

SPECIFICATION

[X] Preliminary Specification
[] Final Specification

Description 800xRGBx480 TFT-LCD Module
Part Number P0700WVN1VA01

Customer		Product Dept, PDBU Tianma Microelectronics Co., Ltd.	
Signatures	Date	Approved By	Date
		Kim Minhong	2025.03.06
		Reviewed By	
		Deng Longping	2025.03.06
		Prepared By	
		Chen Ao	2025.03.06
Comments:			

* This cover page is for your Comments and Signatures back to TIANMA.

REVISION HISTORY

Rev	Date	Page	Revision Items	Editor
1.0	2025/3/6	-	Preliminary spec	Chen Ao

CONTENTS

1.	Summary	3
1.1	General Description	3
1.2	Features	3
2.	General Specifications.....	4
3.	Input/output Terminals	5
3.2	TP pin assignment	6
4.	Absolute Maximum Ratings.....	7
5.	Electrical Characteristics	7
6.	Timing Chart	10
7.	Optical Characteristics.....	14
7.1	TFT Optical Characteristics.....	14
8.	Reliability Test	17
9.	Mechanical Drawing	18
10.	Packaging Material.....	19
11.	Precautions for Use of LCD Modules	20

1. Summary

1.1 General Description

This is a 7 inch a-Si TFT-LCD module with Normal-White technology. It is composed of a TFT-LCD panel, a driver circuit, FPC and a LED backlight unit.

1.2 Features

- High luminance
- Interface: RGB 24 bits
- LED driver integrated
- Projected capacitive touch panel (PCAP T/P) attached
- Interface: I2C
- Lamination type: Air-bonding
- This product will comply with UL62368-1/CSA C22.2 No.62368-1-03
- This product will comply with the European RoHS Directive (2011/65/EU) and Delegated Directive (2015/863/EU, Amending Annex II of 2011/65/EU)

2. General Specifications

Item	Feature	Spec	Unit	Note
TFT	Size	7	inch	--
	Resolution	800(RGB) x 480	--	--
	Interface	RGB 24 bits	--	--
	Color Depth	16.7M	--	--
	Technology Type	a-Si	--	--
	Pixel Pitch	0.1926(H)x0.179(V)	mm	--
	Pixel Configuration	R.G.B. Vertical Stripe	--	--
	Display Mode	TM with Normally White	--	--
	Surface Treatment(Up Polarizer)	Clear	--	--
	Viewing Direction	12 o'clock	--	1
	Gray Scale Inversion Direction	6 o'clock	--	--
	Module size (W x H x D)	LCM:165x100x5.7	mm	--
		LCM+CTP:171.5x110.3x7.35	mm	
TP	Operation Technology	Projected Capacitive	--	--
	Control IC	ILI2118A	--	--
	Input Method	Bare finger	--	--
	Number of simultaneous touches	10	--	--
	Minimum Touch Area	Φ7	mm	--
	Finger Pitch	≥16	mm	--
	Product structure	GG	--	2
	Interface	I2C	--	--
	I2C address	0x26	--	--
Mechanical Characteristics	TFT Active Area	154.08x85.92	mm	--
	TP Active Area	157.00(W) x 92.80(H)	mm	--
	Matching Connection Type	LCM: Hirose FH12A-50S-0.5H	--	--
		CTP:FH19S-10S-0.5SH	--	--
	LED Numbers	30 LEDs	--	--
	Weight	207.57	g	--
Reliability Characteristics	Operation temperature	-20~70	℃	--
	Storage temperature	-30~80	℃	--

Note 1: Viewing direction for best image quality is different from Gray Scale Inversion Direction, there is a 180 degree shift.

Note 2: Requirements on Environmental Protection: RoHS.

3. Input/output Terminals

3.1 TFT CN1 pin assignment

Matching Connection Type: FH12A-50S-0.5SH

PIN	SYMBOL	I/O	Description	remark
1	VLED +	P	Led anode	
2	VLED +	P	Led anode	
3	NC	NC	NC	
4	VLED -	P	Led cathode	
5	VLED -	P	Led cathode	
6	GND	P	Ground	
7	VCC	P	Digital power supply	
8	MODE	I	DE/SYNC mode select. H:DE mode, L:SYNC mode	
9	DE	I	Date enable signal, active high to enable data, if not used, please pull low. DE=DEN	
10	VSYNC	I	Vertical sync input, negative polarity, if not used, please pull High.	
11	HSYNC	I	Horizontal sync input, negative polarity, if not used, please pull High.	
12	B7	I	Blue data(MSB)	
13	B6	I	Blue data	
14	B5	I	Blue data	
15	B4	I	Blue data	
16	B3	I	Blue data	
17	B2	I	Blue data	
18	B1	I	Blue data	
19	B0	I	Blue data(LSB)	
20	G7	I	Green data(MSB)	
21	G6	I	Green data	
22	G5	I	Green data	
23	G4	I	Green data	
24	G3	I	Green data	
25	G2	I	Green data	
26	G1	I	Green data	
27	G0	I	Green data(LSB)	
28	R7	I	Red data(MSB)	
29	R6	I	Red data	
30	R5	I	Red data	
31	R4	I	Red data	
32	R3	I	Red data	
33	R2	I	Red data	
34	R1	I	Red data	
35	R0	I	Red data(LSB)	
36	GND	P	Ground	
37	DCLK	I	Clock for input data. DCLK=CLKIN	
38	GND	P	Ground	
39	LR	I	Source left or right sequence control	
40	UD	I	Gate up or down scan control	

41	NC	NC	NC	
42	VGH	P	Positive power of TFT	
43	NC	NC	NC	
44	VGL	P	Negative power of TFT	
45	NC	NC	NC	
46	AVDD	P	Analog power supply	
47	RESET	I	Global reset pin	
48	VCOM	P	Common voltage input	
49	DITHB	I	Dithering setting. H:6bit resolution, L:8bit resolution	
50	GND	P	Ground	

Note1: I/O definition.

