

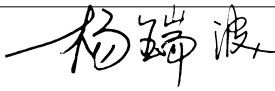
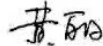
PRODUCT SPECIFICATION

CDTECH Model: **S040HWV19NN-FC10-AF**

CUSTOMER Model: **119.03.0143**

Description: **3.95 " TFT-LCD Module with CTP**

Version: **2.0**

CDTECH	PREPARED BY	CHECKED BY	APPROVED BY
SIGNATURE			
DATE	2024-11-23	2024-11-23	2024-11-23

CUSTOMER APPROVAL	SIGNATURE	DATE

Record of Revisions

Version	Revise Date	Description	Page
1.0	2024-1-26	First Release	-
	2024-4-1	1: Apply 0.5mm thickness double-sided adhesive conductive foam to the TPFPC steel sheet; 2: cancel the double-sided adhesive on TPFC near the ITO; 3: cancel the surface insulation at the double-sided adhesive on TPFPC The character model remains unchanged	21
	2024-4-13	Spray code changed to label, label color requirements transparent PET	21
2.0	2024-10-30	Adjust the length of the bending area of LCD FPC (EMI cannot be brushed in the bending area) and TPFPC bending area for softening treatment (the softening area should not be affixed to yellow gum)	21



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1. General Specifications

1.1 LCM General Information

Item	Specification	Unit
LCD Size	3.95	inch
Number of Pixels	480 (H) RGB x 480 (V)	pixels
Display Mode	Normally Black	-
Viewing Direction	Free	o' clock
Interface	MIPI	-
Display Colors	16.7M	colors
Outline Dimension	86.00 (H) x 86.00 (V) x 3.23 (D)	mm
Active Area	71.86 (H) x 70.18 (V)	mm
Pixel Pitch	0.1497 (H) x 0.1462 (V)	mm
Driver IC	ST7701S	-
Operation Temperature	-20~60	°C
Storage Temperature	-30~70	°C

1.2 Touch Panel Information

Item	Specification
Touch Structure	G+FF
Bonding Type with LCM	OCA Optical Bonding
Driver IC	FT5446IDQQ
Interface	I ² C
Touch Count Max	5 Points
Surface treatment	AF
Surface hardness	6H
I2C slave address	0x70
Origin of coordinate	Top Left Corner

Note1: Requirements on environmental protection RoHS compliant.

2. Absolute Maximum Ratings

Item	Symbol	MIN.	MAX.	Unit	Note
Analog Supply voltage	VDD	-0.3	5.0	V	Note 1
Digital supply voltage	IOVCC	-0.3	3.6	V	Note 1

Note 1: Permanent damage may occur to the LCD module if beyond this specification.

Functional operation should be restricted to the conditions described under normal operating conditions.

3. Electrical Characteristics

3.1 Recommended Operating Condition for TFT LCD

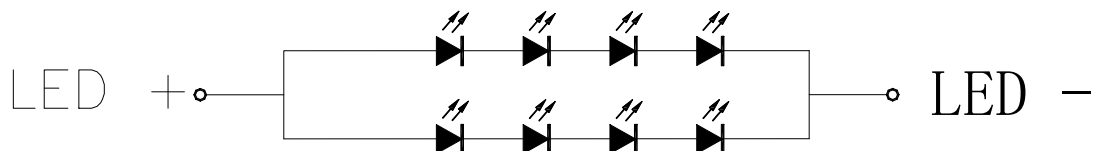
Item	Symbol	Min.	Typ.	Max.	Unit	Note
Analog Supply voltage	VDD	3.0	3.3	3.6	V	
Analog supply current	I _{VDD}	-	TBD	-	mA	VDD=3.3V
Logic supply voltage	IOVCC	1.65	1.8	3.3	V	
Logic supply current	I _{IOVCC}	-	TBD	-	mA	IOVCC=1.8V
Logic input voltage	VIH	0.7*IOVCC	-	IOVCC	V	
	VIL	GND	-	0.3*IOVCC	V	

3.2 Recommended Driving Condition for Backlight

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Driving Current	I _F	-	40	-	mA	
Driving Voltage	V _F	10.8	-	13.6	V	
Power consumption	W _{BL}	0.432	-	0.544	W	
LED Life-Time	N/A	-	30,000	-	Hours	Ta=25℃ Note 1

Note 1: LED lifetime is defined as the module brightness decay 50% of original brightness at Ta=25 degree, typical current.

Note 2:LED circuit :



3.3 Touch Panel

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Power Supply voltage	TP_VCC	-	3.3	-	V	
Analog supply current	I_{TP_VCC}	-	TBD	-	mA	TP_VCC=3.3V
Input high-level voltage	V_{IH}	$0.7 \cdot TP_VCC$	-	TP_VCC	V	
Input low -level voltage	V_{IL}	GND	-	$0.3 \cdot TP_VCC$	V	

