InterElcom

PRODUCT SPECIFICATIONS

Module No.:   IE-TFT-1012880-CTP-A   Date : 2016-06-18

2. Revision Record

| Date	Rev.No.	Page	Revision Items	Prepared
2016-06-18	**V0**		**The first release**	**ZHP**
2016-08-13	**VI**		**Add timing code**	**ZHP**
2016-8-15	**V2**		**Add current consumption**	**ZHP**

3. General Specifications

IE-TFT-1012880-CTP-A is a TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light unit. The 10.1″ display area contains 1280X800 pixels and can display up to 16.7M colors. This product accords with RoHS

Item	Contents	Unit	Note
LCD Type	TFT IPS	-	
Display color	16.7M		1
Viewing Direction	Free view	O'Clock	
Operating temperature	0~+50	℃	
Storage temperature	-20~+60	℃	
Module size	Refer to outline drawing	mm	2
Active Area(W×H)	216.96X135.6	mm	
Number of Dots	1280×800	dots	
Controller for LCD	--	-	
Driver for CTP	GT928		
Power Supply Voltage	2.5	V	
Outline Dimensions	Refer to outline drawing	-	
Backlight	3X14-LEDs (white)	pcs	
Weight	---	g	
Interface	LVDS	-	

4. Outline Drawing

NOTES:
1. DISPLAY TYPE: 10.1"TFT, TRANSMISSIVE
2. VIEWING DIRECTION : U/L/D/R 80/80/80/80
3. CTP Driver IC :GT928
4. THE NUMBER OF CHANNELS:N/A
5. Top : -0° C ~ 50° C, Tst : -20° C ~ 60° C
6. GENERAL TOLERANCE: ±0.2
7. LCM Luminance:LED/350cd/m² (Typical)

PIN FUCTION	
PIN	SYMBOL
1	VCOM
2	VDD
3	VDD
4	NC
5	NC
6	NC
7	GND
8	Rxin0-
9	Rxin0+
10	GND
11	Rxin1-
12	Rxin1+
13	GND
14	Rxin2-
15	Rxin2+
16	GND
17	RxCLK-
18	RxCLK+
19	GND
20	Rxin3-
21	Rxin3+
22	GND
23	NC
24	NC
25	GND
26	NC
27	LED_PWM
28	NC
29	AVDD
30	GND
31	LED-
32	LED-
33	NC
34	NC
35	VGL
36	NC
37	CABC_EN
38	VGH
39	LED+
40	LED+

Pin	Name
1-2	GND
3-4	VDD(3.3V)
5	SCL(I.8V)
6	SDA(1.8V)
7	RESET(I.8V)
8	INT(1.8V)
9-10	GND

DETAIL A (4:1)

10.1"TFT 1280(RGB)X800
80/80/80/80

UNIT:mm		
DECRIPION	TFT COG MODULE	
PART NO.	IE-TFT-1012880-CTP-A	
DRAWING NO.	V0	

Drown By | Checked By | Approved By
2016.05.06

VER. | REVISED DESCRIPTION | DATE | NAME

5. Absolute Maximum Ratings(Ta=25℃)

5.1 Electrical Absolute Maximum Ratings.(Vss=0V ,Ta=25℃)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V_{DD}	-0.3	3.9	V	1，2
	AV_{DD}	6.5	13.5	V	
	V_{GH}	-0.3	42.0	V	
	V_{GL}	-19	0.3	V	
	V_{GH}-V_{GL}	-	40.0	V	

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged.

   Using the module within the following electrical characteristic conditions are also exceeded, the

   module will malfunction and cause poor reliability.

2. V_{CC} >V_{SS} must be maintained.

5.2 Typical operation conditions

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Power voltage	VDD	2.3	2.5	2.7	V	Note 2
	AVDD	8	8.2	8.4	V	
	VGH	21.7	22	22.3	V	
	VGL	-7.3	-7	-6.7	V	
Input signal voltage	VCOM	3.0	3.3	3.6	V	
Input logic high voltage	VIH	0.8 DVDD	-	DVDD	V	Note 3
Input logic low voltage	VIL	0	-	0.2DVDD	V	

Notes:

Note 1: Be sure to apply VDD and VGL to the LCD first, and then apply VGH.