I---Input, O---Output, P--- Power/Ground, N--- No connection

Note2:

Scan control input		Scanning direction
UD	LR	
GND	VCC	Up to down, left to right
VCC	GND	Down to up, right to left
GND	GND	Up to down, right to left
VCC	VCC	Down to up, left to right

3.2 TP pin assignment

Matching Connection Type: FH19S-10S-0.5SH

Pin NO.	Symbol	I/O	Description	Remark
1	SCL	I	IIC clock input	
2	SDA	I/O	IIC data input and output	
3	GND	P	Ground	
4	GND	P	Ground	
5	ATTN	I/O	External interrupt to the host	
6	GND	P	Ground	
7	VPP	I/O	Reset from the host	
8	VDD	P	CTP power supply	
9	GND	P	Ground	
10	GND	P	Ground	

4. Absolute Maximum Ratings

GND=0V

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.3	3.6	V	Note1
Input voltage	V _{IN}	-0.3	3.6	V	
Operating Temperature	Top	-20	70	°C	
Storage Temperature	Tst	-30	80	°C	
Relative Humidity Note2	RH	--	≤95	%	Ta≤40°C
		--	≤85	%	40°C < Ta≤50°C
		--	≤55	%	50°C < Ta≤60°C
		--	≤36	%	60°C < Ta≤70°C
		--	≤24	%	70°C < Ta≤80°C
Absolute Humidity	AH	--	≤70	g/m ³	Ta>70°C

Table 3 Absolute Maximum Ratings

Note1: Input voltage include R0~R7, G0~G7, B0~B7, Dclk, Hsync, Vsync, DITHB, LR, UD.

Note2: Ta means the ambient temperature.

It is necessary to limit the relative humidity to the specified temperature range.

Condensation on the module is not allowed.

5. Electrical Characteristics

5.1 Driving TFT LCD Panel

Ta = 25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
Voltage for logic circuit	VCC	3.00	3.30	3.60	V	
Analog Supply Voltage	AVDD	10.1	10.4	10.7	V	
Gate On Voltage	VGG	14.4	16	17.6	V	
Gate Off Voltage	VEE	-7.70	-7.00	-6.30	V	
Common Electrode Driving Signal	VCOM	3.85	3.95	4.05	V	
Input Signal Voltage	Low Level	VIL	0	-	0.3xVCC	V
	High Level	VIH	0.7xVCC	-	VCC	V

Table 4.1 LCD module electrical characteristics

Note1: For different LCM, the value may have a bit of difference.

Note2: To test the current dissipation, use "all Black Pattern".

5.2 TFT Driving Backlight

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Forward Voltage	VLED	$I_F=150\text{mA}$	--	19.2	20.4	V	Note 1
Forward Current	I_F	-	-	150		mA	
Backlight Power Consumption	WBL	$I_F=150\text{mA}$	--	2880	--	mW	
Life Time	-	$I_F=150\text{mA}$		40000	-	Hrs	Note 3

Table 4.2 LED backlight characteristics

Note 1: I_F is defined for one channel LED. There are total three LED channels in back light unit. Under LCM operating, the stable forward current should be inputted.

Note 2: Optical performance should be evaluated at $T_a=25^\circ\text{C}$ only.

Note 3: 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.

