SPECIFICATION

[ ] Preliminary Specification
[◉] Final Specification

Description **7” 800xRGBx480 TFT-LCD Module**

Part Number **P0700WVF1MA00**

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

REVISION HISTORY

Rev	Date	Page	Revision Items	Editor
1.0	2020-09-29	-	Preliminary spec	Xiaohui.zhou
1.1	2021-02-01	-	Updated drawing	Xiaohui.zhou
1.2	2022-04-14	-	Update parameters and drawing	Aaron Huang
1.3	2022-11-29	-	New format and final release.	Yao Zhang
1.4	2023-03-14	1	Update the file number of UL certification.	Yao Zhang

CONTENTS

1. Summary

1.1 General Description

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

1.2 Features

- Ultra-wide viewing angle
- High luminance
- Long LED life time
- Wide temperature range
- Interface: LVDS
- Surface treatment AG
- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03 (File number: EE333987)
- Compliant with the European RoHS Directive (2011/65/EU) and Delegated Directive (2015/863/EU, Amending Annex II of 2011/65/EU)

2. General Specifications

Feature		Spec	Unit
Display Spec	Size	7 inches	
	Resolution	800 (RGB)x480	
	Pixel Pitch	0.1905x0.1905	mm
	TFT Active Area	152.40x91.44	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	SFT, Normally Black	
	Surface Treatment	Anti-Glare	
	Viewing Direction	All	
	Gray Scale Inversion Direction	NA	
Mechanical Characteristics	LCM (W x H x D)	169.8x109.7x10.87	mm
	Weight	210	g
Optical Characteristics	Luminance	1500typ	cd/m^2
	Contrast Ratio	1000:1	
	NTSC	70	%
	Viewing Angle	88/88/88/88	degree
Electrical Characteristics	Interface	1port LVDS,6/8bit selectable	
	Color Depth	16.7 Million	color
	Power Consumption	LCD:363; Backlinght:4774	mW

Note: The tolerance for weight is +/- 05%.

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
LCD Module connector	FI-SEB20P-HFE(JAE) or equivalent
Matching connector	FI-S20S or equivalent

Table 3.1.1 Connector information

No	Symbol	I/O	Description	Comment
1	VCC	P	Power supply(+3.3V)	
2	VCC	P	Power supply(+3.3V)	
3	GND	P	Ground	
4	GND	P	Ground	
5	Link0-	I	-LVDS differential data input	
6	Link0+	I	+LVDS differential data input	
7	GND	P	Ground	
8	Link1-	I	-LVDS differential data input	
9	Link1+	I	+LVDS differential data input	
10	GND	P	Ground	
11	Link2-	I	-LVDS differential data input	
12	Link2+	I	+LVDS differential data input	
13	GND	P	Ground	
14	CLKIN-	I	-LVDS differential Clock input	
15	CLKIN+	I	+LVDS differential Clock input	
16	GND	P	Ground	
17	Link3-	I	-LVDS differential data input	
18	Link3+	I	+LVDS differential data input	
19	Mode	I	MODE=“H” ,8bit /MODE=“L” ,6bit	
20	SC	I	Scan direction control	Note 3

Table 3.1.2 Pin Assignment for LCD Interface

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection
Note2: All of the GND pins should be connected to the system ground.
Note3: Scan direction is shown as below(PCB at down side):

3.2 CN2 Pin assignment (Back Light)

Connector Information	
LCD Module connector	SM06B-SHLS-TF(LF)(SN) or equivalent
Matching connector	SHLP-06V-S-B or equivalent

Table 3.2.1 Connector information

No	Symbol	I/O	Description	Wire Color
1	NC	-	No connection	
2	NC	-	No connection	
3	LED C1	P	LED Cathode1	
4	LED A1	P	LED Anode1	
5	LED A2	P	LED Anode2	
6	LED C2	P	LED Cathode2	

Table 3.2.2 Pin Assignment for Back Light Interface

Note1: I/O definition: I---Input, O---Output, P---Power/Ground, N---No connection
Note2: All of the GND pins should be connected to the system ground.

4. Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.5	5.0	V	Ta=25℃
Input voltage	V_{IN}	-0.5	5.0	V	
Operating Temperature	Top	-30	80	℃	
Storage Temperature	Tst	-40	90	℃	
Relative Humidity Note2	RH	--	≤95	%	Ta≤40℃
		--	≤85	%	40℃＜Ta≤50℃
		--	≤55	%	50℃＜Ta≤60℃
		--	≤36	%	60℃＜Ta≤70℃
		--	≤24	%	70℃＜Ta≤80℃
Absolute Humidity	AH	--	≤70	g/m³	Ta＞70℃