Note 2: VDD setting should match the signals output voltage (refer to Note 3) of customer   's

system board.

5.3 Current consumption

Item	Symbol	Condition	Min	Typical	Max	Unit
Gate on current	I_{VGH}	VGH=22V	-	4	-	mA
Gate off current	I_{VGL}	VGL=-7.5V	-	4	-	
Digital current	I_{VDD}	VDD=2.5V	-	100	-	
Analog current	I_{AVDD}	AVDD=8.2V	-	45	-	
Comment current	I_{VCOM}	VCOM=3.3V	-	95	-	

5.4 Environmental Absolute Maximum Ratings.

Item	Storage		Operating		Note
	MIN.	MAX.	MIN.	MAX.	
Ambient Temperature	-20℃	60℃	0℃	50℃	1,2
Humidity	-	-	-	-	3

1. The response time will become lower when operated at low temperature.

2. Background color changes slightly depending on ambient temperature.

 The phenomenon is reversible.

3. Ta<=40℃:85%RH MAX.

 Ta>=40 ℃:Absolute humidity must be lower than the humidity of 85%RH at 40℃.

6 Electrical Specifications and Instruction Code

6.1 Electrical characteristics(Vss=0V ,Ta=25℃)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VDD	Ta=25℃	2.3	2.5	2.7	V	
Input voltage	'H'	V_{IH}	V_{DD}=3.3V	$0.8V_{DD}$	-	V_{DD}	V	
	'L'	V_{IL}	V_{DD}=3.3V	0	-	$0.2V_{DD}$	V	
Clock Frequency		f_{CLK}	-	-	71.1	73.4	MHz	
PWM Frequency		f_{pwm}	-	-	--	--	KHz	

Note:

　1: Tested in 1X 1 chessboard pattern.

6.2 LED backlight specification(VSS=0V ,Ta=25℃)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	Vf	If=20X14mA	-	9.0	-	V	
Uniformity	Δ Bp	If=20X14mA	75			%	
Luminance for LCD (W/O CTP)	Lv	If=20X14mA	-	420		Cd/m2	
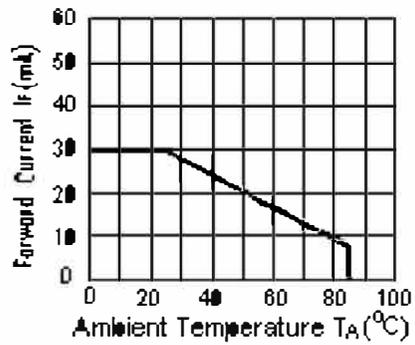
ILED VS TEMP

6.3 Interface signals （ Connector: F62240-H1210A）

Pin No.	Symbol	I/O	Function
1	VCOM	P	COMMON voltage
2~3	VDD	P	Power supply.
4~6	NC		No connection.
7	GND	P	Ground.
8	Rxin0-	I	-LVDS differential data input
9	Rxin0+	I	+LVDS differential data input
10	GND	P	Ground.
11	Rxin1-	I	-LVDS differential data input
12	Rxin1+	I	+LVDS differential data input
13	GND	P	Ground.
14	Rxin2-	I	-LVDS differential data input
15	Rxin2+	I	+LVDS differential data input
16	GND	P	Ground.
17	RxCLK-	I	-LVDS differential data input
18	RxCLK+	I	+LVDS differential data input
19	GND	P	Ground.
20	Rxin3-	I	-LVDS differential data input
21	Rxin3+	I	+LVDS differential data input
22	GND	P	Ground.
23~24	NC		No connection.
25	GND	P	Ground.
26	NC		No connection.
27	LED_PWM	I	CABC controller signal output for backlight
28	NC		No connection.
29	AVDD	P	Power for analog circuit.
30	GND	P	Ground.
31~32	LED-	P	LED cathode
33~34	NC		No connection.
35	VGL	P	Gate off voltage
36	NC		No connection.
37	CABC_EN	I	CABC enable input.
38	VGH	P	Gate on voltage
39~40	LED+	P	LED anode.