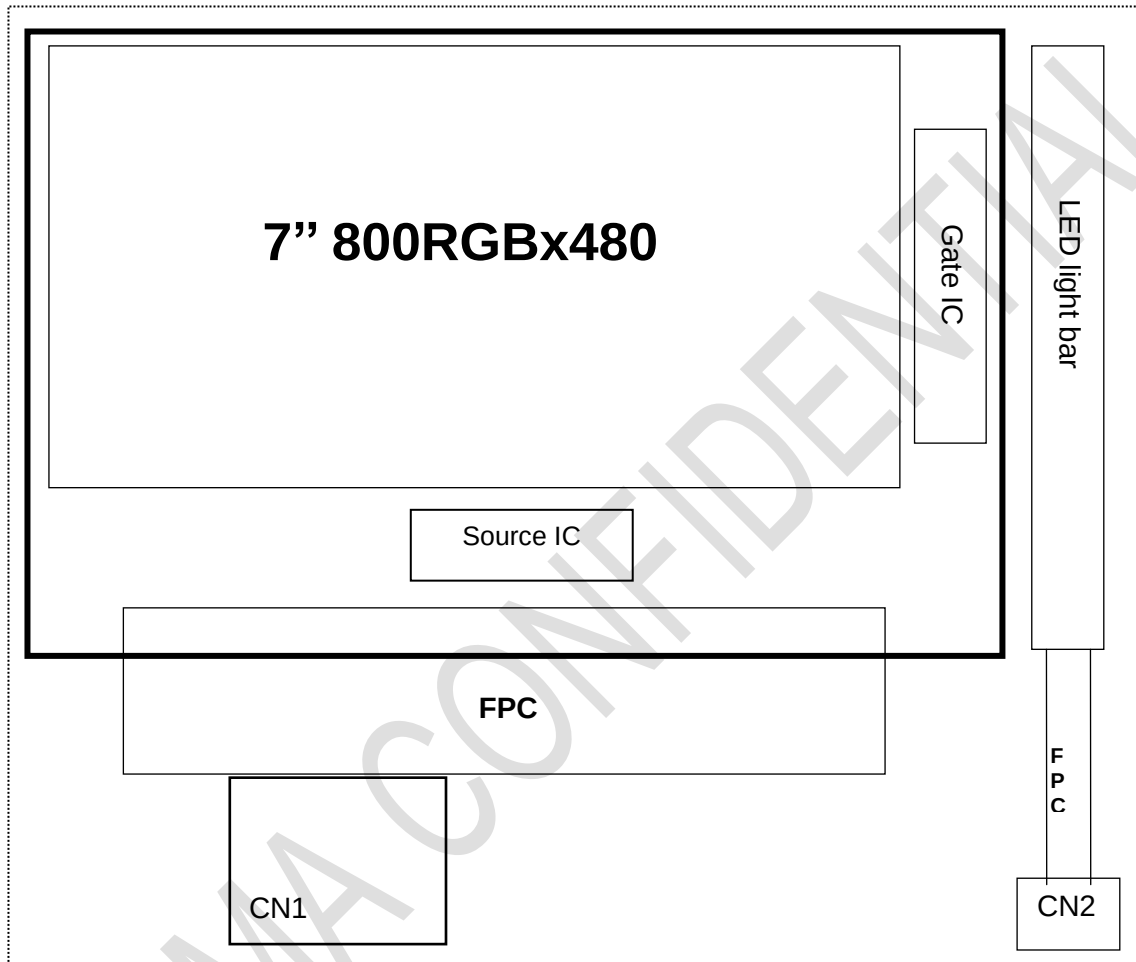
5.3 TP DC Characteristics

($T_A=25^\circ\text{C}$, $V_{DD}=3.3\text{V}$)

Item	Min	Typ	Max	Unit	Remark
power supply voltage	2.8	3.3	3.6	V	
Input Voltage High	1	-	-	V	
Input Voltage Low	-	-	0.5	V	
Output Voltage High	-	See Note	-	V	
Output Voltage Low	-	-	0.1	V	
Power supply current	-	25	-	mA	Operating mode

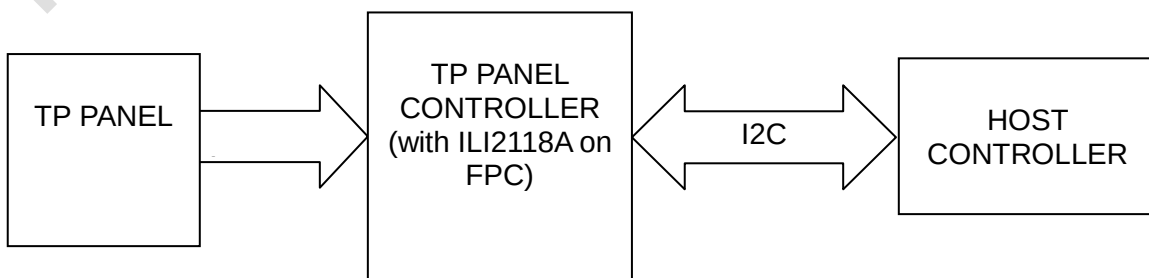
Note:

V_{OH} is for ATTN output voltage level which is programmable by registers. Typical values are 1.2V/1.5V/1.8V/ V_{DD} .



