



深圳显昶光电科技有限公司
Shenzhen Xianyang Optoelectronic Technology Co., Ltd

PRODUCTION SPECIFICATION OF LCD MODULE

MODULE NO: XY097XGH02-H1368A

Customer Name:			
Customer Part Number:			
Approved By:		Date:	

Prepared By	Checked By	Approved By

Table of Contents

Revision History	3
1 General Specifications	4
2 Pin Assignment	5
3 Absolute Maximum Ratings	7
4 Electrical Characteristics	7
5 INTERFACE TIMING	10
5.1 System Bus Read/Write Characteristics.	10
5.2 Power ON/OFF Timing	11
6 Optical Characteristics	12
7 Environmental / Reliability Test	16
8 Mechanical Drawing	17
9 Precautions For Use of LCD Modules	18

Revision History

Rev	Issued Date	Description	Page	Editor
1.0	Jul 17.2019	First release	All	

1 General Specifications

Feature		Specifications
Display Spec.	LCD type	9.7 inch
	Resolution (H*V)	1024(RGB)×768
	Technology Type	a-Si TFT
	Pixel Configuration	R.G.B. Vertical Stripe
	Display Mode	Normally white
	Surface Treatment	Glare
	Viewing Direction	All
	Gray Scale Inversion Direction	No
Mechanical Characteristics	OutlineDimensions (W x H x T) (mm)	210.21*164.25*2.8
	Active Area(mm)	196.61*147.46
	With /Without Touch screen	Without
	Match Connector Type	50PIN 0.5PITCH
	Backlight Type	LED
	Weight (g)	TBD
Electrical Characteristics	Interface	RGB
	Number of color	262k
	Driver IC	HX8282A HX8695

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

2 Pin Assignment

NO.	PIN NAME	Description
1	LED-A1	Power voltage for LED backlight Anode
2	LED-A2	Power voltage for LED backlight Anode
3	LED-K1	Power voltage for LED backlight Cathode
4	LED-K1	Power voltage for LED backlight Cathode
5	GND	Power ground
6	VCOM	VCOM voltage
7	DVDD	Power for Digital Circuit
8	MODE	DE or HV mode control.H:DE mode.L:HSD/VSD
9	DE	Data enable
10	VS	Vsync signal input
11	HS	Hsync signal input
12	B5	BLUE Data Signal(MSB)
13	B4	BLUE Data Signal
14	B3	BLUE Data Signal
15	B2	BLUE Data Signal
16	B1	BLUE Data Signal
17	B0	BLUE Data Signal(LSB)
18	NC	NC
19	NC	NC
20	G5	GREEN Data Signal(MSB)
21	G4	GREEN Data Signal
22	G3	GREEN Data Signal
23	G2	GREEN Data Signal
24	G1	GREEN Data Signal
25	G0	GREEN Data Signal(LSB)
26	NC	NC
27	NC	NC
28	R5	RED Data Signal(MSB)
29	R4	RED Data Signal
30	R3	RED Data Signal
31	R2	RED Data Signal
32	R1	RED Data Signal
33	R0	RED Data Signal(LSB)
34	NC	NC
35	NC	NC
36	GND	Power ground
37	DCLK	DOT CLOCK
38	GND	Power ground
39	L/R	Select left or right scanning direction.
40	U/D	Select up or down scanning direction.

41	VGH	Gate ON Voltage
42	VGL	Gate OFF Voltage
43	AVDD	Power voltage for Analog circuit.
44	RESET	Global reset pin
45	NC	No connection
46	VCOM	VCOM voltage
47	NC	NC
48	GND	Power ground
49	NC	No connection
50	NC	No connection

【Note1】 SHLR : left or right setting
UPDN : up or down setting

SHLR	UPDN	Data shifting
DVDD	GND	Left→Right , Up→Down(default)
GND	GND	Right→Left , Up→Down
DVDD	DVDD	Left→Right , Down→Up
GND	DVDD	Right→Left , Down→Up

3 Absolute Maximum Ratings

GND=0V, Ta= 25°C

Item	Symbol	Value	Unit
Power supply voltage for logic	V _{DD}	0.3~3.6	V
Input voltage	V _{in}	V _{DD} +0.3	V
Operating temperature	T _{opr}	-20 to 70	°C
Storage temperature	T _{stg}	-30 to 80	°C

Note: Note1: Absolute maximum rating is the limit value beyond which the IC maybe broken.