Table 4.1 Absolute Maximum Ratings

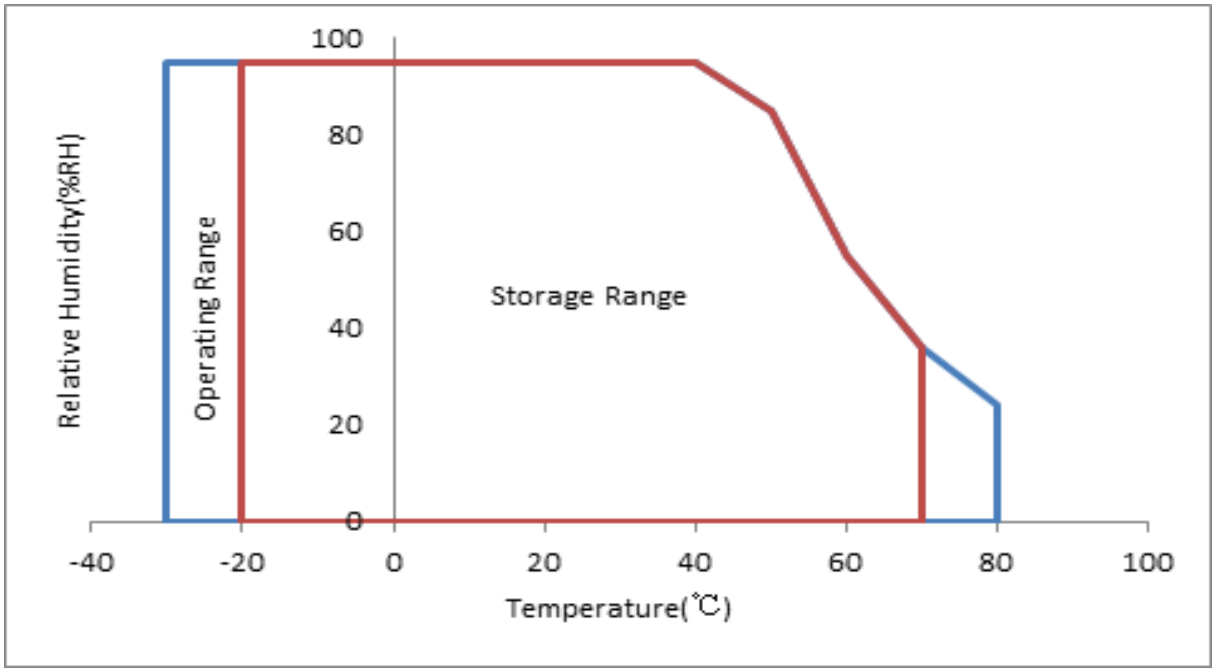


Table 4.2 Absolute Maximum Ratings chart

Note1: Input voltage include all input data.
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.
Note3: The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed

5. Electrical Characteristics

5.1 Driving TFT LCD Panel

Ta = 25℃; VCC=3.3V

Item		Symbol	Min	Typ	Max	Unit	Remark
Power Supply Voltage		VCC	3.0	3.3	3.6	V	
Power supply ripple		Vp-p	-	-	200	mV	
Supply Current		IVCC	-	110	-	mA	Note1
Power consumption		P_{TFT}	-	363	-	mW	
Input Voltage	Low level	V_{IL}	0		0.3*VCC	V	Note2
	High level	V_{IH}	0.7*VCC		VCC	V	
Differential input voltage		|VID|	200		600	mV	
Differential input common voltage		VCM	|VID|/2		VDD-1.2-|VID|/2	V	
Differential input threshold voltage	Low level	VTL	-100	-	-	mV	
	High level	VTH	-	-	100		
Inrush current		Inrush			1.5	A	Note3

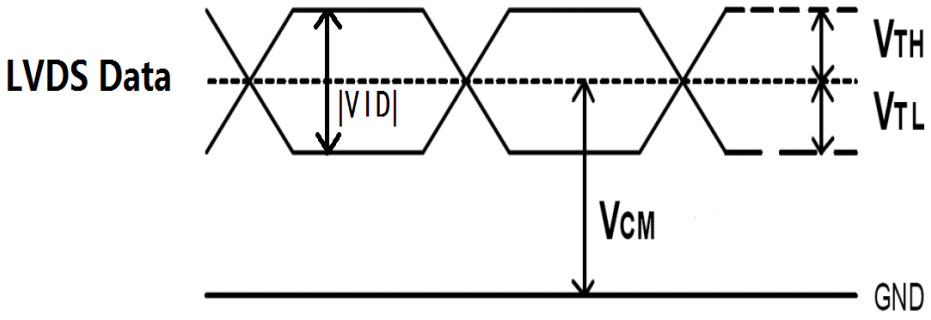


Figure4.1.1 LVDS DC characteristics

Note1: To test the current dissipation, using the “white” testing pattern.
Note2: For setting “SC” and “MODE”.
Note3: Inrush current definition