JM: THE BLOCK DIAGRAM REQUIRES UPDATE. CN2 is related to Touch, not to Backlight

5.4 TP Circuit Block Diagram



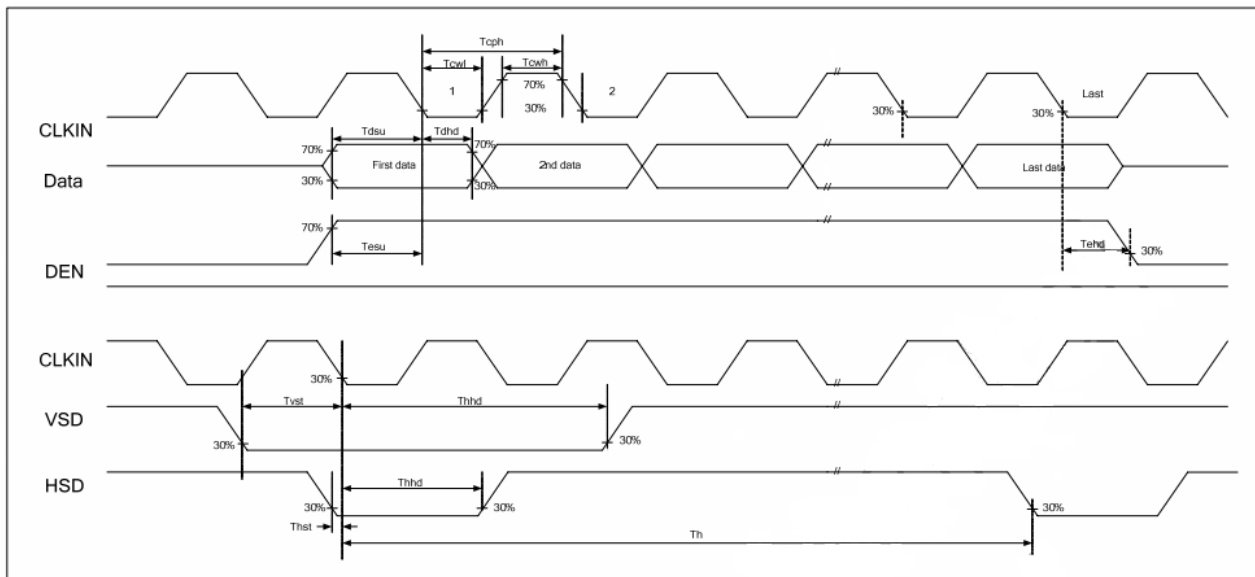
6. Timing Chart

6.1 TFT - LCD Input Timing

VDD=3.3V, GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK frequency	F_{clk}	28	30.0	40.0	MHz	Graph:CLKIN
DCLK cycle time	T_{cph}	25	33.3	36	ns	Graph:CLKIN
DCLK pulse width	T_{cw}	40%	50%	60%	T_{cph}	Graph:CLKIN
VS setup time	T_{vst}	8			ns	Graph:VSD
VS hold time	T_{vhd}	8	-	-	ns	Graph:VSD
HS setup time	T_{hst}	8			ns	Graph:HSD
HS hold time	T_{hhd}	8	-	-	ns	Graph:HSD
Data setup time	T_{dsu}	8			ns	Data to DCLK
Data hold time	T_{dhd}	8	-	-	ns	Data to DCLK
DE setup time	T_{esu}	8	-	-	ns	Graph:DEN
DE hold time	T_{ehd}	8	-	-	ns	Graph:DEN

Input Clock and Data timing Diagram:



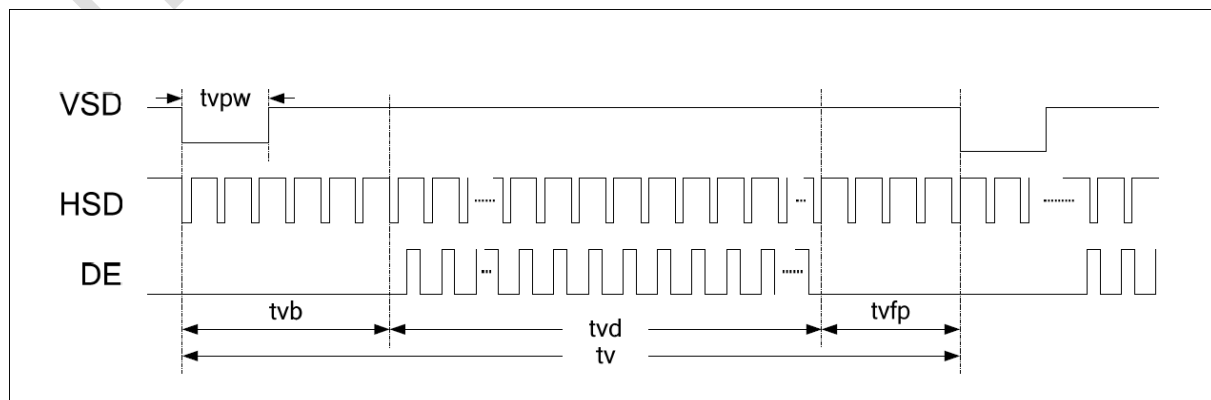
6.2 Recommended Timing Setting Of TCON

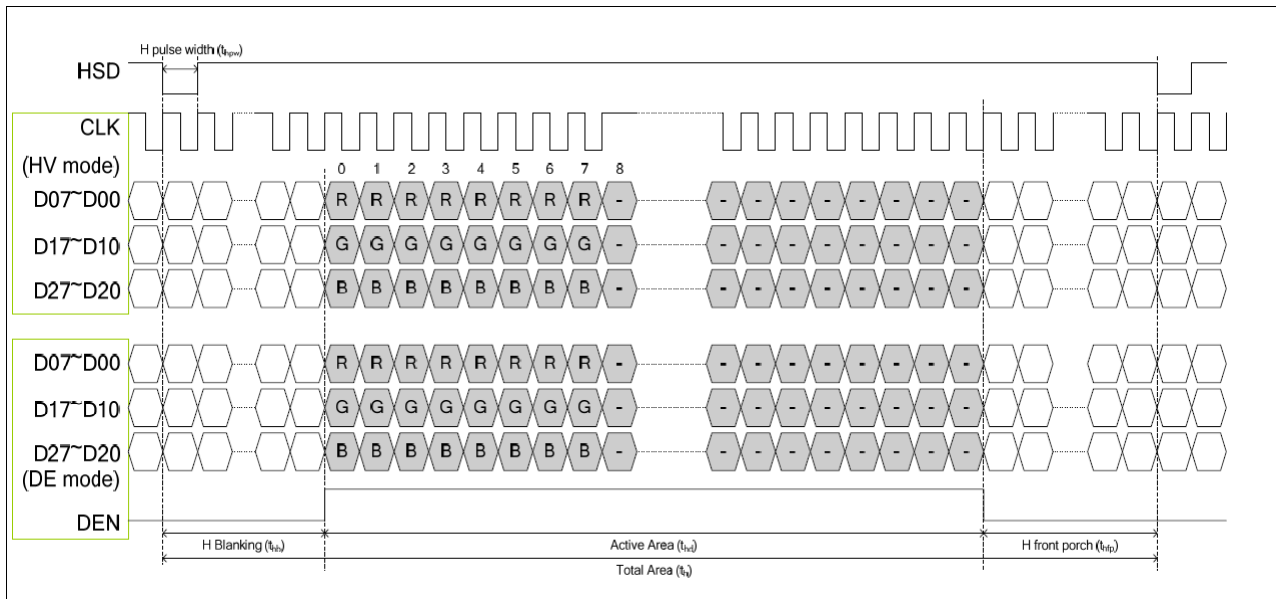
TCON (Embedded In Source IC) Input Timing (DCLK, HS, VS, DE)

