Consumption	I_{DD}	-	260	380	mA	Note2

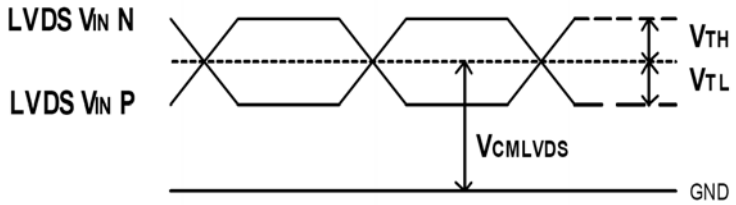


Figure 4.1.1 LVDS DC timing diagram

Note1: The value may be different for different LCM.

Note2: To test the current dissipation, using the “color bar” testing pattern shown as below:

1. White
2. Yellow
3. Cyan
4. Green
5. Magenta
6. Red
7. Blue
8. Black

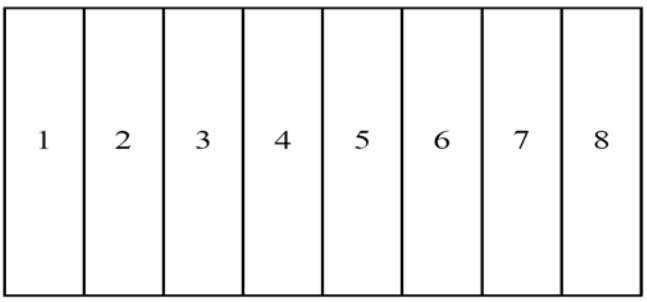


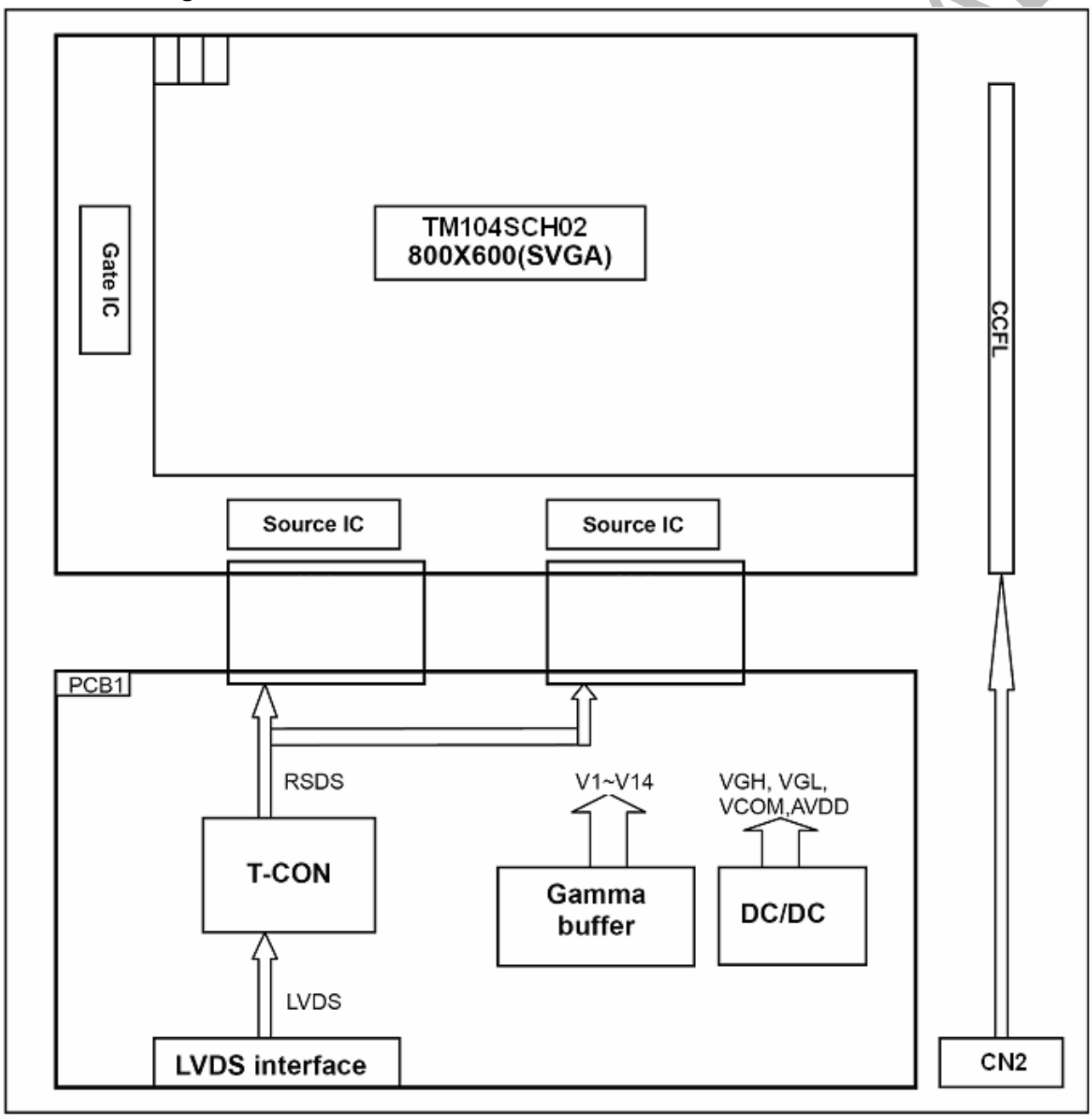
Figure 4.1.2 Current dissipation testing pattern