NOTE:

Pin	Enable	Disable
CABC_EN	High Voltage	Low Voltage or oper

CTP   interface

Pin No.	Symbol	I/O	Function
1-2	GND	P	Ground.
3-4	VDD(3.3V)	P	Power supply.
5	SCL(1.8V)	I	serial interface clock
6	SDA(1.8V)	I	Serial in/out signal
7	REST(1.8V)	I	Reset pin.
8	INT(1.8V)	I	Interrupt pin
9-10	GND	P	Ground.

7. Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness (With CTP)	Bp		θ=0° Φ=0°	-	350	-	Cd/m^2	1
Uniformity	$\triangle$Bp			75	-	-	%	1,2
Viewing Angle	3:00		Cr≥10	-	80	-	Deg	3
	6:00			-	80	-		
	9:00			-	80	-		
	12:00			-	80	-		
Contrast Ratio	Cr		θ=0° Φ=0°	300	500		-	4
Response Time	T$_r$			-	10	-	ms	5
	T$_f$			-	15	-	ms	
Color of CIE Coordinate	W	x	θ=0° Φ=0°		0.28		-	1,6
		y			0.33		-	
	R	x			0.51		-	
		y			0.34		-	
	G	x			0.31		-	
		y			0.56		-	
	B	x			0.15		-	
		y			0.14		-	

Note: The parameter is slightly changed by temperature, driving voltage and materiel

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white.

The brightness is the average value of 9 measured spots. Measurement equipment PR-705 (Φ8mm)

Measuring condition:
- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25℃.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

50cm

Detecter
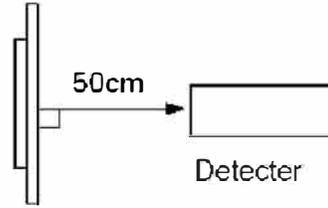
Note 2: The luminance uniformity is calculated by using following formula.

$\triangle$Bp = Bp (Min.) / Bp (Max.)×100 (%)

Bp (Max.) = Maximum brightness in 9 measured spots

Bp (Min.) = Minimum brightness in 9 measured spots.

Active area
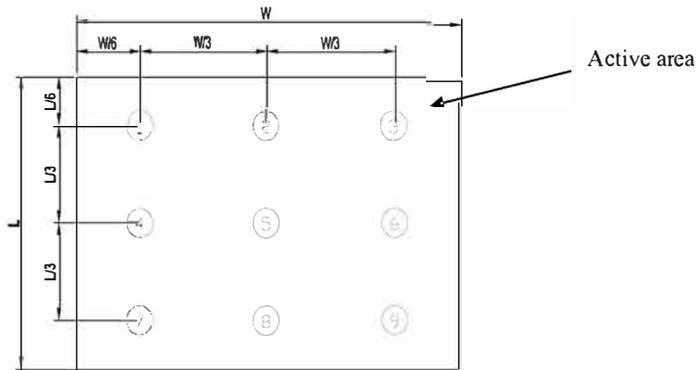
Note 3: The definition of viewing angle:
Refer to the graph below marked by θ and Φ