VDD=3.3V, GND=0V, Ta=25°C

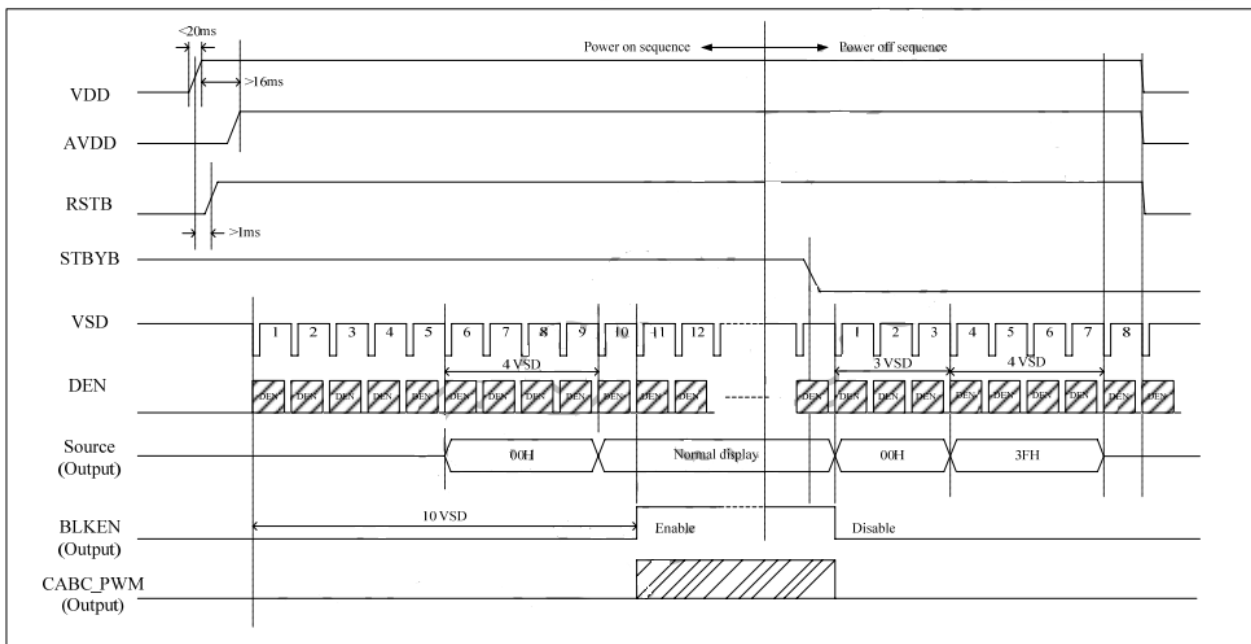
Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	F _{clk}	28	30	40	MHZ	
	t _{clk}	20	33.3	36	ns	
HSD	t _h	862	1056	1200	t _{clk}	
	t _{hd}	800	800	800	t _{clk}	
	t _{h_{pw}}	1	-	40	t _{clk}	
	t _{hb}	46	46	46	t _{clk}	
	t _{h_{fp}}	16	210	354	t _{clk}	
DE mode blanking	t _{h-t_{hd}}	85	256	400	t _{clk}	
VSD	t _v	513	525	650	th	
	t _{vd}	480	480	480	th	
	t _{v_{pw}}	3	-	20	th	
	t _{vb}	23	23	23	th	
	t _{v_{fp}}	7	22	147	th	
DE mode blanking	t _{v-t_{vd}}	30	45	170	th	