4.2 Driving Backlight

Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Lamp voltage	V_L	468	520	572	Vrms	
Lamp current	I_L	3.0	5.5	7.0	mArms	
Lamp start voltage	V_{LS}	-	-	890	Vrms	
Lamp frequency	F_L	40	60	80	KHz	

4.3 Block Diagram

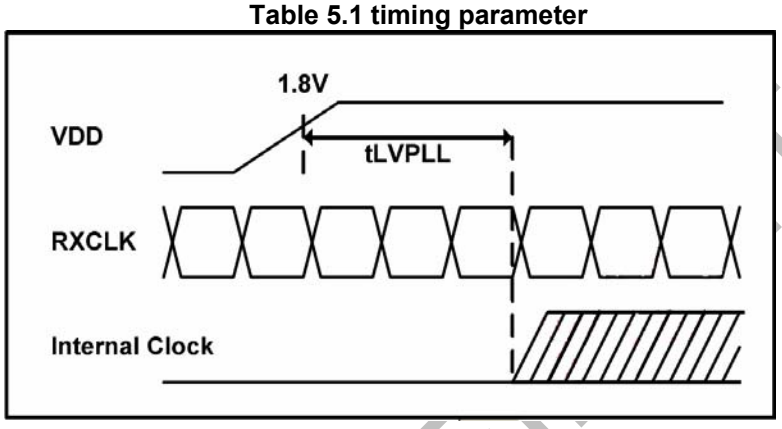


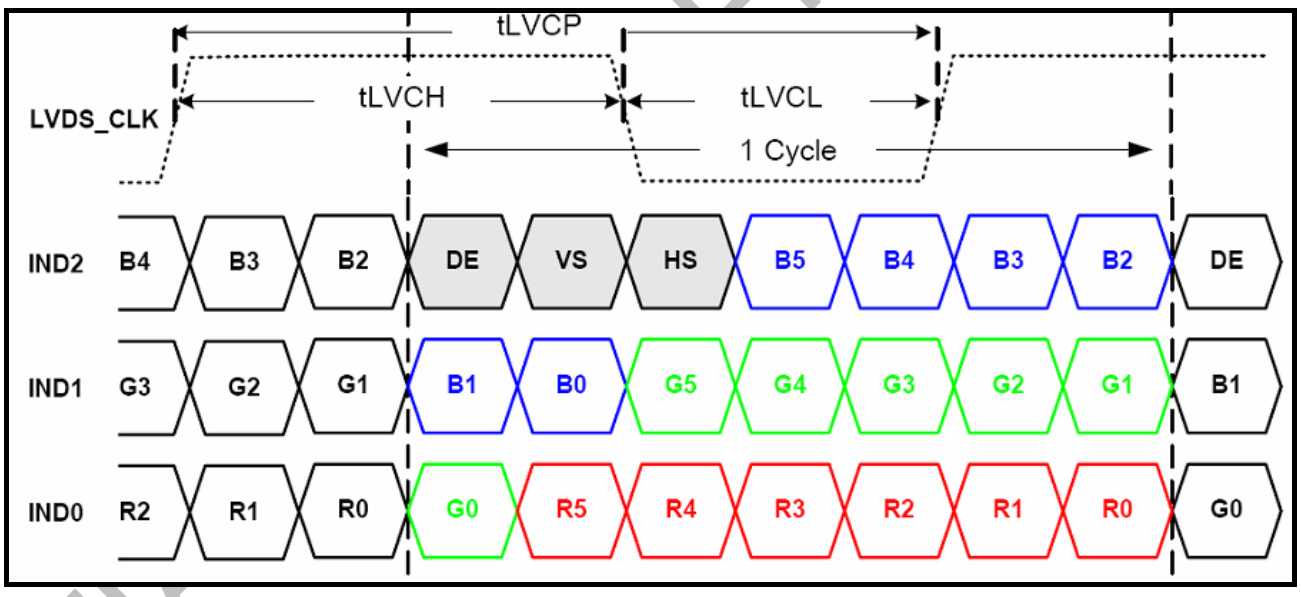
5 Timing Chart

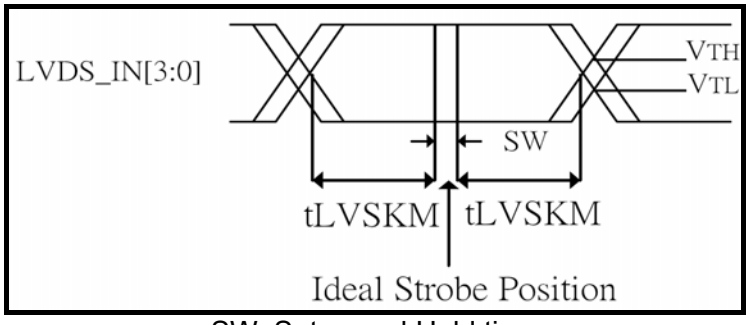
5.1 Timing Parameter

Item	Symbol	Min	Typ	Max	Unit	Condition
Clock period	tLVCP	20.0	25	31.25	ns	
Clock high time	tLVCH	-	14.29	-	ns	
Clock low time	tLVCL	-	10.71	-	ns	
PLL wake-up time	tLVPLL	-	-	1	ms	
Input skew marign	tLVSKM	400	-	-	ps	f=85MHz

Table 5.1 timing parameter







SW: Setup and Hold time

Figure 5.1 Input signal data timing

5.2 Power On/Off Sequence

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD 3.0V to signal starting	Tp1	0	-	30	ms	
Signal starting to backlight on	Tp2	0	-	-	ms	
Signal off to VDD 3.0V	Tp3	0	-	30	ms	
Backlight off to signal off	Tp4	0	-	-	ms	