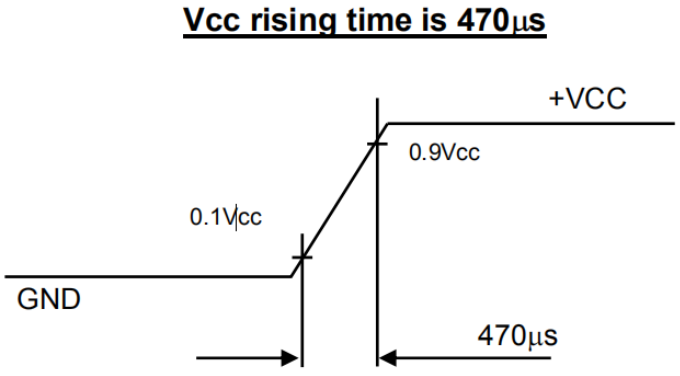
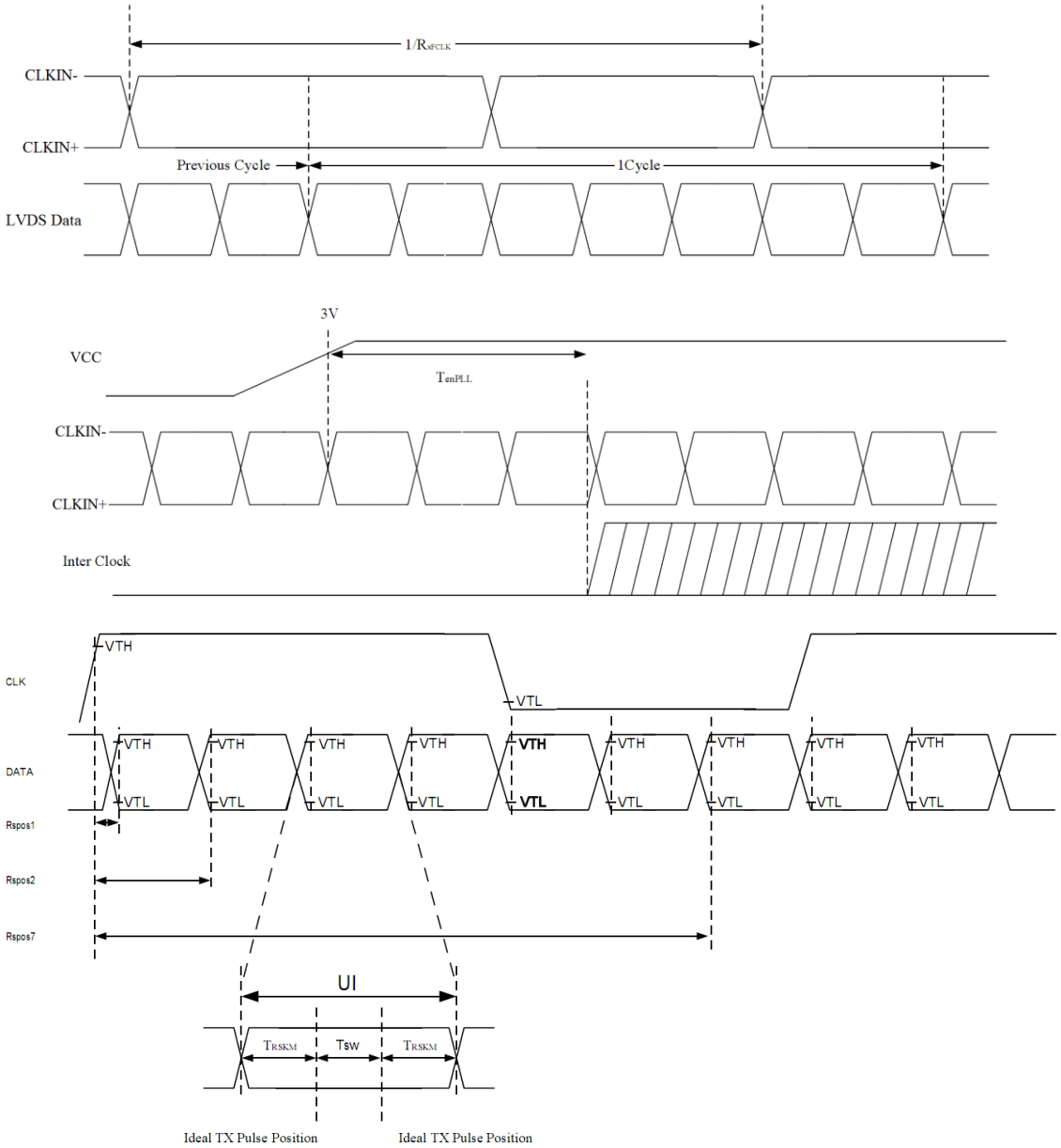


Figure4.1.2 Inrush current test condition

5.2 Recommended Operating Condition (AC Electrical Characteristics)

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Clock frequency	R_{xFLCK}	20	-	85	MHz	
Input data skew margin	T_{RSKM}	-	-	400	ps	|VID|=400mV V_{CM}=1.2V R_{xFCLK}=75MHz
Clock high time	T_{LVCH}	-	4/(7*RXFCLK)	-	ns	
Clock low time	T_{LVCL}	-	3/(7*RXFCLK)	-	ns	
PLL wake-up time	T_{emPLL}	-	-	150	us	

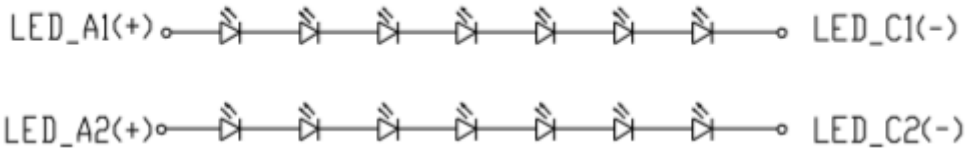


TRSKM: Receiver strobe margin
Tsw : Strobe width (internal data sampling window)
VTH=Rxvcm+|VID|/2, VTL=Rxvcm-|VID|/2

Figure4.3 LVDS AC characteristics

5.3 Driving Backlight

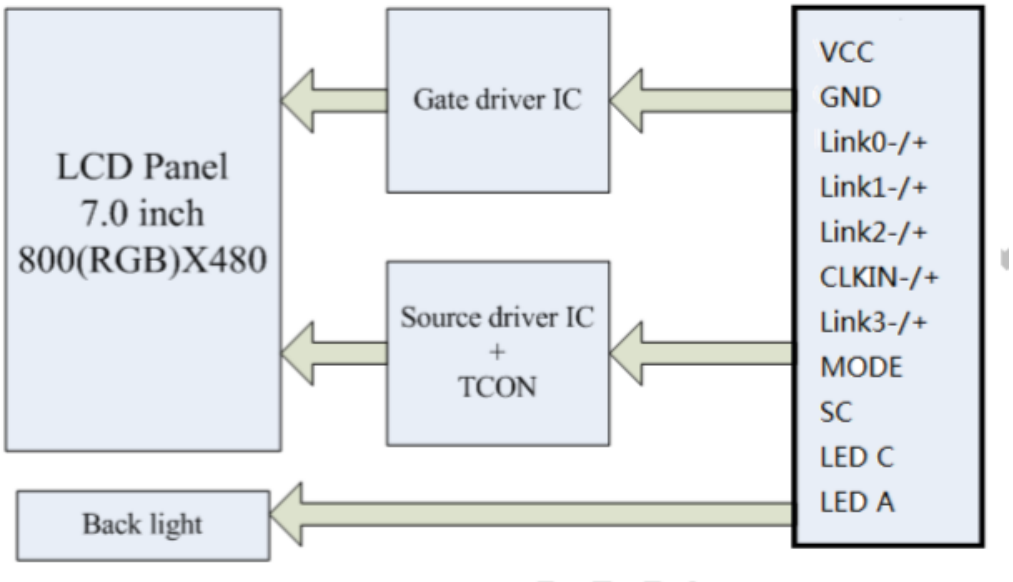
Item	Symbol	Min	Typ	Max	Unit	Note
Forward Current	I_F	-	220	-	mA	
Forward Current Voltage	V_F	-	21.7	23.1	V	
Power Consumption	P_Total	-	4.774	-	W	
Operating Life Time	-	80000	100000		h	



Backlight Circuit Diagram
2*7=14LEDS; If=110mA/LED

Note1: The LED driving condition is defined for total LED module.
Note2: Under LCM operating, the stable forward current should be inputted. And forward voltage is for reference only.
Note3: 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.
Note4: The LED driving condition is defined for each LED module.