4. Interface Pin Assignment

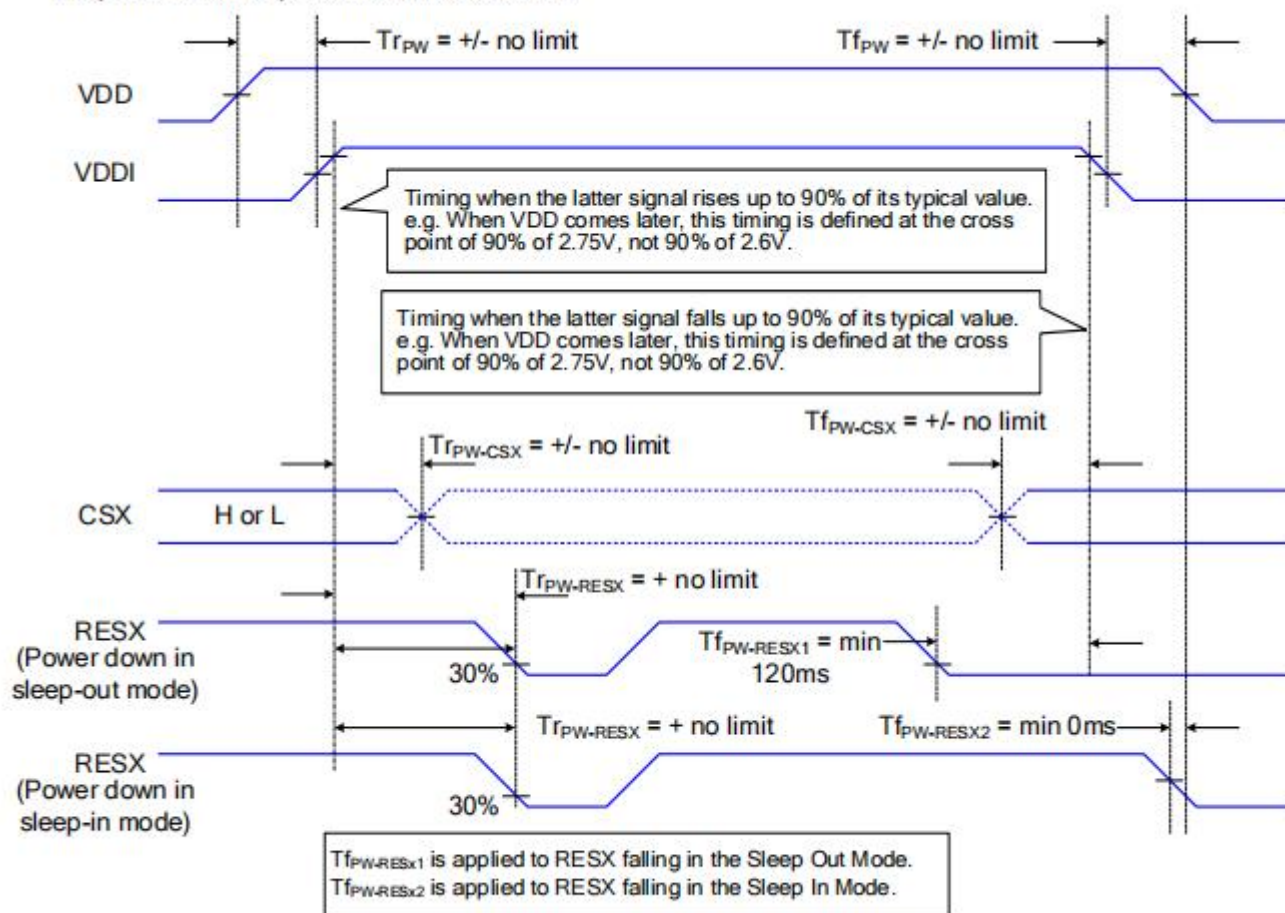
4.1 LCM Pin Assignment

No.	Symbol	Description
1	IOVCC	Power supply
2	GND	Ground
3	VCI	Power supply
4	GND	Ground
5	VCI	Power supply
6	GND	Ground
7	LEDK	Power for LED backlight (Cathode)
8	LEDA	Power for LED backlight (Anode)
9	RST	Reset signal pin
10	GND	Ground
11	D1P	MIPI Positive data signal(+)
12	D1N	MIPI Negative data signal(-)
13	GND	Ground
14	CLKP	MIPI Positive clock signal(+)
15	CLKN	MIPI Negative clock signal(-)
16	GND	Ground
17	D0P	MIPI Positive data signal(+)
18	D0N	MIPI Negative data signal(-)
19	GND	Ground
20	D2P(NC)	No connection
21	D2N(NC)	No connection
22	GND	Ground
23	D3P(NC)	No connection
24	D3N(NC)	No connection
25	GND	Ground
26	TP_RESET	Reset Pin for CTP
27	TP_SDA	I2C data input and output for CTP
28	TP_SCL	I2C clock input for CTP
29	TP_INT	Interrupt signal for CTP
30	TP_VCC	Power supply for CTP

5. Interface Characteristics

5.1 Power Sequence

The power on/off sequence is illustrated below



5.2 AC Characteristics

5.2.1 MIPI Interface Characteristics:

High Speed Mode

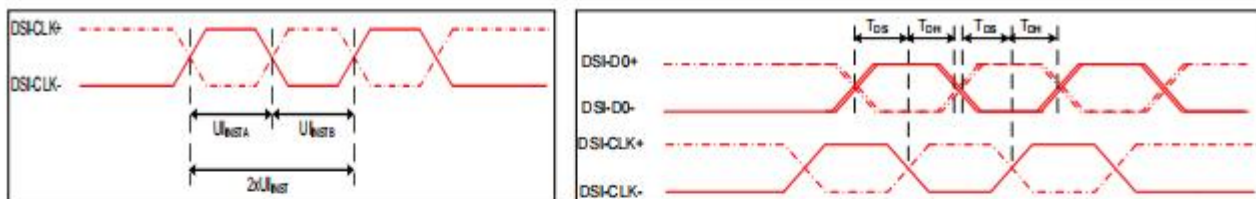


Figure 4 DSI clock channel timing

Figure 5 Rising and falling time on clock and data channel

$V_{DDI}=1.8, V_{DD}=2.8, A_{GND}=D_{GND}=0V, T_a=25^{\circ}C$

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-CLK+/-	$2xUI_{INSTA}$	Double UI instantaneous	2.5	25	ns	
DSI-CLK+/-	UI_{INSTA} UI_{INSTB}	UI instantaneous halves	1.25	12.5	ns	$UI = UI_{INSTA} = UI_{INSTB}$
DSI-Dn+/-	t_{DS}	Data to clock setup time	0.15	-	UI	
DSI-Dn+/-	t_{DH}	Data to clock hold time	0.15	-	UI	