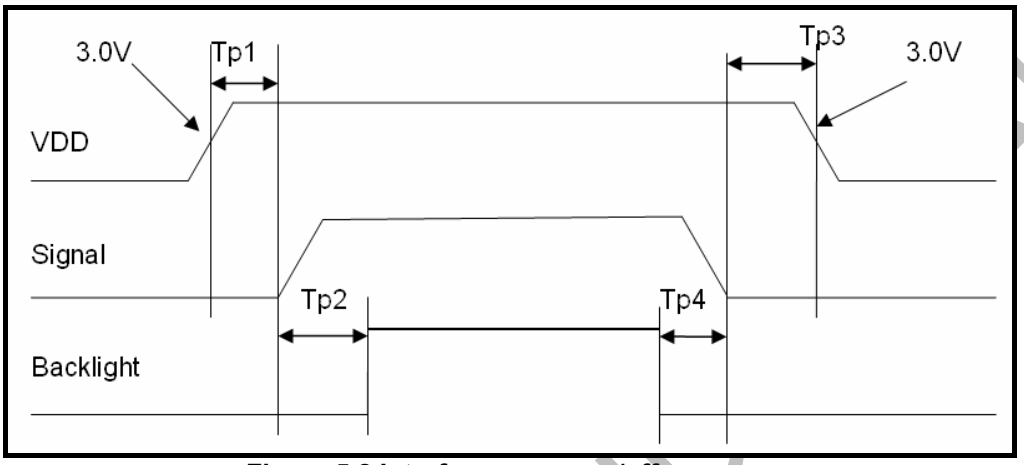


Figure 5.2 Interface power on/off sequenc

6 Optical Characteristics

6.1 Optical Specification

Ta=25℃

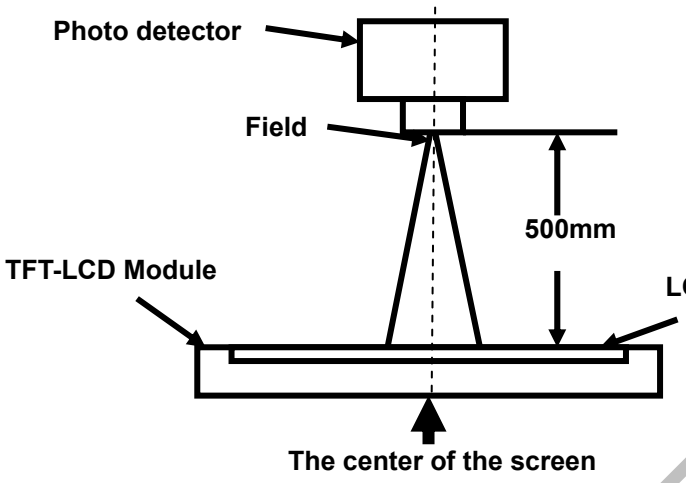
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	50	60	-	Degree	Note 2
		θB		60	70	-		
		θL		60	70	-		
		θR		60	70	-		
Contrast Ratio		CR	θ=0°	300	400	-	-	Note1 Note3
Response Time		T_{ON}	25℃	-	10	15	ms	Note1 Note4
		T_{OFF}		-	15	25		
Chromaticity	White	x	Backlight is on	0.261	0.311	0.361	-	Note5 Note1
		y		0.280	0.330	0.380		
	Red	x		0.550	0.600	0.650		
		y		0.297	0.347	0.397		
	Green	x		0.250	0.300	0.350		
		y		0.517	0.567	0.617		
	Blue	x		0.097	0.147	0.197		
		y		0.065	0.115	0.165		
Uniformity		U	-	70	80	-	%	Note1 Note6
NTSC		-	-	-	50	-	%	Note 5
Luminance		L		185	230	-	cd/m^2	Note1 Note7

Test Conditions:

1. The ambient temperature is 25±2℃.humidity is 65±7%
2. The test systems refer to Note 1 and Note 2.
3. Testing invertor: KODA/KE3085080

Note 1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 20 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.



Item	Photo detector	Field
Contrast Ratio	SR-3A	1°
Luminance		
Chromaticity		
Lum Uniformity		
Response Time	BM-7A	2°