5.4 Module Block diagram



6. Interface Timing Characteristics

6.1 TFT-LCD Input Timing

VCC=3.3V, GND=0V, Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
CLK frequency	$1/t_{CLK}$	25.2	27.2	30.5	MHz	
Horizontal blanking time	t_{HBT}	56	60	120	t_{CLK}	$t_{HBP} + t_{HFP}$
Horizontal back porch	t_{HBP}	5	16	101	t_{CLK}	
Horizontal display area	t_{HD}	-	800	-	t_{CLK}	
Horizontal front porch	t_{HFP}	19	44	115	t_{CLK}	
Horizontal period	t_H	856	860	920	t_{CLK}	
Horizontal pulse width	t_{HPW}	1	2	100	t_{CLK}	
Vertical blanking time	t_{VBT}	10	48	72	t_H	$t_{VBP} + t_{VFP}$
Vertical back porch	t_{VBP}	5	5	67	t_H	
Vertical display area	t_{VD}	-	480	-	t_H	
Vertical front porch	t_{VFP}	5	43	67	t_H	
Vertical period	t_V	490	528	552	t_H	
Vertical pulse width	t_{VPW}	1	2	66	t_H	
Frame Rate	F	-	60	-	Hz	

Table 5.1 Timing table

6.2 Timing Diagram

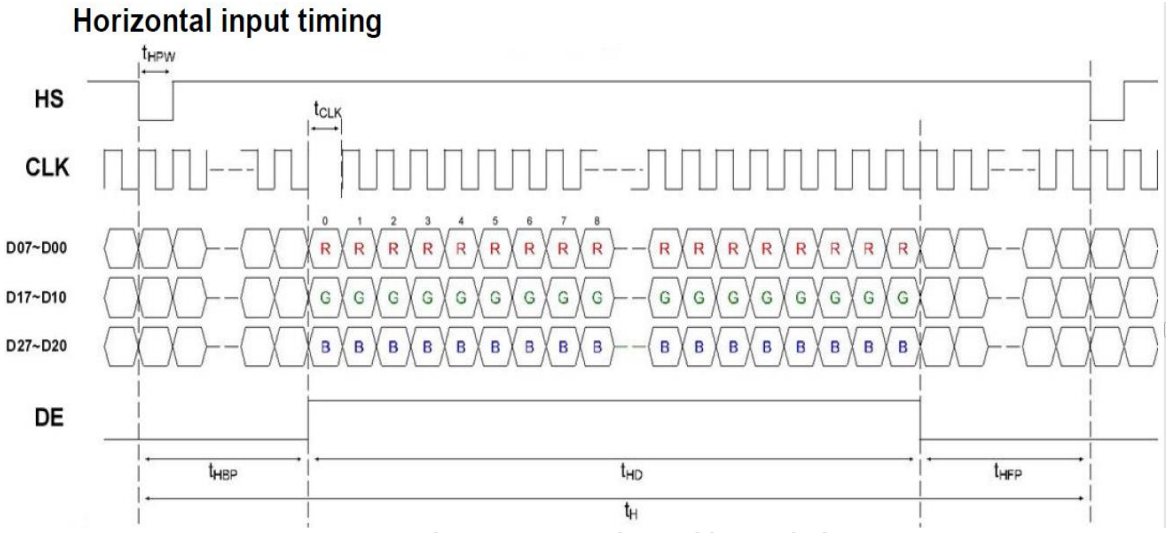


Figure 5.2.1 Horizontal input timing

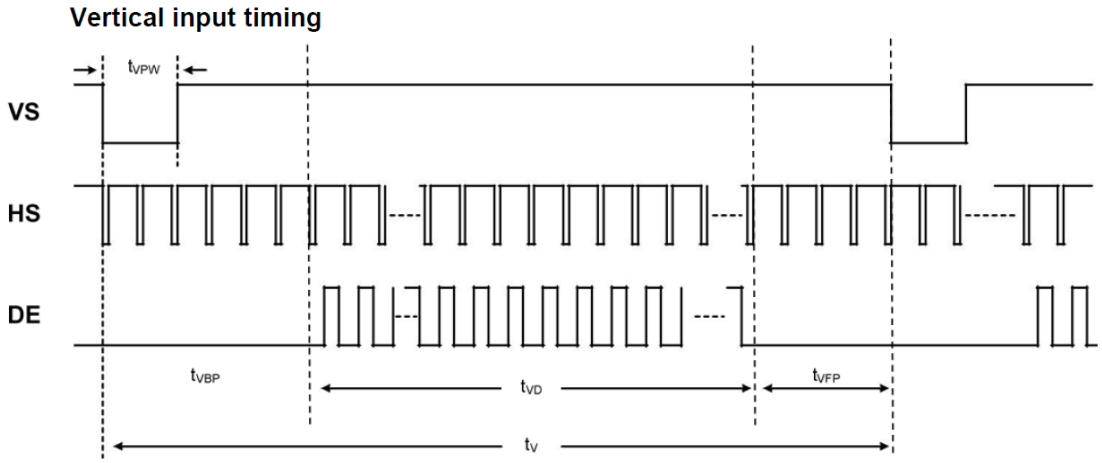
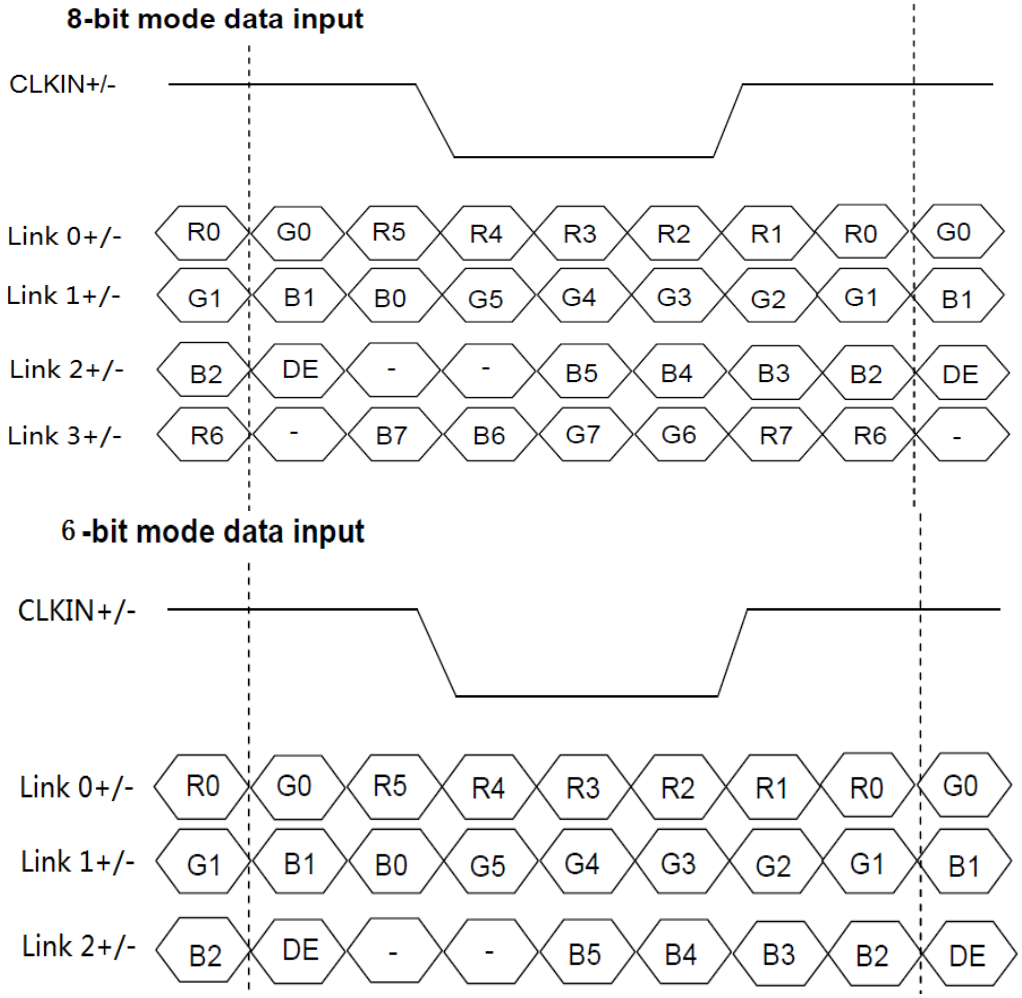


Figure 5.2.2 Vertical input timing

6.3 LVDS data input format



6.4 POWER ON/OFF SEQUENCE

Item	Symbol	Min	Typ	Max	Unit	Remark
VCC on to VCC stable	TP1	1	-	20	ms	