Table 7 Mipi Interface- High Speed Mode Timing Characteristics

Low Power Mode

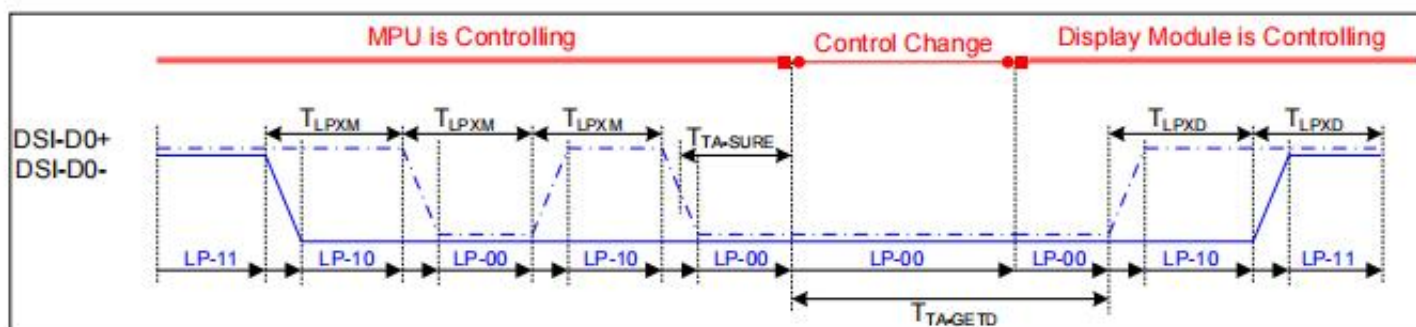


Figure 6 Bus Turnaround (BTA) from display module to MPU Timing

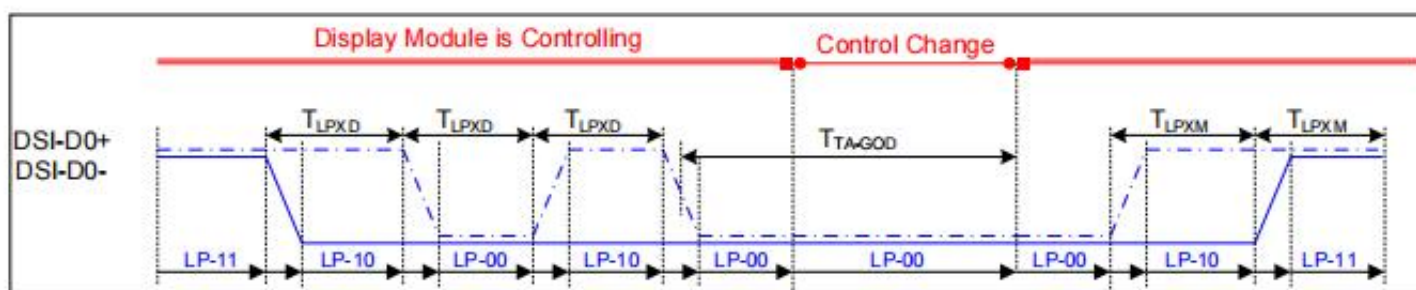


Figure 7 Bus Turnaround (BTA) from MPU to display module Timing

VDDI=1.8, VDD=2.8, AGND=DGND=0V, Ta=25 °C

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
DSI-D0+/-	TLPXM	Length of LP-00, LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Input
DSI-D0+/-	TLPXD	Length of LP-00, LP-01, LP-10 or LP-11 periods MPU→Display Module	50	75	ns	Output
DSI-D0+/-	TTA-SURED	Time-out before the MPU start driving	TLPXD	2xTLPXD	ns	Output
DSI-D0+/-	TTA-GETD	Time to drive LP-00 by display module	5xTLPXD		ns	Input
DSI-D0+/-	TTA-GOD	Time to drive LP-00 after turnaround request-MPU	4xTLPXD		ns	Output