They do not assure operations.

Note2: Background color changes slightly depending on ambient temperature. This Phenomenon is reversible.

Ta ≤ 70°C: 75%RH max

Ta > 70°C: absolute humidity must be lower than the humidity of 75%RH at 70°C

Note3: Ta at -30°C will be <48hrs, at 80 °C will be <120hrs

4 Electrical Characteristics

4.1 Driving TFT LCD Panel

Item	Symbol	Min	Type	Max	Unit	Test condition
Power voltage	DVDD	3.0	3.3	3.6	V	-
	AVDD	8.63	8.9	9.16	V	
	VGH	18	19	20	V	
	VGL	-11	-10	-9	V	
Input signal voltage	VCOM	2.44	3.44	4.44	V	
Input logic high voltage	V _{IH}	0.7DVDD	-	DVDD	V	
Input logic low voltage	V _{IL}	0		0.3DVDD	V	
Current for Driver	IGH	-	0.2	30	mA	VGH=16.0V
	IGL	-	0.2	30	mA	VGL=7.0V
	IDVDD	-	4.0	30	mA	DVDD=3.3V
	IAVDD	-	20	50	mA	AVDD=10.4V

Note1: Be sure to apply DVDD and VGL to the LCD first, and then apply VGH.

Note2: DVDD setting should match the signals output voltage of customer's system board.

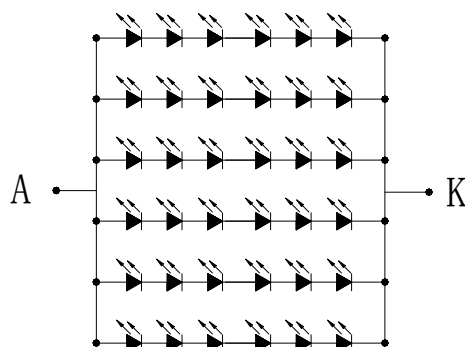
Note3: DCLK, HS, VS, RESET, U/D, L/R, DE, R0-R7, G0-R7, B0-B7, MODE, DITHB.