VCC stable to signal on	TP2	1	-	-	ms	
Signal on to LED on	TP3	200	-	-	ms	
VCC off time	TP4	1	-	10	ms	
VCC off to next VCC on	TP5	500	-	-	ms	
Signal off before VCC off	TP6	1	-		ms	
LED off before signal off	TP7	200	-	-	ms	

Table 5.4 Power on/off sequence

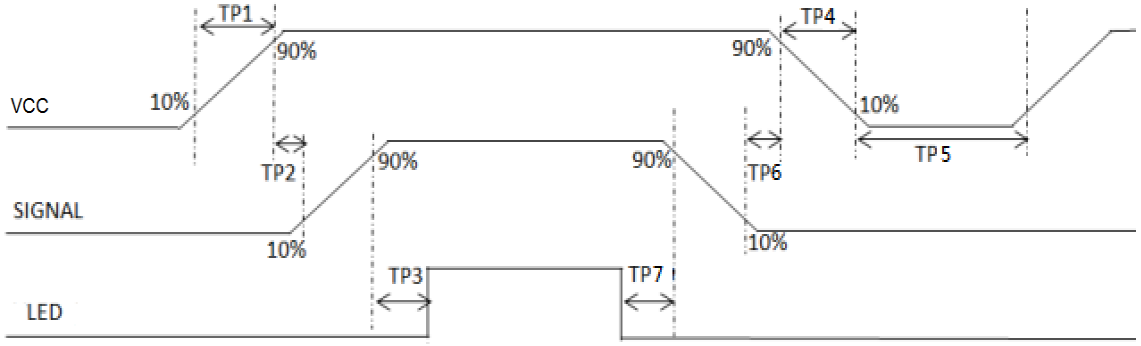


Figure 5.4 Power on/off sequence

7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	75	88	-	degree	Note2,3
		θB		75	88	-		
		θL		75	88	-		
		θR		75	88	-		
Contrast Ratio		CR	θ=0°	800	1000			Note 3
Response Time		T_{ON}	25℃		25	35	ms	Note 4
		T_{OFF}						
Chromaticity	**White**	x	Backlight is on	0.256	0.306	0.356		Note 1,5
		y		0.269	0.319	0.369		
	Red	x		0.580	0.630	0.680		Note 1,5
		y		0.285	0.335	0.385		
	Green	x		0.268	0.318	0.368		Note 1,5
		y		0.582	0.632	0.682		
	Blue	x		0.102	0.152	0.202		Note 1,5
		y		0.008	0.058	0.108		
Uniformity		U		75	80		%	Note 6
NTSC		-		65	70		%	Note 5
Luminance		L		1200	1500		cd/m^2	Note 7

Table 7.1 Optical Parameters

Test Conditions:

1. IF= 220 mA, and the ambient temperature is 25℃.
2. The test systems refer to Note1 and Note2.

Note1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical characteristics are measured at the center point of the LCD screen.