Table 8 Mipi Interface Low Power Mode Timing Characteristics

DSI Bursts Mode

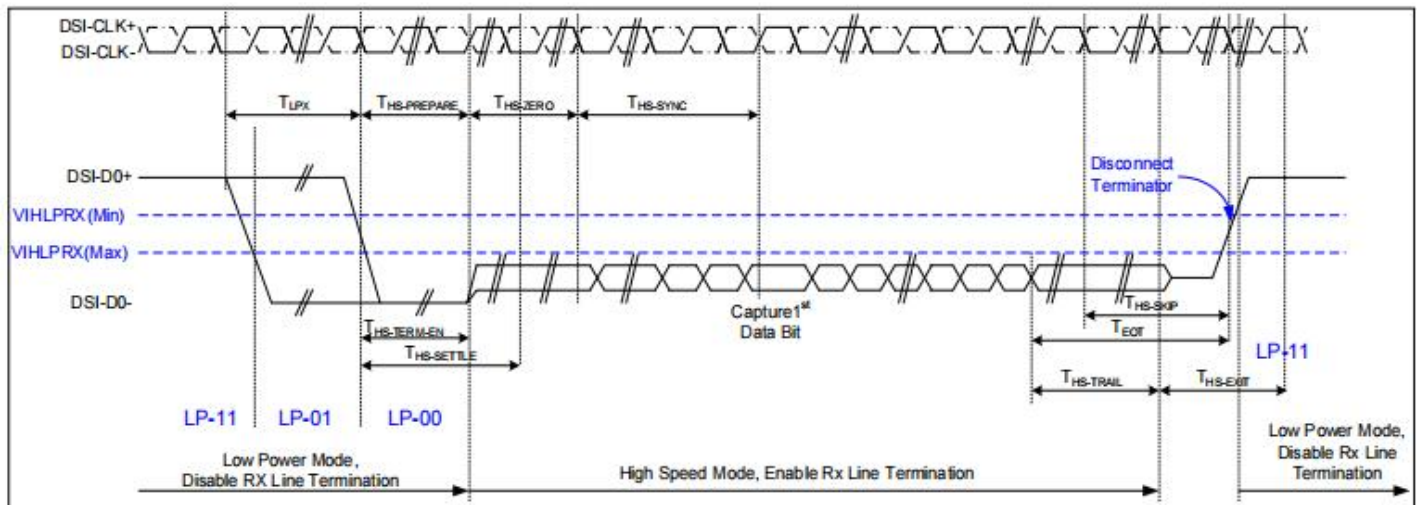


Figure 7 Data lanes-Low Power Mode to/from High Speed Mode Timing

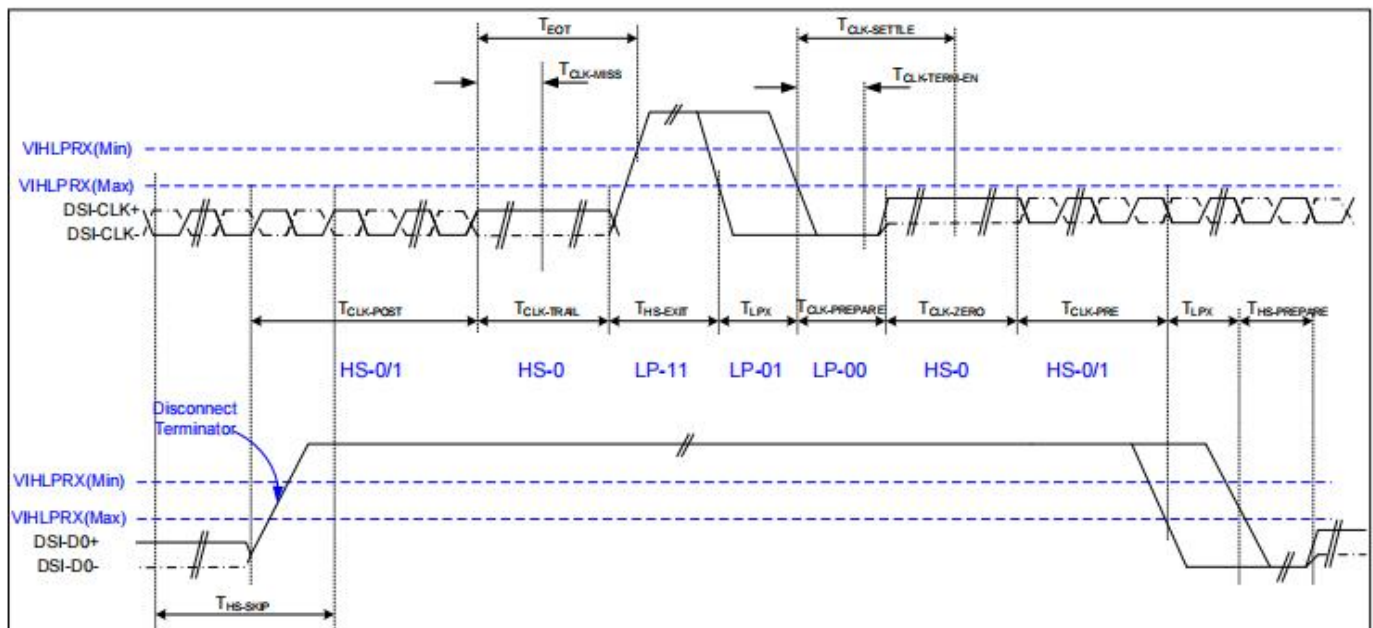


Figure 8 Clock lanes- High Speed Mode to/from Low Power Mode Timing

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
Low Power Mode to High Speed Mode Timing						
DSI-Dn+/-	TLPX	Length of any low power state period	50	-	ns	Input
DSI-Dn+/-	THS-PREPARE	Time to drive LP-00 to prepare for HS transmission	40+4 UI	85+6 UI	ns	Input
DSI-Dn+/-	THS-TERM-EN	Time to enable data receiver line termination measured from when Dn crosses VILMAX	-	35+4 UI	ns	Input
DSI-Dn+/-	THS-PREPARE + THS-ZERO	THS-PREPARE + time to drive HS-0 before the sync sequence	140+ 10UI	-	ns	Input
High Speed Mode to Low Power Mode Timing						
DSI-Dn+/-	THS-SKIP	Time-out at display module to ignore transition period of EoT	40	55+4 UI	ns	Input
DSI-Dn+/-	THS-EXIT	Time to drive LP-11 after HS burst	100	-	ns	Input
DSI-Dn+/-	THS-TRAIL	Time to drive flipped differential state after last payload data bit of a HS transmission burst	60+4 UI	-	ns	Input
High Speed Mode to/from Low Power Mode Timing						
DSI-CLK+/-	TCLK-POS	Time that the MPU shall continue sending HS clock after the last associated data lane has transition to LP mode	60+5 2UI	-	ns	Input
DSI-CLK+/-	TCLK-TRAIL	Time to drive HS differential state after last payload clock bit of a HS transmission burst	60	-	ns	Input
DSI-CLK+/-	THS-EXIT	Time to drive LP-11 after HS burst	100	-	ns	Input
DSI-CLK+/-	TCLK-PREPARE	Time to drive LP-00 to prepare for HS transmission	38	95	ns	Input
DSI-CLK+/-	TCLK-TERM-EN	Time-out at clock lan display module to enable HS transmission	-	38	ns	Input
DSI-CLK+/-	TCLK-PREPARE + TCLK-ZERO	Minimum lead HS-0 drive period before starting clock	300	-	ns	Input
DSI-CLK+/-	TCLK-PRE	Time that the HS clock shall be driven prior to any associated data lane beginning the transition from LP to HS mode	8UI	-	ns	Input
DSI-CLK+/-	TEOT	Time form start of TCLK-TRAIL period to start of LP-11 state	-	105n s+12 UI	ns	Input