Up (12:00)
$\emptyset$ =90°

Θ=0° $\emptyset$ =0°

Left (9:00)
$\emptyset$ =180°

Right (3:00)
$\emptyset$ =0°

Down (6:00)
$\emptyset$ =270°
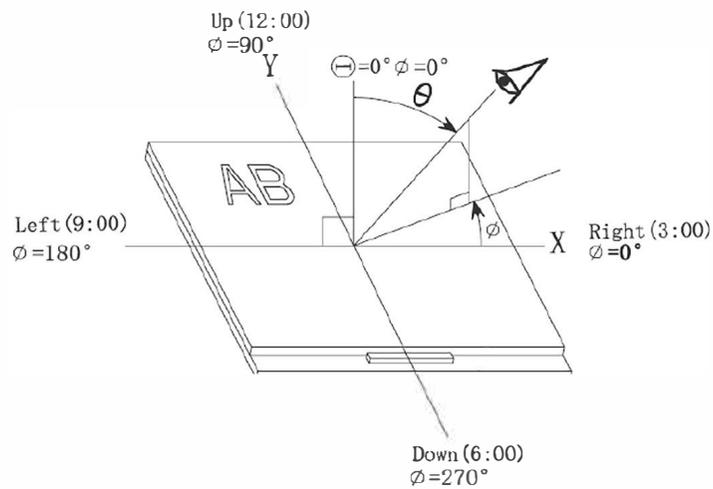
Note 4: Definition of contrast ratio.(Test LCD using DMS501)

Selected Wave

100%

Cr max

Non-selected Wave

*Conditions

Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
View angle (θ, Φ) : (0°, 0°)

Vop
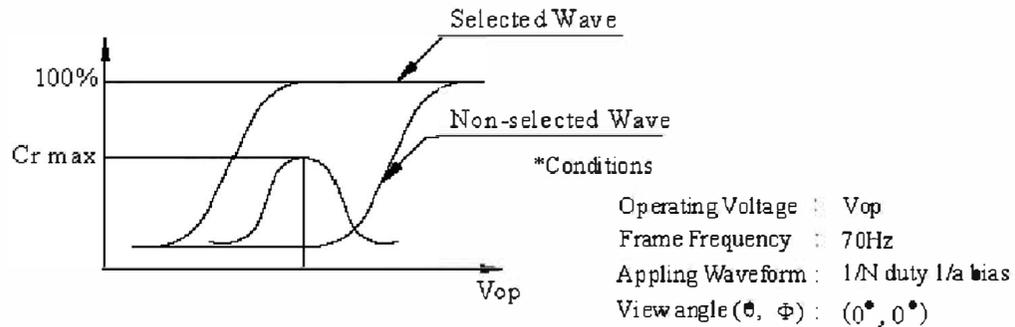
$$Contrast\ ratio(Cr) = \frac{Brightness\ of\ selected\ dots}{Brightness\ of\ non-selected\ dots}$$

Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from "black" to "white"(falling time) and from "white" to "black"(rising time), respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes.Refer to figure as below.

100%
90%

10%

T_r T_f
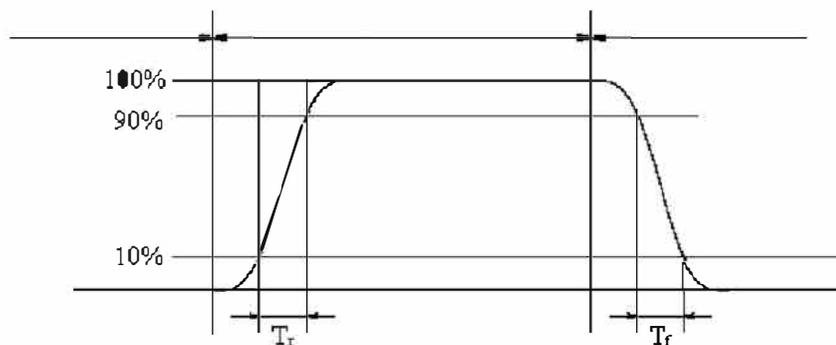
The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