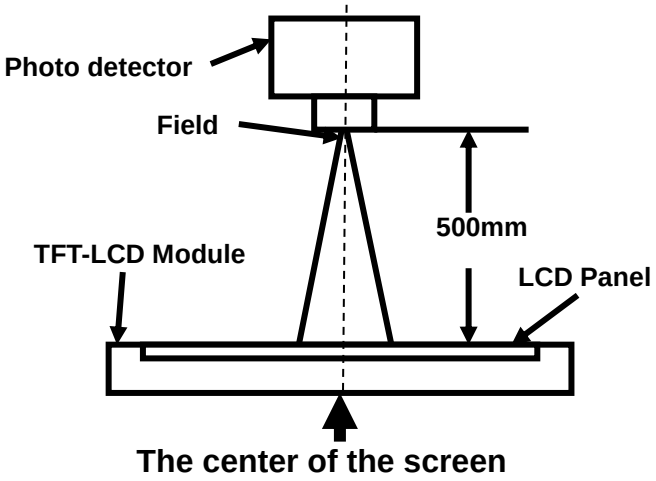


Fig1.Measurement Set Up

Note2: Definition of viewing angle range and measurement system. Viewing angle is measured at the center point of the LCD 。

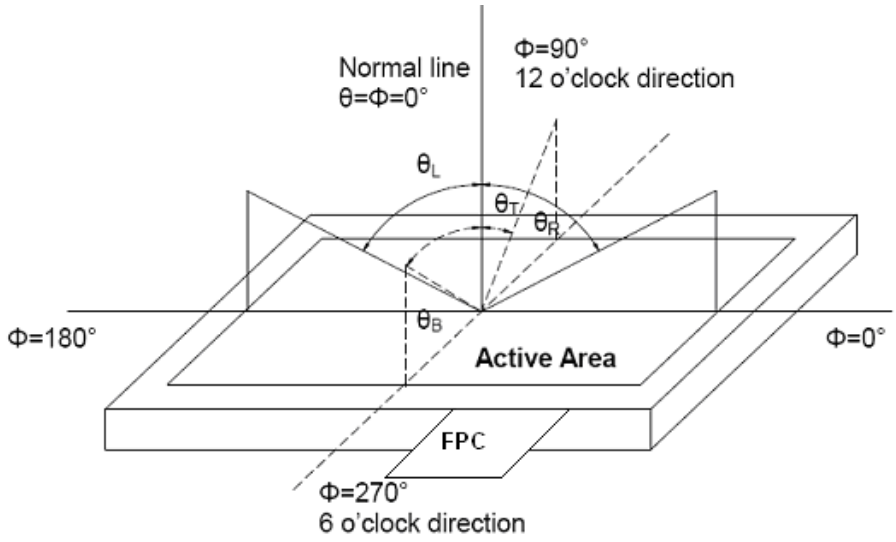


Fig2. Measurement viewing angle

Note3: Definition of contrast ratio

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

Note4: Definition of Response time

For SFT LCM, the response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_r) is the time between photo detector output intensity changed from 10% to 90%. And fall time (T_f) is the time between photo detector output intensity changed from 90% to 10%.

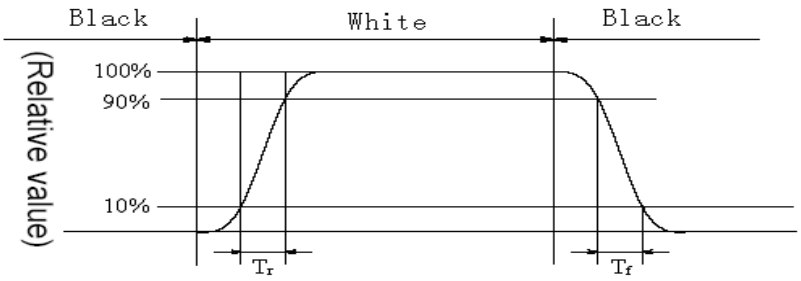


Fig4.Response Time Testing(SFT)

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig.5). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

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

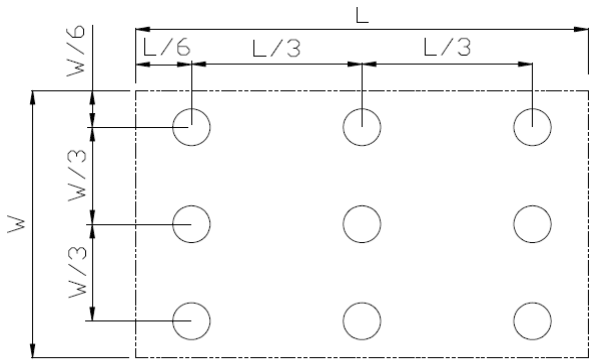


Fig5. Luminance Uniformity Measurement Locations(9 points)