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

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80)。

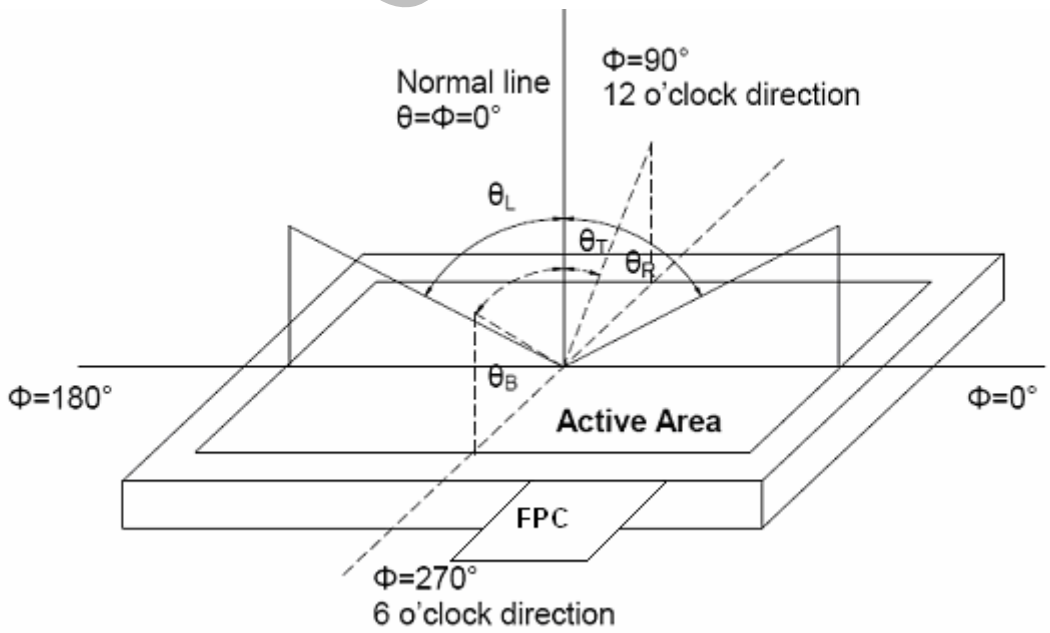


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

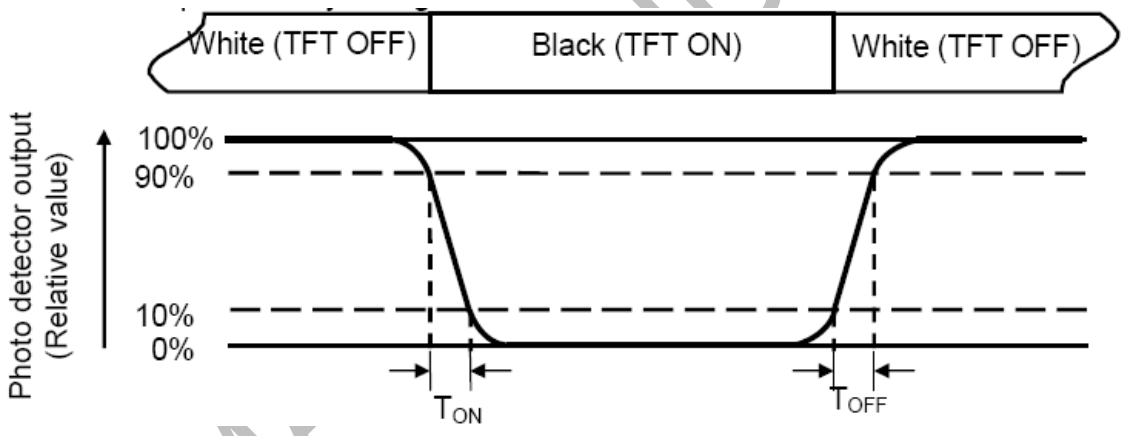
“White state “:The state is that the LCD should driven by Vwhite.

“Black state”: The state is that the LCD should driven by Vblack.