4.2 Driving Backlight

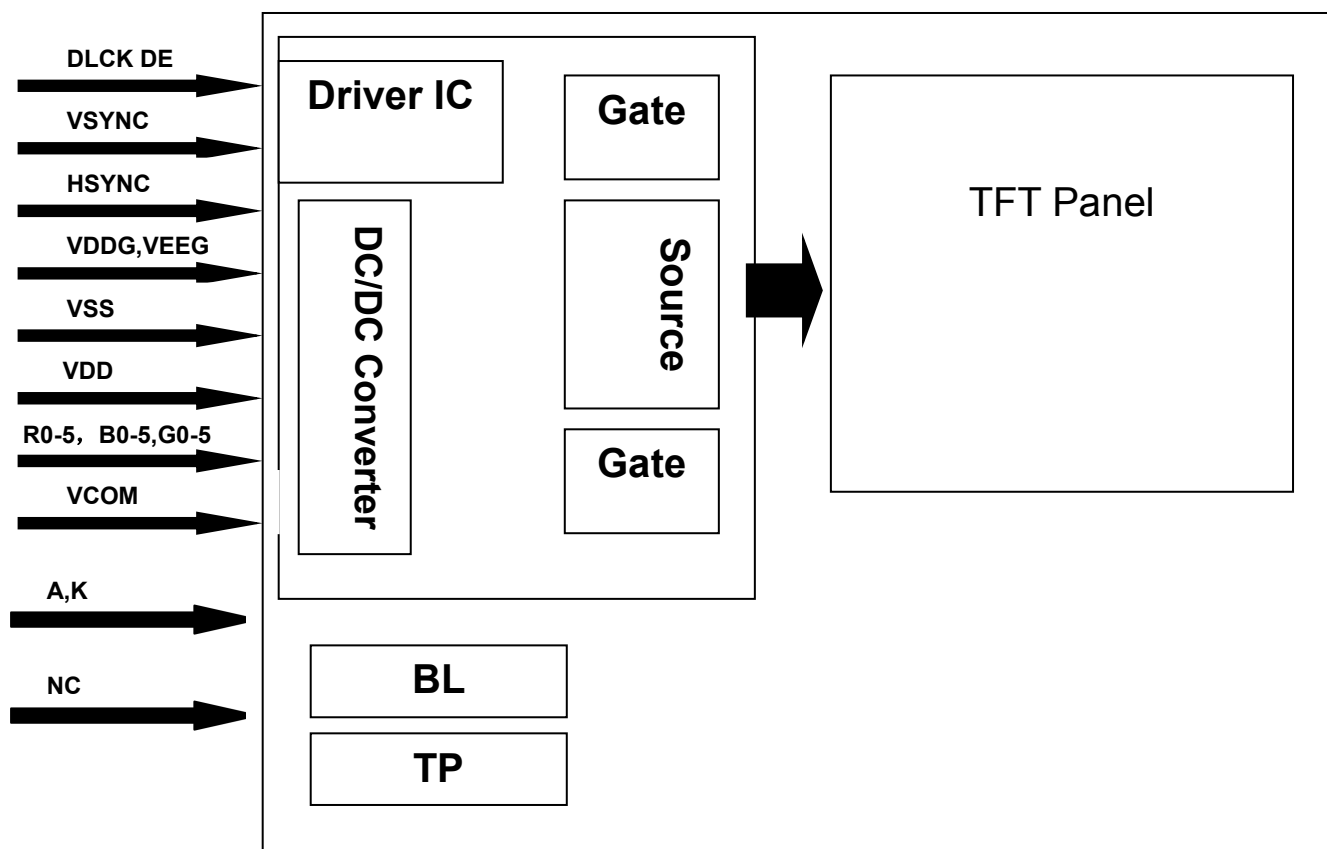
Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Current	I _F	--	120	130	mA	
Forward Voltage	V _F	-	19.2	-	V	
Connection mode	8S2P	--	6S6P	--		
LED number	/		36		pcs	
Life time			20000		H	

Note1: Optical performance should be evaluated at Ta=25℃ only .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.