1931 CIE Chromaticity Diagram
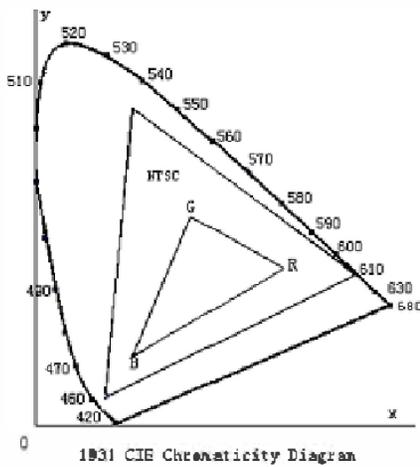
Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

Cross talk ratio(%)=| pattern A Brightness-pattern B Brightness| /pattern A Brightness*100

Pattern A   Pattern B

Measurement point(center)
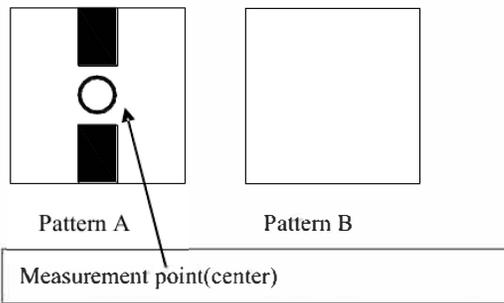
Electric volume value=3F+/-3Hex

8 LVDS Signal Timing Characteristics

8.1 Ac Electrical Characteristics

Parameter	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
LVDS Differential input high Threshold voltage	R_{xVTH}	-	-	+100	mV	$R_{xVCM}=1.2V$
LVDS Differential input low Threshold voltage	R_{xVTL}	-100	-	-	mV	
LVDS Differential input common mode voltage	R_{xVCM}	0.7	-	1.6	V	
LVDS Differential voltage	$|V_{ID}|$	100	-	600	mV	
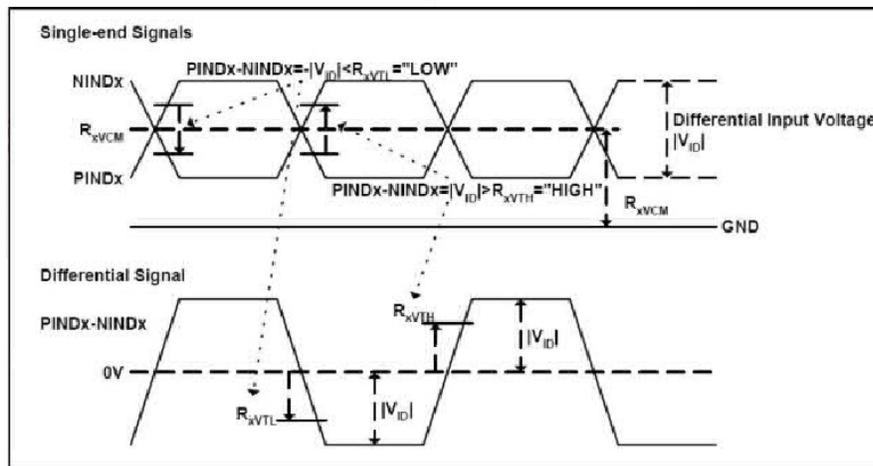
8.2 Tming Table