Vwhite: To be determined Vblack: 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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) 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.

Luminance Uniformity(U) = Lmin/ Lmax

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

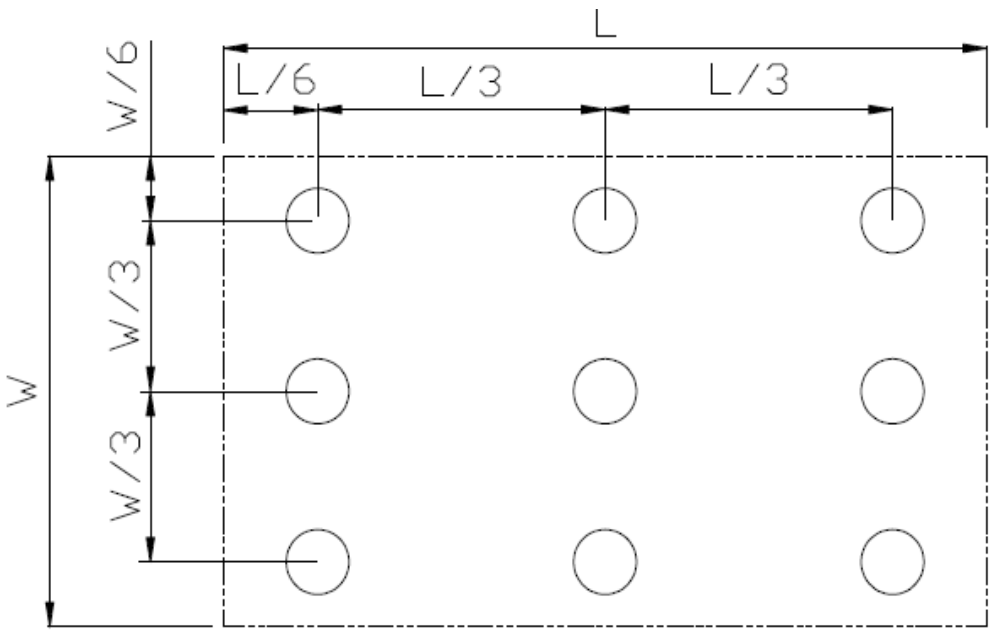


Fig. 2 Definition of uniformity

Lmax: The measured maximum luminance of all measurement position.

Lmin: The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.