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

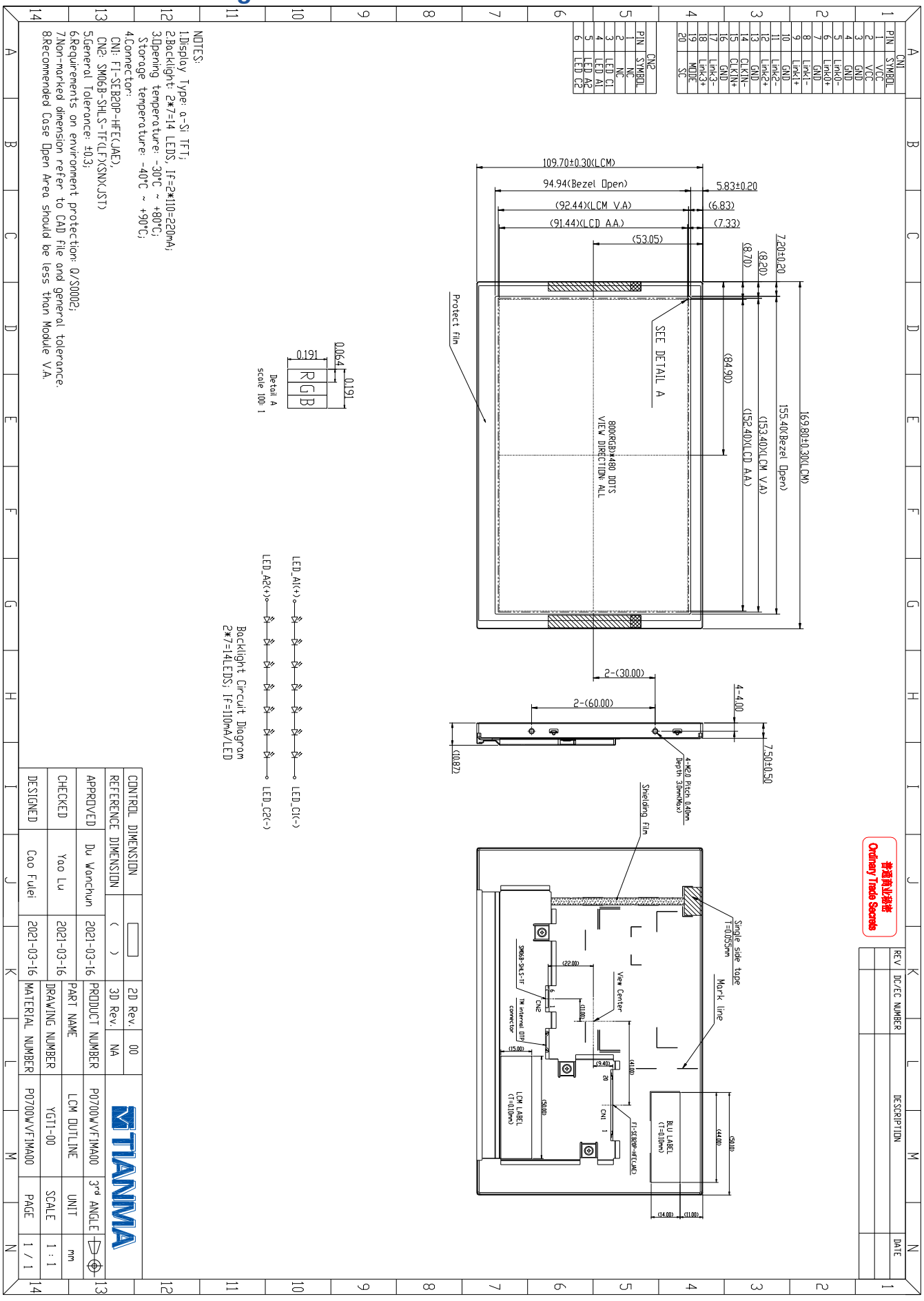
8. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	+80℃，500H	IEC60068-2-2:2007 GB/T 2423.2-2008
2	Low Temperature Operation	-30℃，500H	IEC60068-2-1:2007 GB/T 2423.1-2008
3	High Temperature Storage	+90℃，500H	IEC60068-2-2:2007 GB/T 2423.2-2008
4	Low Temperature Storage	-40℃，500H	IEC60068-2-1:2007 GB/T 2423.2-2008
5	Storage at High Temperature and Humidity(non-operation)	+60℃，90%RH，500H	IEC60068-2-78 :2012 GB/T2423.3—2016
6	Thermal Shock (non-operation)	-30℃，30min~85℃，30min，change time：5min，100cycle Start with cold temperature, End with high temperature	Start with cold temperature, End with high temperature, IEC60068-2-14:2009, GB/T 2423.22-2012
7	ESD	C=150pF、R=330Ω Air: ±15KV Contact:±8KV 5point/panel, 5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T 2423.5-2019
8	Vibration Test (non-operation)	1G Waveform: sinusoidal Frequency range: 5~500Hz Frequency sweep rate: 0.5 octave/mim Duration: one sweep from 5 to 500Hz in each of three mutually perpendicular axis(each x,y,z axis:1hour,total 3hrs)	IEC60068-2-6:2007 GB/T 2423.5-2019
9	Shock Test (non-operation)	Half Sine Wave 60G ,2ms,±X,±Y,±Z 2times for each direction	IEC60068-2-27:2008 GB/T 2423.5-2019
10	Package Drop Test	Weight≤10Kg，Height:80cm; Weight > 10Kg, ，Height:60cm; 1corner,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