Reset Timing:

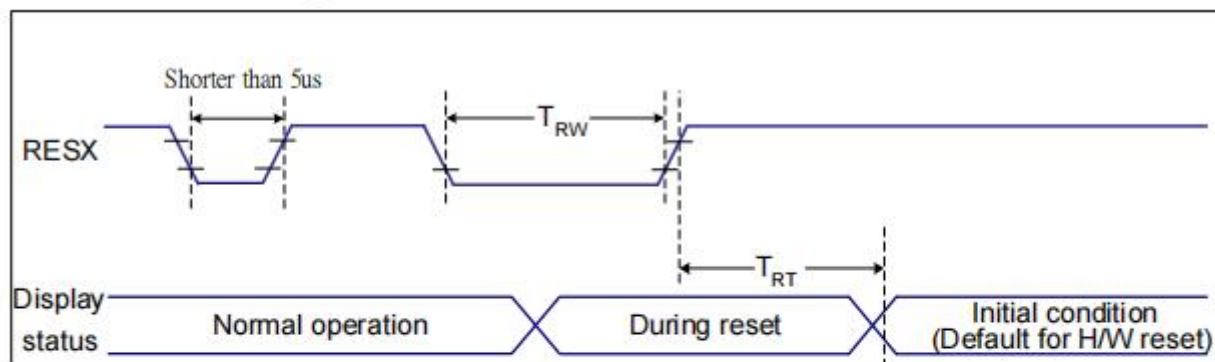


Figure 9 Reset Timing

$VDDI=1.8, VDD=2.8, AGND=DGND=0V, T_a=25\text{ }^{\circ}\text{C}$

Related Pins	Symbol	Parameter	MIN	MAX	Unit
RESX	TRW	Reset pulse duration	10	-	us
	TRT	Reset cancel	-	5 (Note 1, 5)	ms
				120 (Note 1, 6, 7)	ms

Table 9 Reset Timing

6. Optical Specifications

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing Angle (CR≥10) B/L ON	θ_T	$\Phi=90^\circ$ (12 o'clock)	70	80	-	deg	Note2
	θ_B	$\Phi=270^\circ$ (6 o'clock)	70	80	-	deg	Note2
	θ_L	$\Phi=180^\circ$ (9 o'clock)	70	80	-	deg	Note2
	θ_R	$\Phi=0^\circ$ (3 o'clock)	70	80	-	deg	Note2
Response Time	T_{ON}	Normal $\theta=\Phi=0^\circ$	-	12	17	msec	Note4
	T_{OFF}		-	12	17	msec	Note4
Contrast Ratio	CR		640	800	-	-	Note1 Note3
Color Chromaticity	W_X		0.2680	0.2980	0.3280	-	Note1 Note5
	W_Y		0.2798	0.3098	0.3398	-	Note1 Note5
Luminance	L		220	270	-	cd/m ²	Note1 Note7
Luminance Uniformity	Y_U		75	80	-	%	Note1 Note6
NTSC	-		55	60	-	%	-

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.

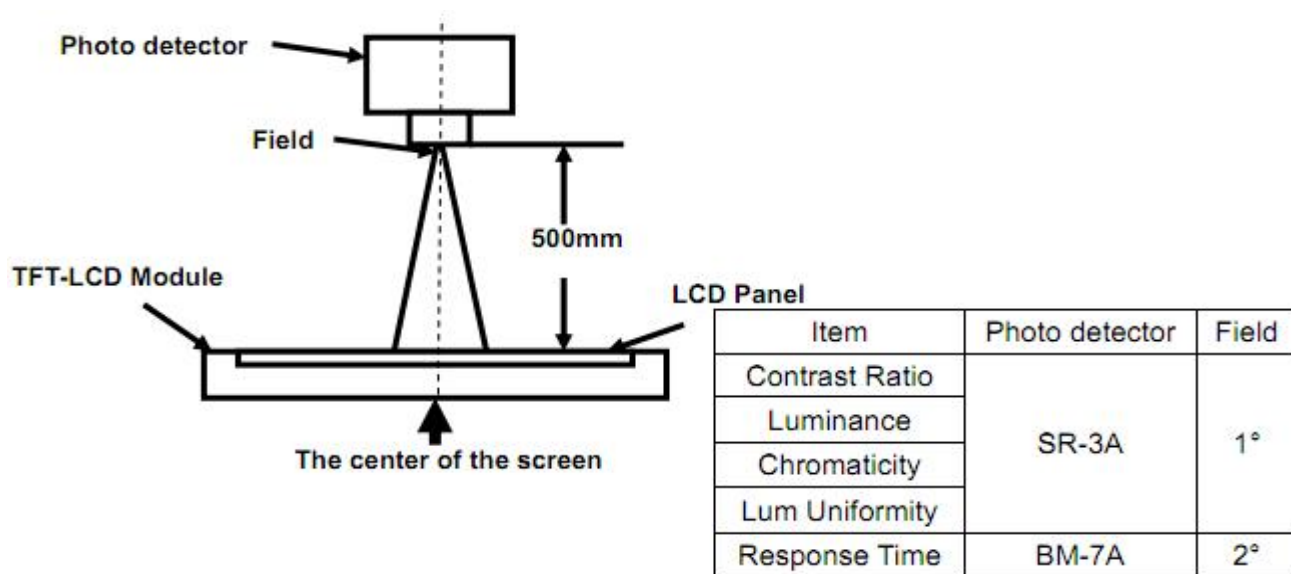


Fig 1

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).