4.3 Block Diagram



5 INTERFACE TIMING

5.1 System Bus Read/Write Characteristics.

10.2.1 TTL mode data input format

Vertical timing

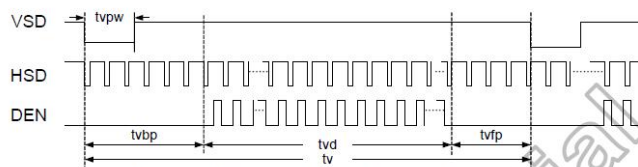


Figure 10.2: Vertical input timing diagram

Horizontal timing

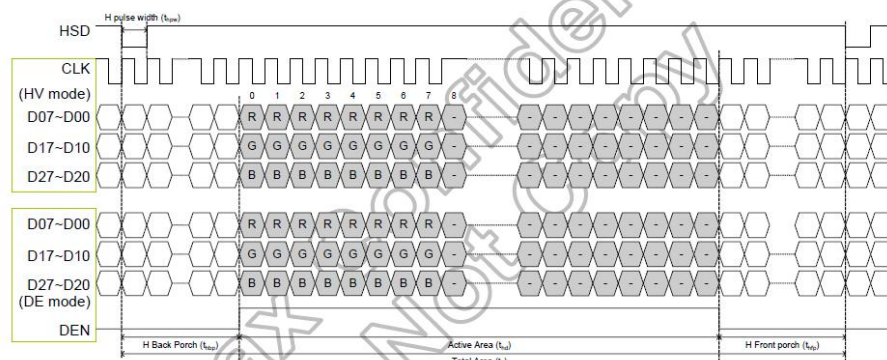


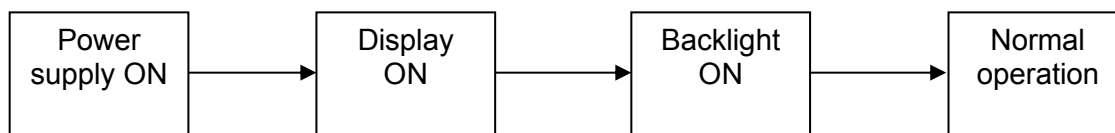
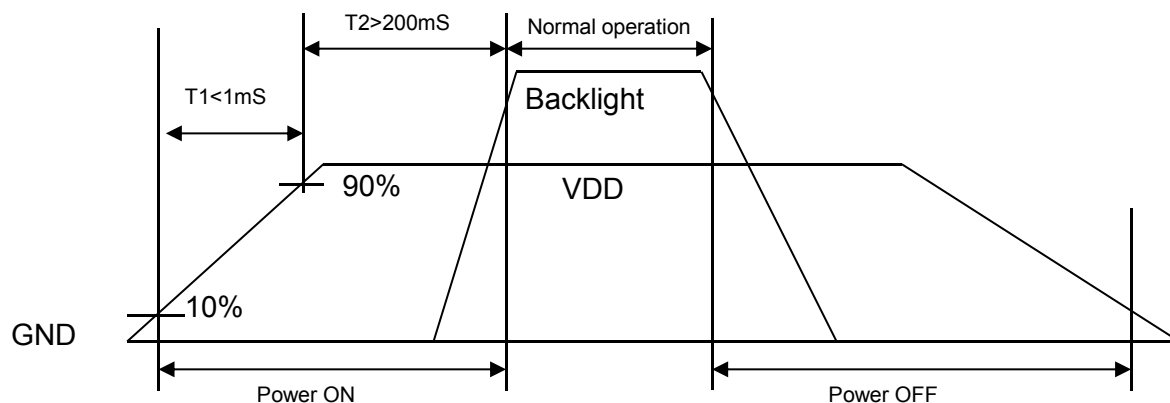
Figure 10.3: Horizontal input timing diagram

● DE mode

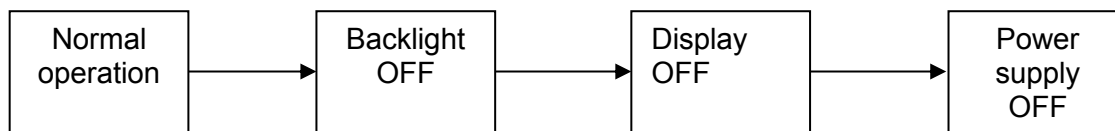
Parameter	Symbol	Spec.			Unit
		Min.	Typ.	Max.	
DCLK Frequency	fclk	52	65	71	MHz
Horizontal Display Area	thd		1024		DCLK
HSD Period	th	1114	1344	1400	DCLK
HSD Blanking	thb+ thfp	90	320	376	DCLK
Vertical Display Area	tvd		768		T _H
VSD Period	tv	778	806	845	T _H
VSD Blanking	tvbp+ tvfp	10	38	77	T _H

Table 10.7: DE mode (1024x768)