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Clock Frequency	1/Tc	(68.9)	71.1	(73.4)	MHz	Frame rate =60Hz
Horizontal display area	tHD		1280		Tc	
HS period time	tH	(1410)	1440	(1470)	Tc	
HS Width +Back Porch +Front Porch	tHW+ tHBP +tHFP	(60)	160	(190)	Tc	
Vertical display area	tVD		800		tH	
VS period time	tv	(815)	823	(833)	tH	
VS Width +Back Porch +Front Porch	tVW+ tVBP +tVFP	(15)	23	(33)	tH	
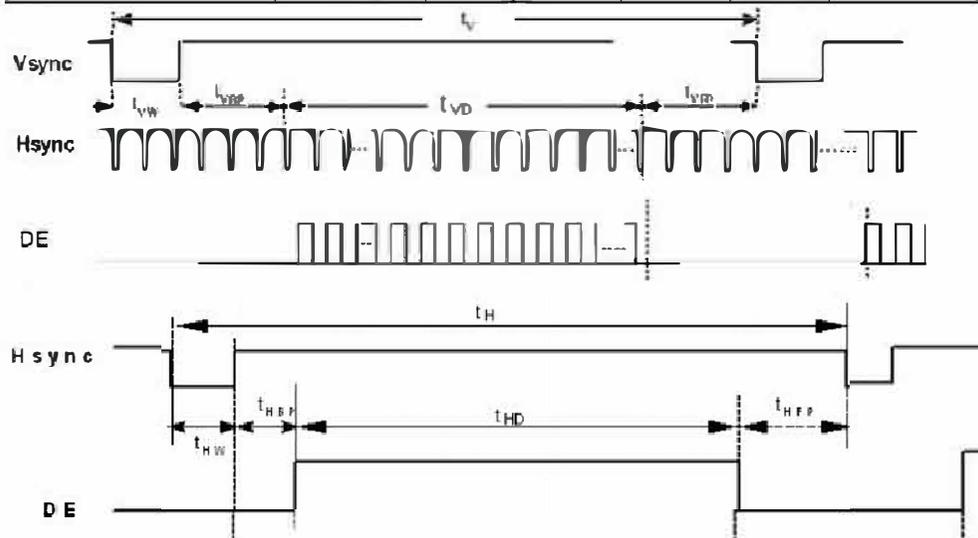
8.3 VDS Data input format
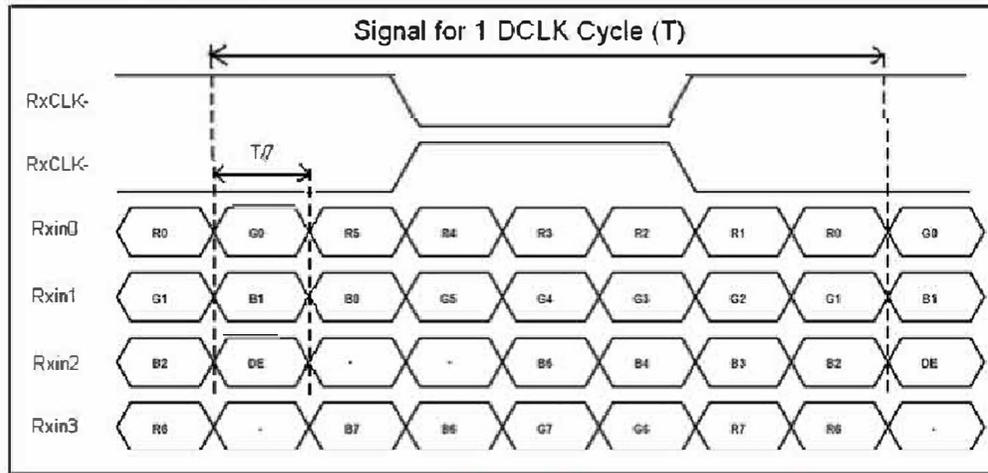
9 Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	60℃±2℃ 96H Restore 2H at 25℃ Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-20℃±2℃ 96H Restore 2H at 25℃ Power off	
3	High Temperature Operation	50℃±2℃ 96H Restore 2H at 25℃ Power on	
4	Low Temperature Operation	0℃±2℃ 96H Restore 4H at 25℃ Power on	
5	High Temperature/Humidity Operation	50℃±2℃ 90%RH 96H Power on	
6	Temperature Cycle	--20℃←-----------------℃→60 30min 5min 30min after 5 cycle, Restore 2H at 25℃ Power off	
7	Vibration Test	10Hz~150Hz, 100m/s², 120min	Not allowed cosmetic and electrical defects.
8	Shock Test	Half- sine wave,300m/s²,11ms	

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Note: Operation: Supply 2.5V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

10 Precautions for Use of LCD Modules

10.1 Handling Precautions

10.1.1 he 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.

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

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

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

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