Table 8.1 RA test condition

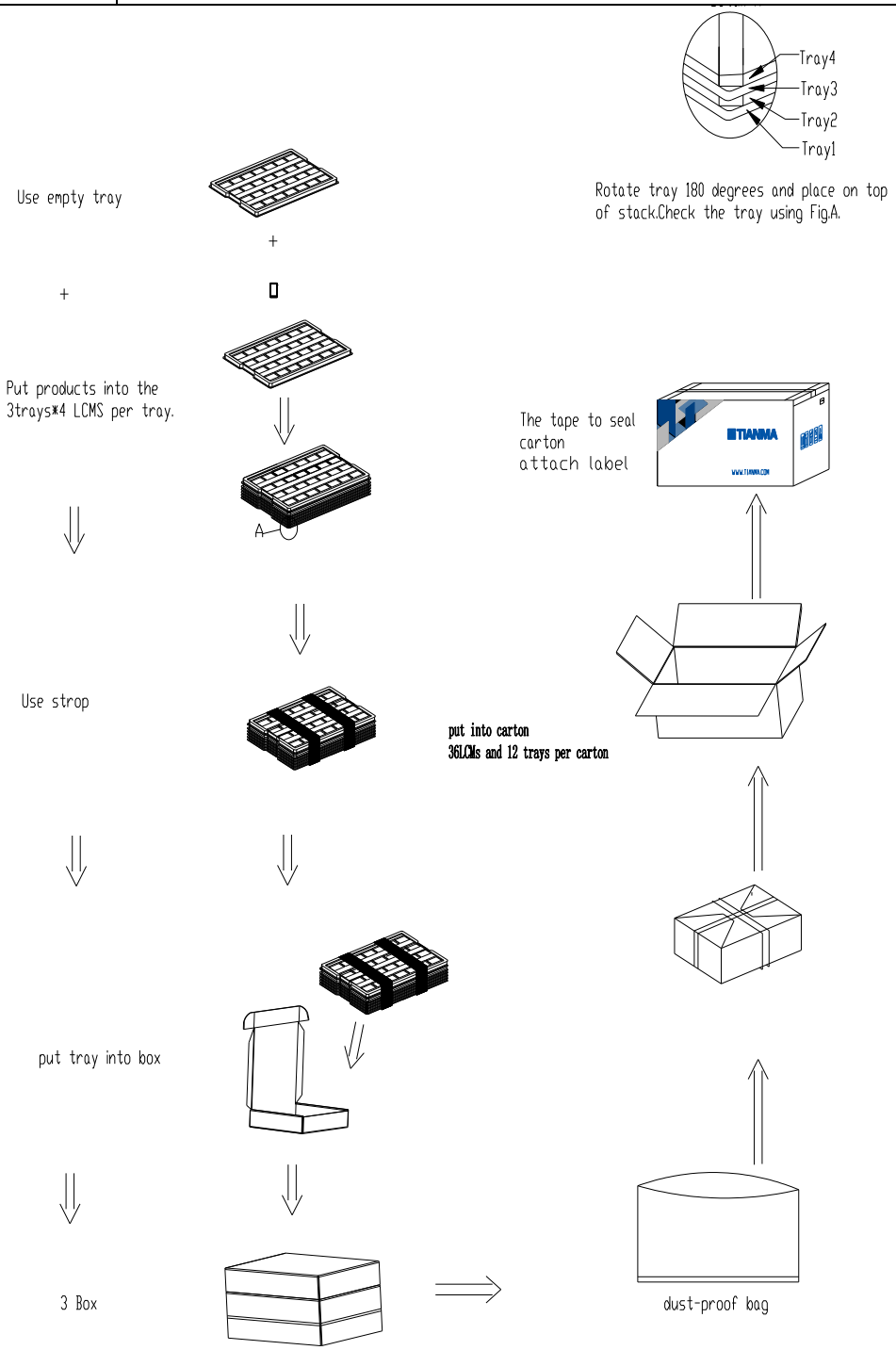
Note1: Temperature is the ambient temperature of sample
Note2: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.
Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product's function only be guaranted, but not for all of the cosmetic specification.

9. Mechanical Drawing



10. Packing Instruction

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	P0700WVF1MA00	169.8×109.7×7.5	0.211	36	
2	Tray	PET	485×330×22	0.215	12	
3	Dust-proof Bag	PE	700×545×0.05	0.021	1	
4	Carton	Corrugated Paper	544×365×250	1.01	1	
5	BOX	Corrugated Paper	520×345×74	0.380	3	
6	Label		100×52	0.001	1	
7	Total weight	14.5 Kg±10%				



11. Precautions for Use of LCD Modules

11.1 Handling Precautions

(1) The display panel is made of glass. Do not subject it to mechanical shock by dropping it, etc.
(2) If the display panel is damaged and the liquid crystal fluid inside it leaks out be sure not to get any in your mouth. If the fluid comes into contact with your skin or clothes promptly wash it off using soap and water.
(3) Do not apply excessive force to the display surface or the bezel since this may cause the color tone to vary.
(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle the polarizer carefully.
(5) If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is still not completely clear use a moist cloth with one of the following solvents:
- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Specifically, do not use the following:
- Water
- Ketone
- Aromatic solvents

(6) Do not disassemble the LCD Module.
(7) If powered off, do not apply the input signals.
(8) To prevent destruction of the module by static electricity, be careful to maintain an optimum work environment.
(9) Be sure to ground your body when handling the LCD Modules.
(10) Tools used for assembly, must be properly grounded.
(11) To reduce the amount of static electricity generated, do not conduct assembly or other work under very low humidity conditions.
(12) The LCD Module is covered with a film to protect the display surface, remove film slowly under the ionizer.

11.2 Storage precautions

(1) When storing the LCD modules avoid exposure to direct sunlight or to the light of fluorescent lamps.
(2) The LCD modules should be stored within the rated storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is: Temperature: 0 ~ 35 ℃ at normal humidity.
(3) The LCD modules should be stored in a room without acid, alkali or other harmful gas.

11.3 Transportation Precautions

The LCD modules should not be dropped or subject to violent mechanical shock during transportation. Also they should avoid excessive pressure, water, high humidity and direct sunlight.

11.4 Screen saver Precautions

Not display the fixed pattern for a long time. Use a screen saver, if the fixed pattern is displayed on the screen

11.5 Safety Precautions

(1) When you waste damaged or unnecessary LCDs, it is recommended to crush LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned
(2) Be sure to turn off the power supply when inserting or disconnecting the LED backlight cable.
(3) LED driver should be designed carefully to limit or stop its function when over current is detected on the L ED.