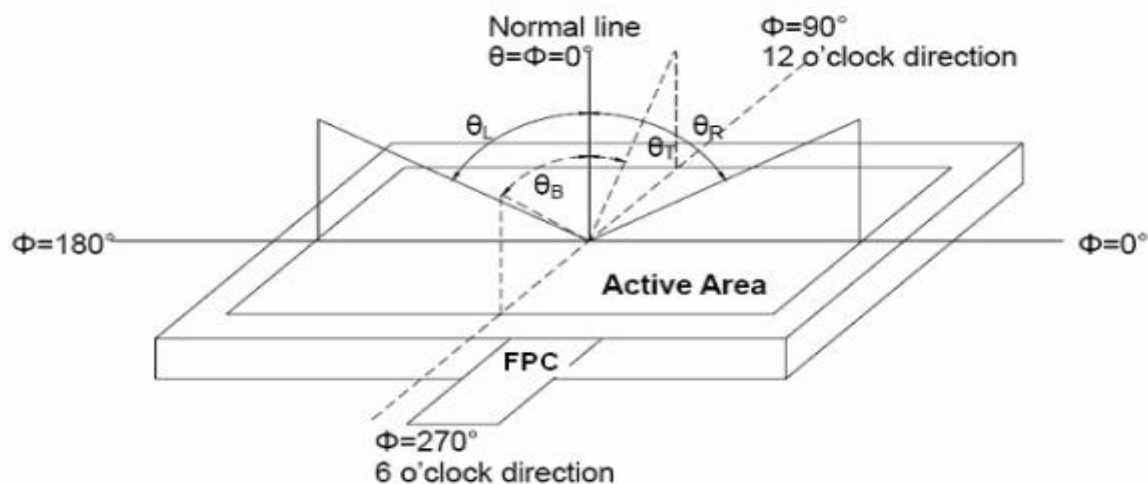


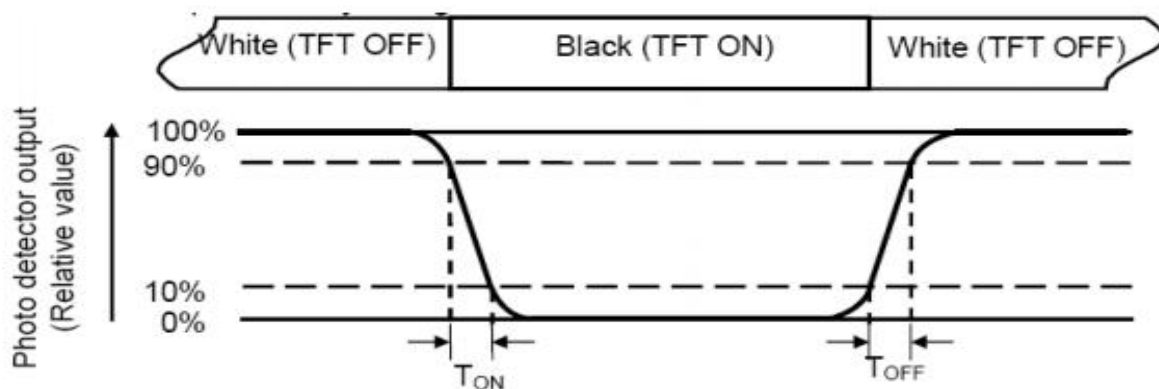
Fig 2 Definition of viewing angle

Note 3: Definition of contrast ratio

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

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

The luminance uniformity in surface luminance is determined by measuring luminance at each test position 1 through n, and then dividing the maximum luminance of n points luminance by minimum luminance of n points luminance. For more information see FIG.3-a/b

Note 7: Surface luminance is the luminance with all pixels displaying white.

L_v = Average Surface Luminance with all white pixels ($P_1, P_2, P_3, \dots, P_n$)

For more information see FIG.3-a/b

Note 8: Size : $S \leq 5"$ (see Figure a) H,V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7) 50cm distance or test spot position : see Figure a.
measurement instrument : TOPCON's luminance meter SR-3A or BM-7 or compatible (see Figure 1).

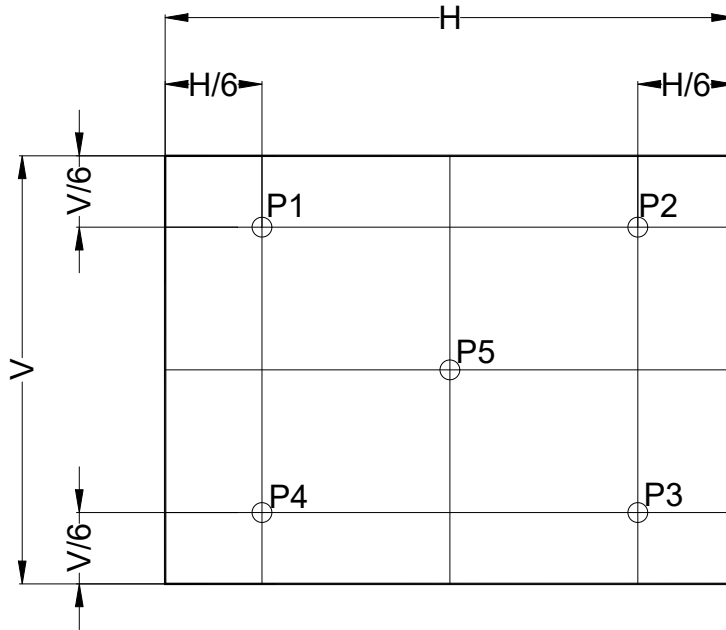


Fig. 3-a Definition of points

$5" < S \leq 12.3"$ (see Figure b) . H,V : Active area

Light spot size $\varnothing = 5\text{mm}$ (BM-5) or $\varnothing = 7.7\text{mm}$ (BM-7) 50cm distance or compatible distance from the LCD surface to detector lens. test spot position : see Figure b.

measurement instrument : TOPCON's luminance meter SR-3A or BM-7 or compatible (see Figure 1).