5.2 Power ON/OFF Timing



Power ON sequence



Power OFF sequence

6 Optical Characteristics

Ta=25℃

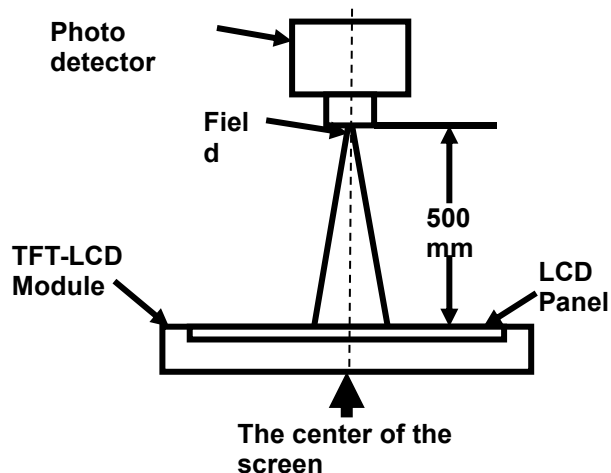
Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	$CR \geq 10$	-	60	-	Degree	Note 2
	θB		-	55	-		
	θL		-	60	-		
	θR		-	60	-		
Contrast Ratio	CR	$\theta=0^\circ$	400	500	-	-	Note1 Note3
Response Time	T_{ON}	25℃	-	30	40	ms	Note1 Note4
	T_{OFF}						
Uniformity	U	-	70	80	-	%	Note1 Note6
NTSC	-	-	-	70	-	%	Note 5
Luminance	L		200	250	-	cd/m ²	Note1 Note7

Test Conditions:

1. $V_F=19.2V$, $I_F=120mA$, 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.



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).

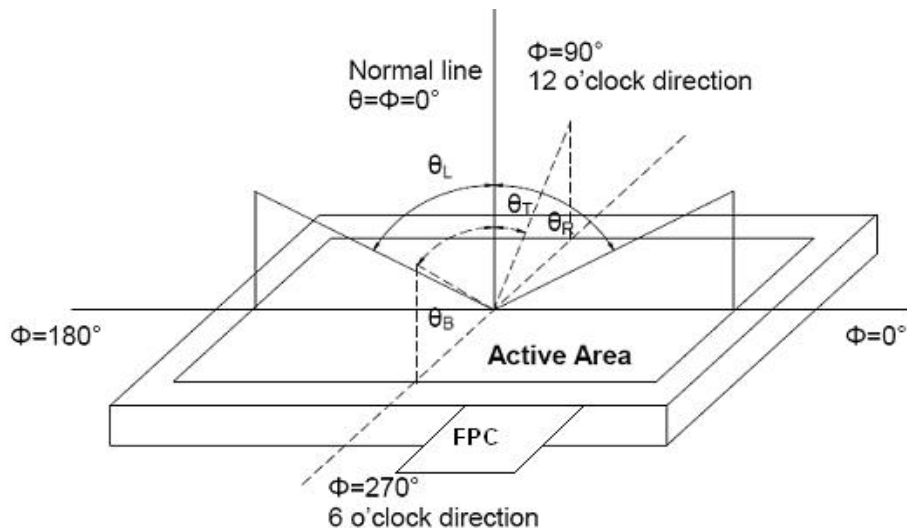


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

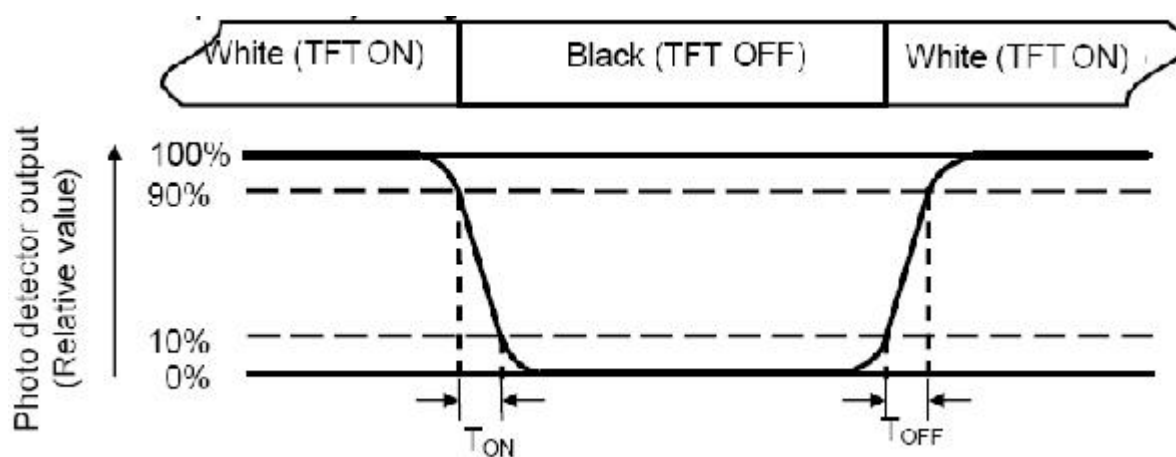
"White state ":The state is that the LCD should be driven by V_{white}.