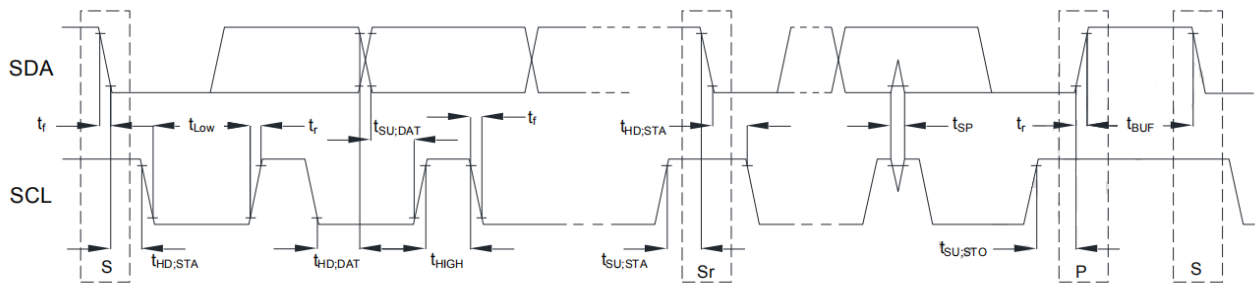
TCON Vertical Input Timing Diagram





6.3 POWER ON/OFF SEQUENCE





Symbol	Parameter	100KHz			400KHz		
		Min	Max	Unit	Min	Max	Unit
f_{SCL}	SCL clock frequency	0	100	kHz	0	400	KHz
$t_{HD,STA}$	Hold time (repeated) START condition. After this period, the first clock pulse is generated	4.0	–	μs	0.6	–	μs
t_{LOW}	LOW period of the SCL clock	4.7	–	μs	1.3	–	μs
t_{HIGH}	HIGH period of the SCL clock	4.0	–	μs	0.6	–	μs
$t_{SU,STA}$	Set-up time for a repeated START condition	4.7	–	μs	0.6	–	μs
$t_{HD,DAT}$	Data hold time	0	3.45	μs	0	0.9	μs
$t_{SU,DAT}$	Data set-up time	250	–	ns	100	–	ns
t_r	Rise time of both SDA and SCL signals	–	1000	ns	–	300	ns
t_f	Fall time of both SDA and SCL signals	–	300	ns	–	300	ns
$t_{SU,STO}$	Set-up time for STOP condition	4.0	–	μs	0.6	–	μs
t_{BUF}	Bus free time between a STOP and START condition	4.7	–	μs	1.3	–	μs

Fig4: IIC Timing

Note1: Command flow referred to the IC protocol file.

Note2: TP firmware should be adjusted again after assembled on the overall unit.

Note3: Tianma should evaluate the firmware adjustment, if there is any change about the overall unit.

7. Optical Characteristics

7.1 TFT Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	50	60	--	Degree	Note 2
		θB		60	80	--		
		θL		60	80	--		
		θR		60	80	--		
Contrast Ratio		CR	θ=0°	400	500	--		
Response Time		T _{ON}	25℃	--	25	35	ms	Note1 Note4
		T _{OFF}						
Chromaticity	White	x	Backlight is on	0.274	0.324	0.374		Note5 Note1
		y		0.299	0.349	0.399		
	Red	x		0.539	0.589	0.639		
		y		0.300	0.350	0.400		
	Green	x		0.292	0.342	0.392		
		y		0.547	0.597	0.647		
	Blue	x		0.103	0.153	0.203		
		y		0.056	0.106	0.156		
Uniformity		U		70	80	--	%	Note1、Note6
NTSC				45	50	--	%	
Luminance		L		1000	1200	--	cd/m ²	Note7

Test Conditions:

- $I_F = 30mA$ (one channel), the ambient temperature is $25^\circ C$.
- 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 10 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.

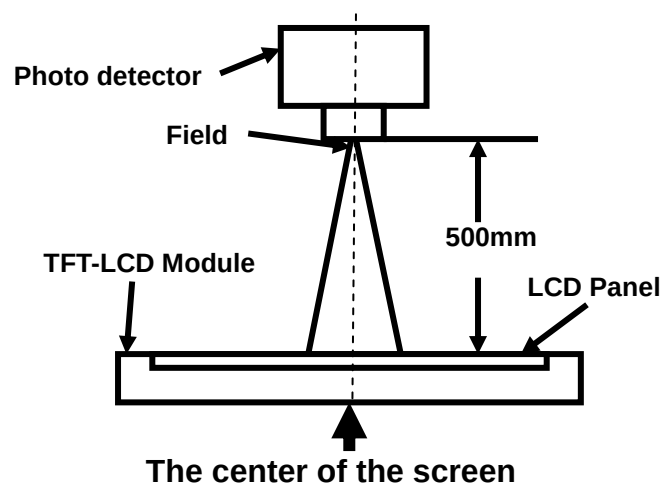


Fig1. Measurement Set Up

Note 2: Definition of viewing angle range and measurement system.
viewing angle is measured at the center point of the LCD.

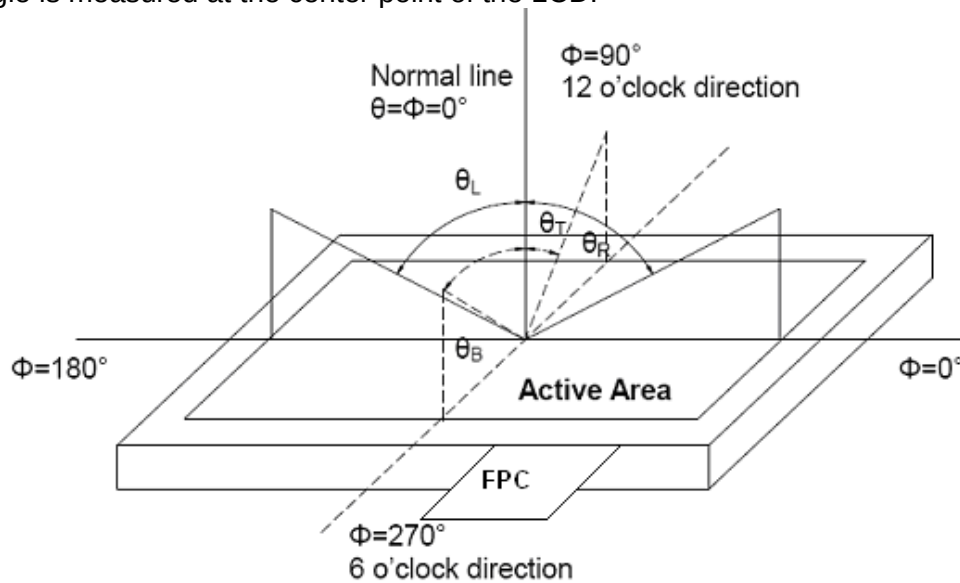


Fig2. Measurement viewing angle

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 drive by V_{white}.