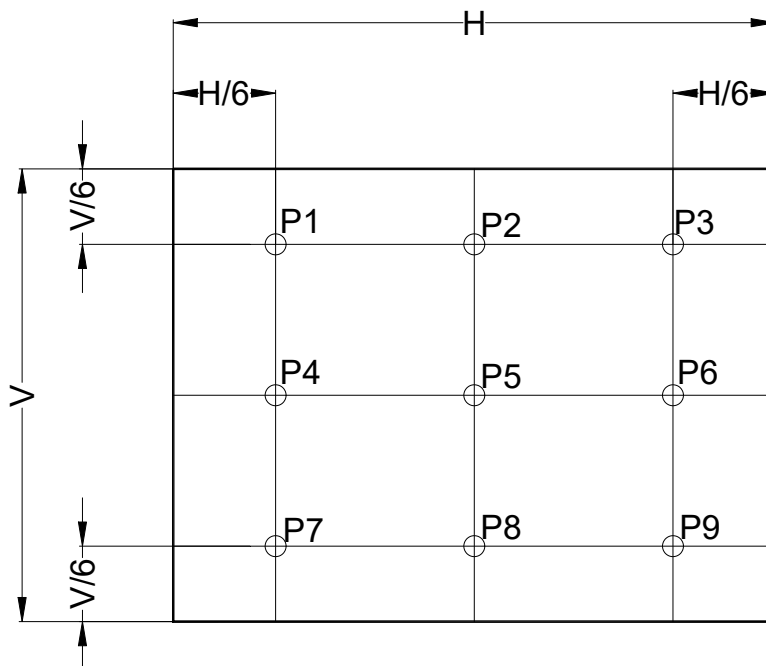


Fig. 3-b Definition of points

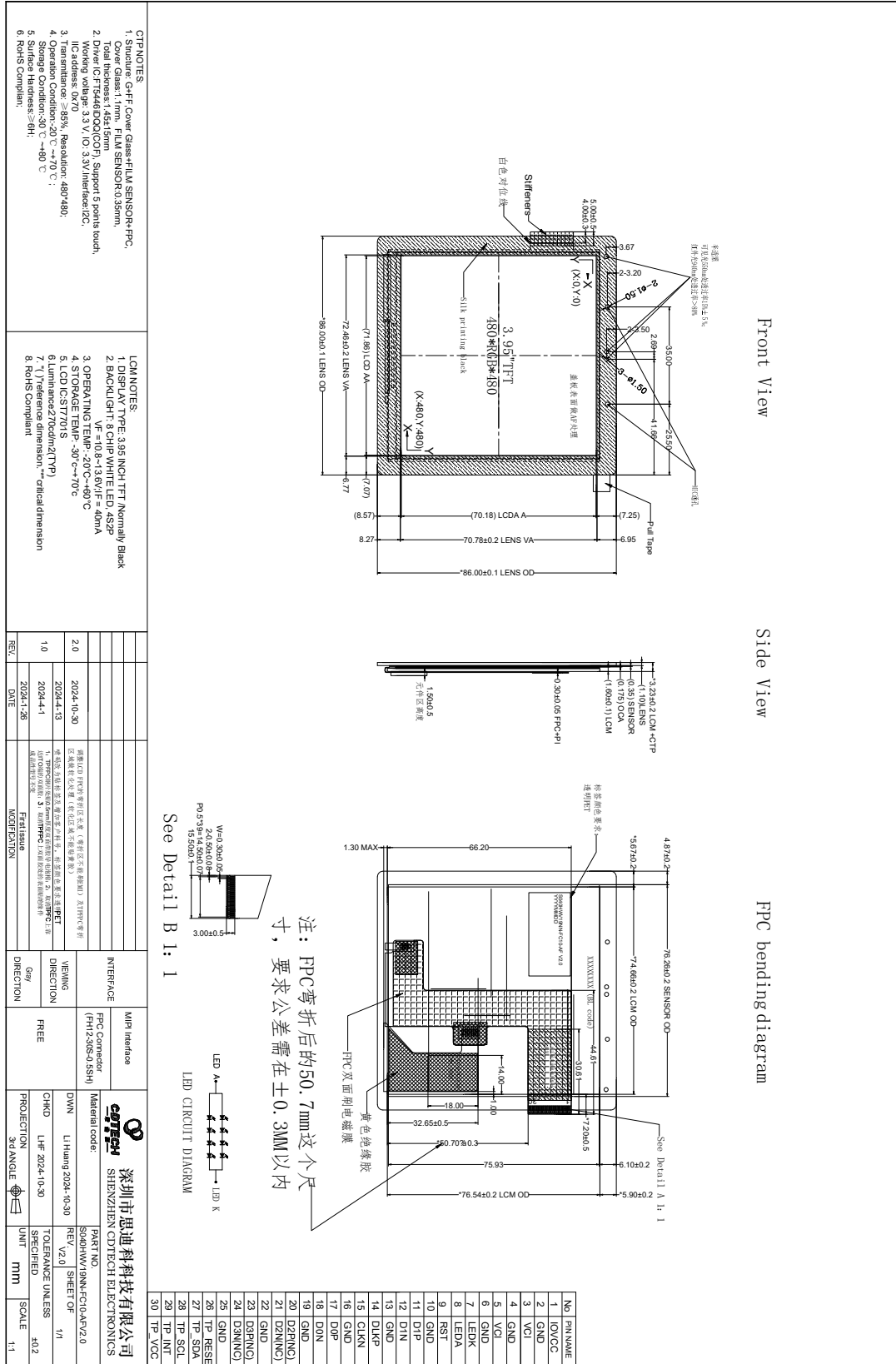
7. Reliability Test Items

Test Item	Test Conditions
High Temperature Storage	Ta= +70℃ 96hrs
Low Temperature Storage	Ta= -30℃ 96hrs
High Temperature Operation	Ta= +60℃ 96hrs
Low Temperature Operation	Ta= -20℃ 96hrs
High Temperature and Humidity Storage	Ta= +60℃, 90% RH 96hrs
Thermal Shock (Non-operation)	-30℃/30 min ~ +70℃/30 min for 20 cycles Start with cold temperature end with high temperature
Electro Static Discharge	Contact = ± 4 kV, class B Air = ± 8 kV, class B R=330Ω,C=150pF
Vibration	Sweep: 10Hz~55Hz~10Hz Stroke: 1.5mm 2 hrs for each direction of X .Y. Z.
Mechanical Shock	60G 6ms,±X,±Y,±Z 3 times for each direction