"Black state": The state is that the LCD should be driven 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.

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

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

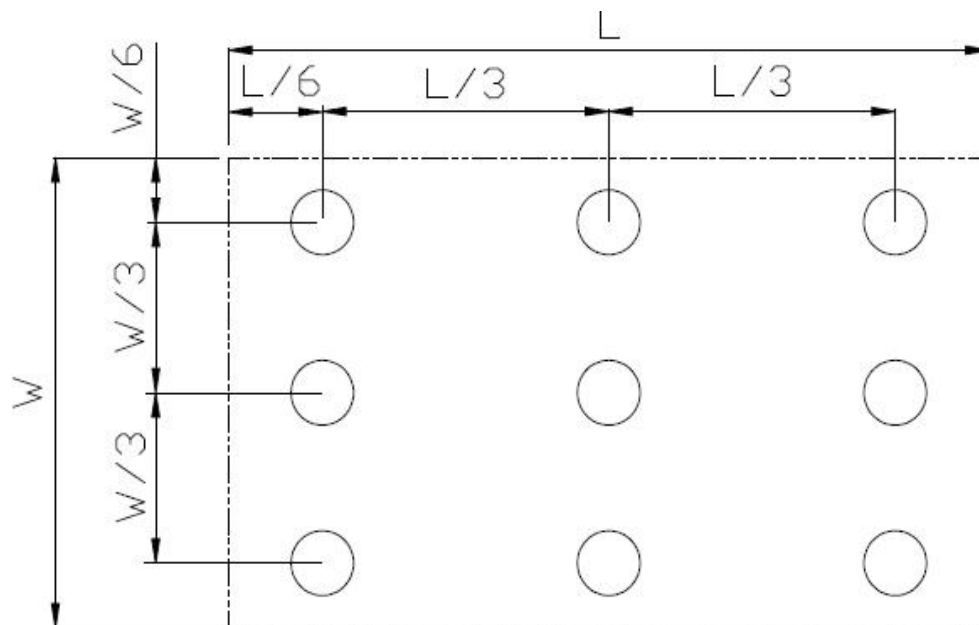


Fig. 2 Definition of uniformity

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

Item	Condition	Time (hrs)	Assessment
High temp. Storage	80°C	120	No abnormalities in functions and appearance
High temp. Operating	70°C	120	
Low temp. Storage	-30°C	120	
Low temp. Operating	-20°C	120	
Humidity	40°C/ 90%RH	120	
Thermal Shock(Non-operation)	-20°C ← 25°C → 70°C (0.5 hour ← 5 min → 0.5 hour)	10cycles	

Remark:

- 1.The test samples should be applied to only one test item.
- 2.Sample size for each test item is 1~10pcs.
- 3.In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.

Rev. 1.0

9 Precautions For Use of LCD Modules

9.1 Handling Precautions

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

9.1.1.2 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.

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

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

9.1.1.5 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

9.1.1.6 Do not attempt to disassemble the LCD Module.

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

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

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

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

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

9.1.1.12 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.

9.1.1.13 Storage precautions

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

9.1.1.15 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:

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

9.2 Transportation Precautions

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