"Black state": The state is that the LCD should drive 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%.

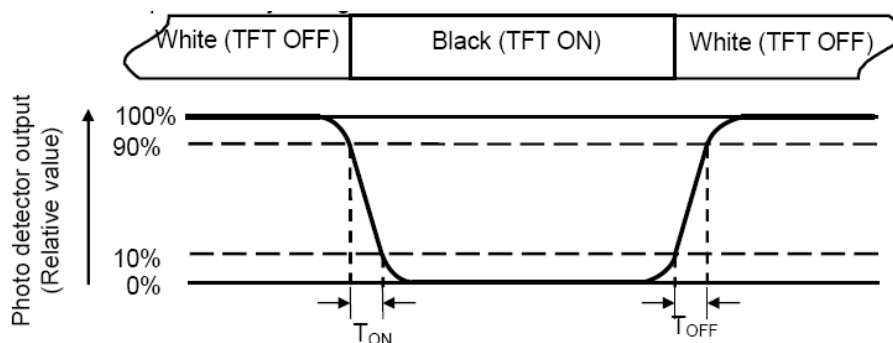


Fig3. Response Time Testing(TN)

Note 5: Definition of color chromaticity (CIE1931)

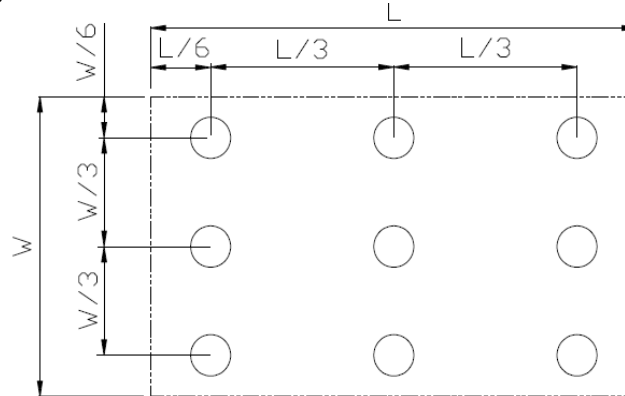
Color coordinates measured at center point of LCD.

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



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.

8. Reliability Test

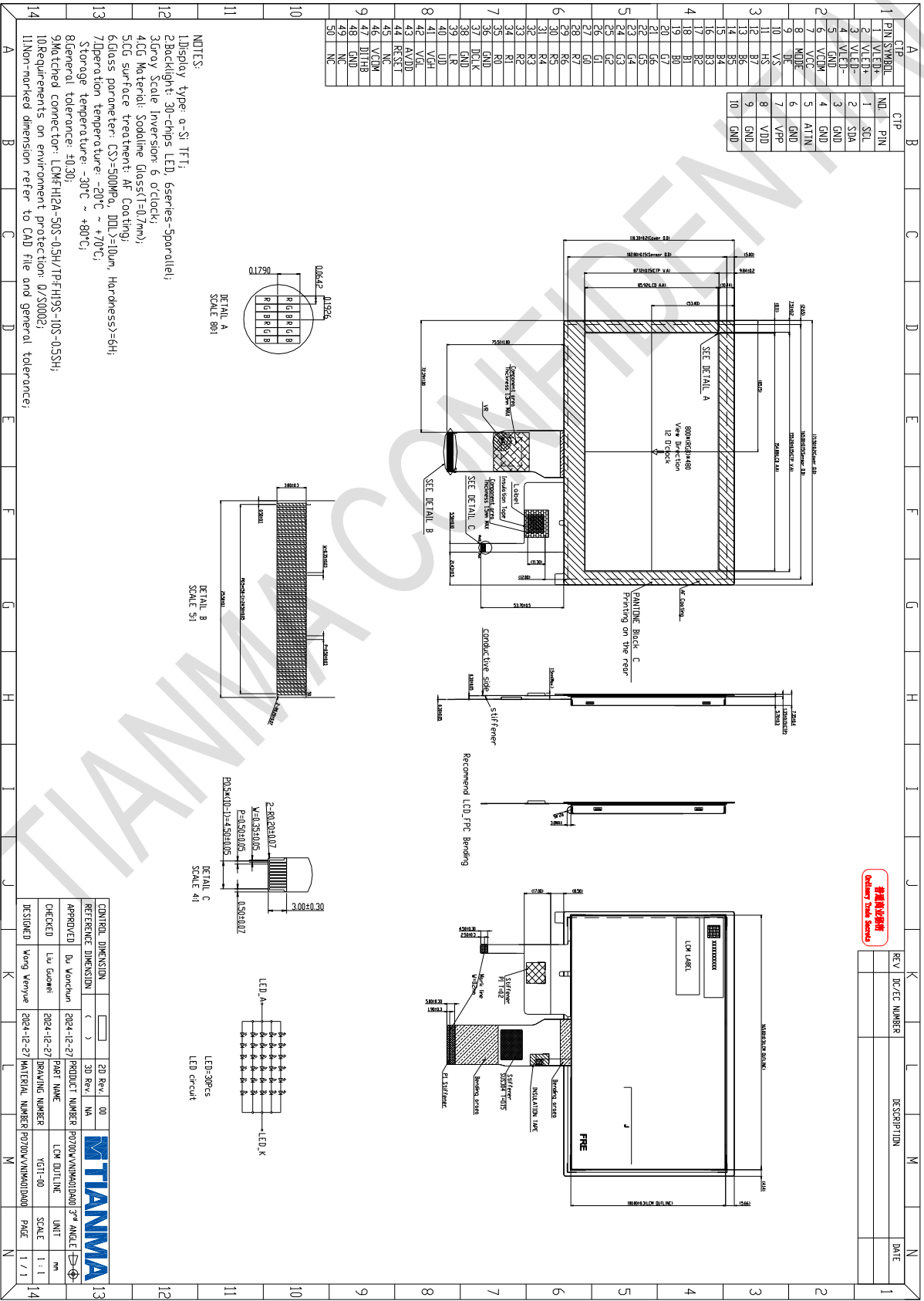
No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +70℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Operation at High Temperature and Humidity	Ta = +60℃, 90% RH ,240hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ (30min) ~ + 80℃ (30min) ,Change Time:5min,100cycle	Start with cold temperature End with high temperature, IEC60068-2-14,GB2423.22
7	ESD	C=150pF、R=330Ω 5point/panel Air: ±8KV Contact:±4KV 5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	GB/T17626.6-2006
8	Vibration Test	Frequency range:10~55Hz Stroke: 1.5mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z.(6 hours for total)	GB/T 2423.10-2008
9	Shock Test	Half Sine Wave 100G ,6ms,±X,±Y,±Z 3times for each direction	GB/T 2423.5-1995
10	Drop Test(package state)	Height: X cm,1 corner, 3edges, 6 surfaces actual parameter of "X": Box weight>10kg,X=60cm Box weight≤10kg,X=80cm	GB/T 4857.5-1992