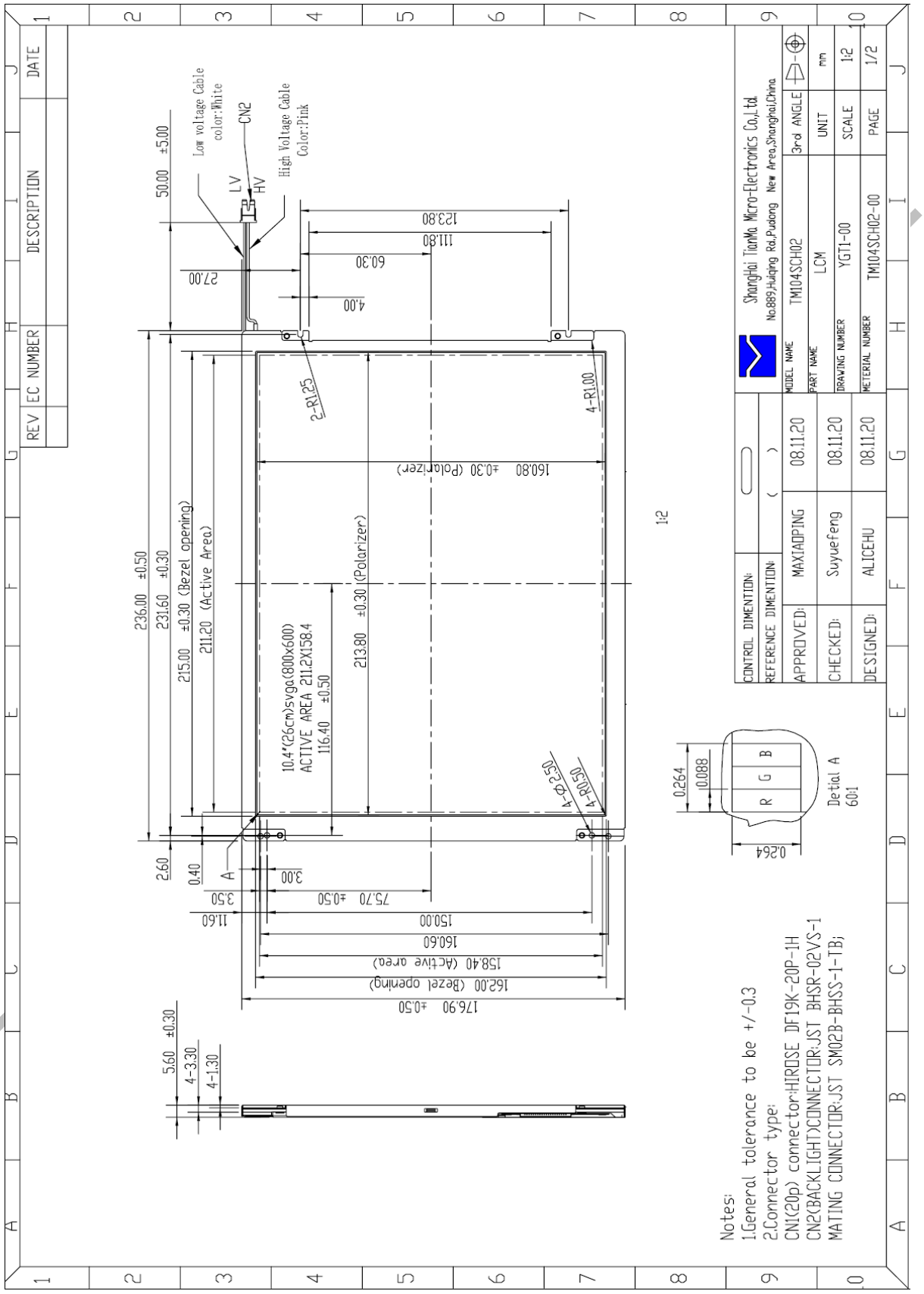
7 Environmental / Reliability Test

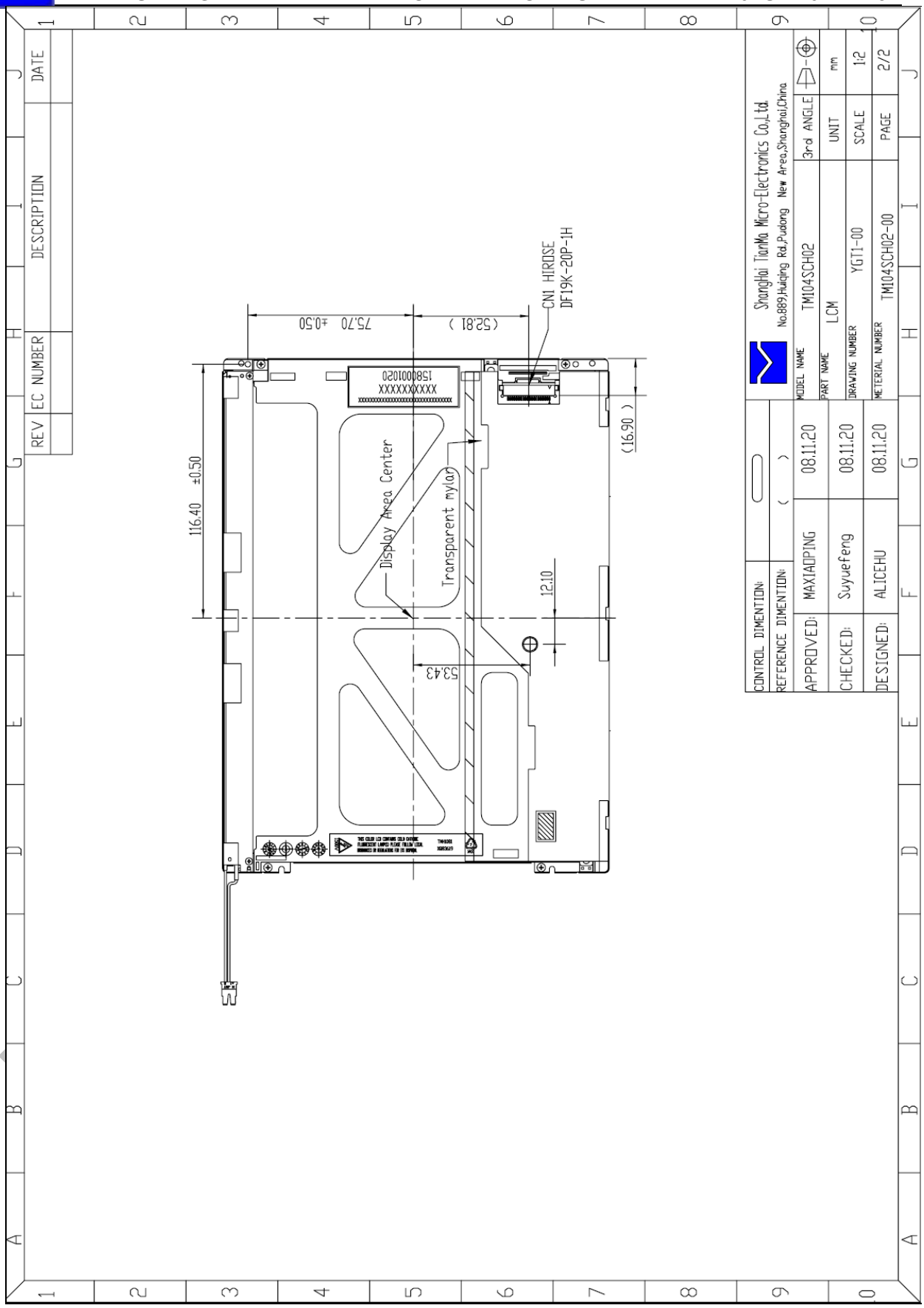
No	Test Item	Condition	Remark
1	High Temperature Operation	Ts=+70℃, 240hrs	Note1 IEC60068-2-1,GB2423.2
2	Low Temperature Operation	Ta=-20℃, 240hrs	IEC60068-2-1 GB2423.1
3	High Temperature Storage (non-operation)	Ta=+80℃, 240hrs	IEC60068-2-1 GB2423.2
4	Low Temperature Storage (non-operation)	Ta=-30℃, 240hrs	IEC60068-2-1 GB2423.1
5	High Temperature & High Humidity Operation	Ta = +60℃, 90% RH max,240 hours	Note2 IEC60068-2-78 GB/T2423.3
6	Thermal Shock (non-operation)	-20℃ 30 min~+70℃ 30 min, Change time:5min, 100 Cycles	Start with cold temperature, end with high temperature IEC60068-2-14,GB2423.22
7	Electro Static Discharge (operation)	C=150pF,R=330Ω, Air:±15Kv, Contact:±8Kv, 10times/terminal	IEC61000-4-2 GB/T17626.2
8	Vibration (non-operation)	Frequency range:10～55Hz, Stroke:1.5mm Sweep:10Hz～55Hz～10Hz 2hours for each direction of X.y.z (6 hours for total)	IEC60068-2-6 GB/T2423.10
9	Shock (non-operation)	80G 6ms, ±X,±Y,±Z 3 times for each direction	IEC60068-2-27 GB/T2423.5
10	Package Drop Test	Height:80 cm,1 corner, 3 edges, 6 surfaces	IEC60068-2-32 GB/2423.8
11	Package Vibration Test	Random Vibration: 0.015GxG/Hz for 5-200Hz, -6dB/Octave from 200-500Hz 2 hours for each direction of X,Y,Z (6 hours for total)	IEC60068-2-34 GB/T2423.11

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

Note2: Ta is the ambient temperature of sample.