Package Drop Test	Height: 60 cm 1 corner, 3 edges, 6 surfaces

Notes: The test result shall be evaluated after the sample has been left at room temperature and humidity for 2 hours without load. No condensation shall be accepted. The sample will not be accepted if appear these defects:

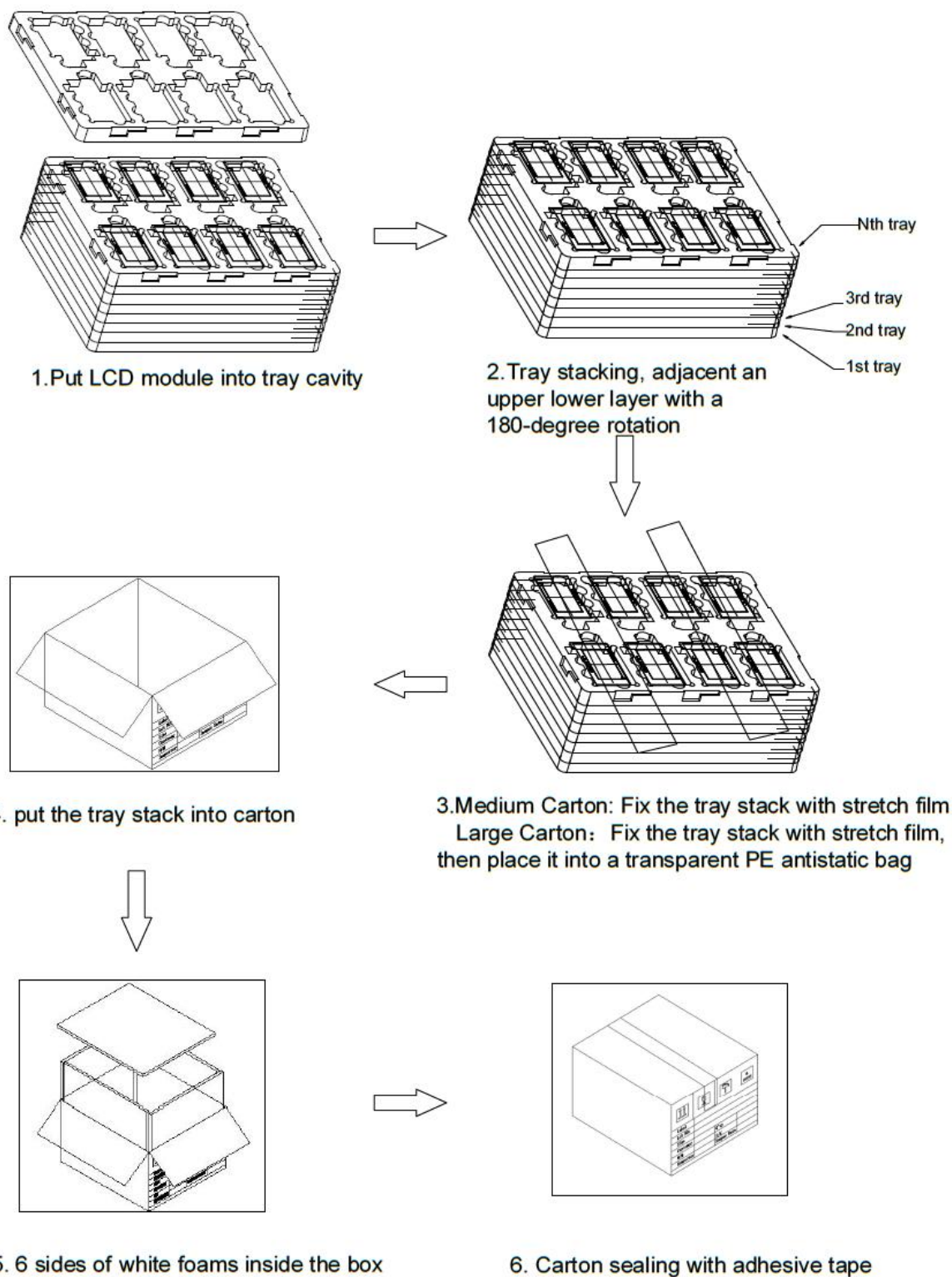
- 1). Air bubble in the LCD
- 2). Seal leak or Glass crack
- 3). Non display or abnormal display
- 4). Brightness reduction >50%

8. Mechanical Drawing



9. Packing

Packing Method



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
- Ketene
- 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.

10.4 Packaging instructions

when the customers using trays, they have to stack the adjacent trays in a 180° staggered to prevent pressure that could cause product damage.