Note1: Ta is the ambient temperature of sample.

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

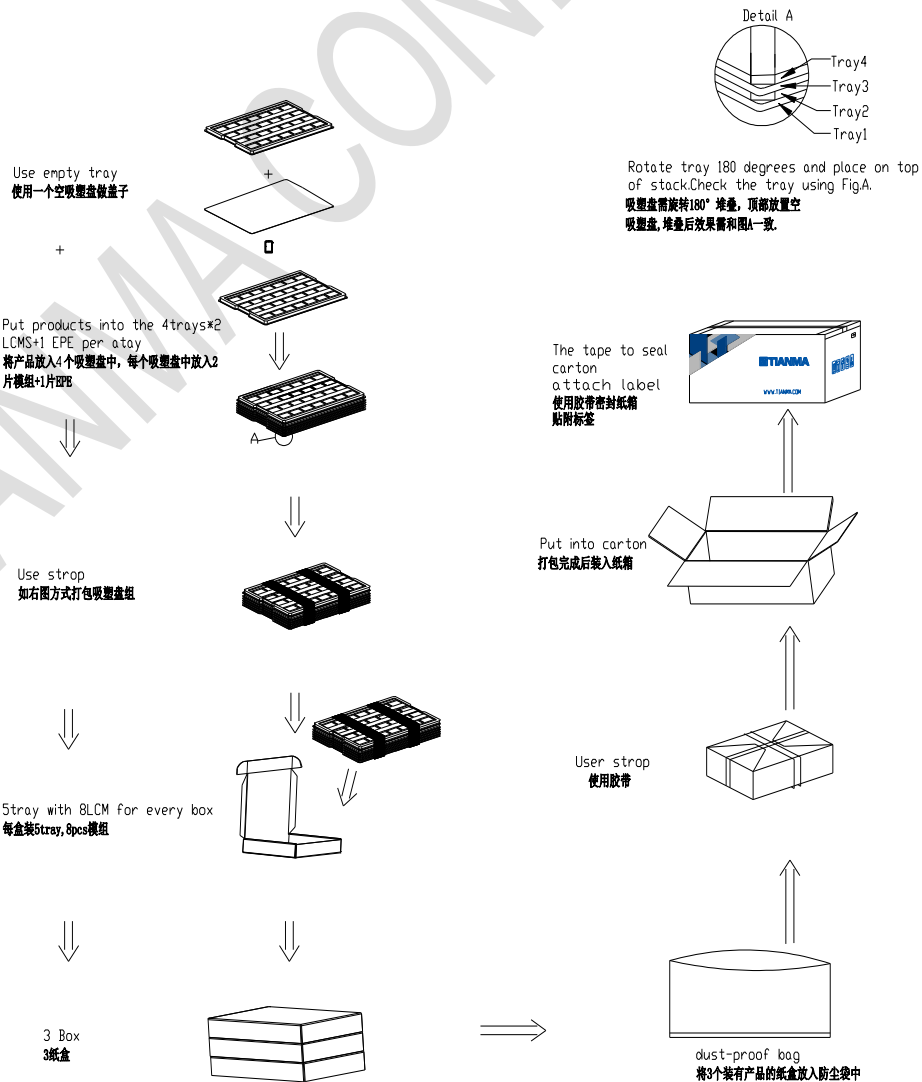
Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

9. Mechanical Drawing



10. Packaging Material

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	P0700WVN1MA01D A00	171.5*110.3*7.35	0.21	24	
2	Tray	PET	485*330*17	0.2	15	
3	Dust-proof Bag	PE	700*545*0.05	0.046	1	
4	Carton	Corrugated Paper	544*365*250	1.01	1	
5	BOX	Corrugated Paper	520*345*111	0.4	3	
6	EPE	EPE	308.68*190.04*1	0.0004	12	
7	Label	PP	100*52	0.011	1	
8	Total weight	10.3KG±5%				



11. 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

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