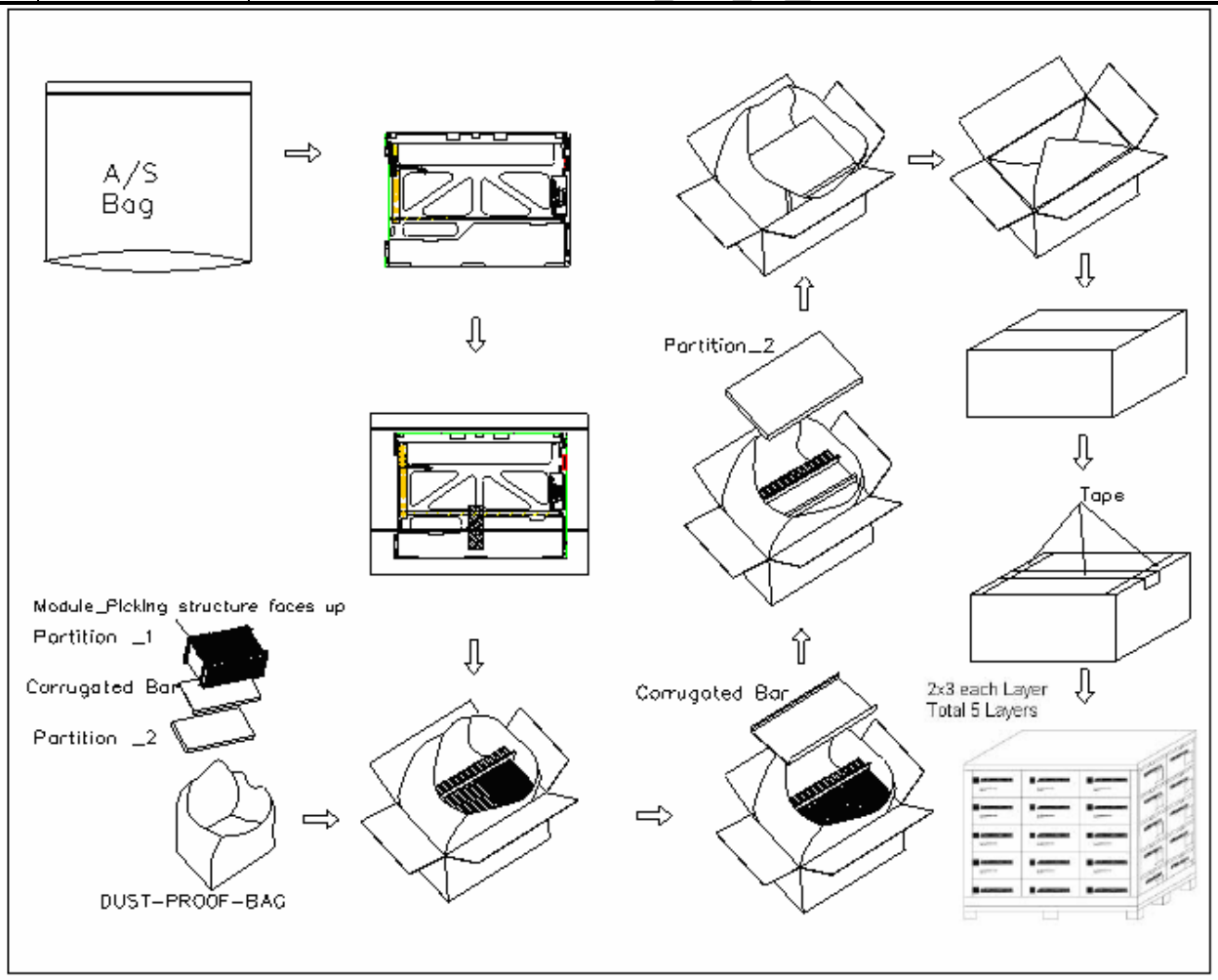
8 Mechanical Drawing





9 Packing Drawing

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	TM104SCH02	236.00x176.90x5.60	0.29	25	
2	Partition_1	CORRUGATED PAPER	513x333x217	1.96	1	
3	Anti-static Bag	PE	247x256x0.05	0.04	25	
4	DUST-PROOF BAG	PE	700×530	0.06	1	
5	Partition_1	CORRUGATED PAPER	505x332x4.0	0.1	2	
6	CORRUGATED	CORRUGATED PAPER	513x248	0.09	2	
7	Carton	CORRUGATED PAPER	530x350x250	1.12	1	
8	Total weight(Kg)	11.8				



10 Precautions For Use of LCD Modules

10.1 Handling Precautions

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

10.1.2 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.

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

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

10.1.5 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

10.1.6 Do not attempt to disassemble the LCD Module.

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

10.1.8 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.

10.2 Storage Precautions

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

10.2.2 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%

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

10.3 Transportation Precautions

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