SPECIFICATION

[ ] Preliminary Specification
[◉] Final Specification

Description 7” 800xRGBx480 TFT-LCD Module
Part Number P0700WVN1MB01

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

REVISION HISTORY

Rev	Date	Page	Revision Items	Editor
2.0	2021/12/07	-	Final spec.	Chunhui Yang

CONTENTS

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

- Surface treatment
- Interface: RGB

- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03 (File number: E170632)
- 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	0.1926 (H) x 0.179(V)	mm
	TFT Active Area	154.08 (W) x 85.92 (H)	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	TN, Normally White	
	Surface Treatment	Anti-Glare	
	Viewing Direction	12 o'clock	
	Gray Scale Inversion Direction	6 o'clock	
Mechanical Characteristics	LCM (W x H x D)	164.9x 100 x 5.7	mm
	Weight	160	g
Optical Characteristics	Luminance	450	cd/m^2
	Contrast Ratio	800:1	
	NTSC	50	%
	Viewing Angle	80/80/80/60(TN)	degree
Electrical Characteristics	Interface	RGB 24 bits	
	Color Depth	16.7 Million	color
	Power Consumption	LCD:200; Backlinght:1536	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
Matching connector	HIROSE FH12A-50S-0.5H

Table 3.1.1 Connector information

No	Symbol	I/O	Description	Comment
1	VLED+	P	Led anode	
2	VLED+	P	Led anode	
3	VLED-	P	Led cathode	
4	VLED-	P	Led cathode	
5	GND	P	Ground	
6	NC	N	No Connection	
7	VCC	P	Digital power supply	
8	MODE	I	DE/SYNC mode select. H:DE mode, L:SYNC mode	
9	DE	I	Data enable signal, active high to enable data,if not used,please pull low	
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	Note1
33	R2	I	Red data	Note1
34	R1	I	Red data	Note1
35	R0	I	Red data（LSB）	
36	GND	P	Ground	
37	DCLK	I	Clock for input data, latching data at falling edge	
38	GND	P	Ground	
39	LR	I	Source left or right sequence control	
40	UD	I	Gate up or down scan control	
41	VGH	P	Positive power of TFT	
42	VGL	P	Negative power of TFT	
43	AVDD	P	Analog power supply	
44	RESET	I	Global reset pin	
45	NC	N	No Connection	
46	NC	N	No Connection	
47	DITHB	I	Dithering setting. H: 6bit resolution, L: 8bit resolution	
48	GND	P	Ground	
49	NC	N	No Connection	
50	NC	N	No Connection	

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: This LCD module supports DE mode, the pin setting is different from each other. Please refer to the descriptions.

3.2 U/D R/L Function Description

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

4. Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.5	3.95	V	
	AVDD	-0.50	14.85	V	
	VGH	-0.30	42.00	V	
	VGL	VGH-42	0.30	V	
	VGH-VGL	-0.30	40.00	V	
Input voltage	V_{IN}	-0.5	5.0	V	Note1
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tst	-30	80	℃	
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

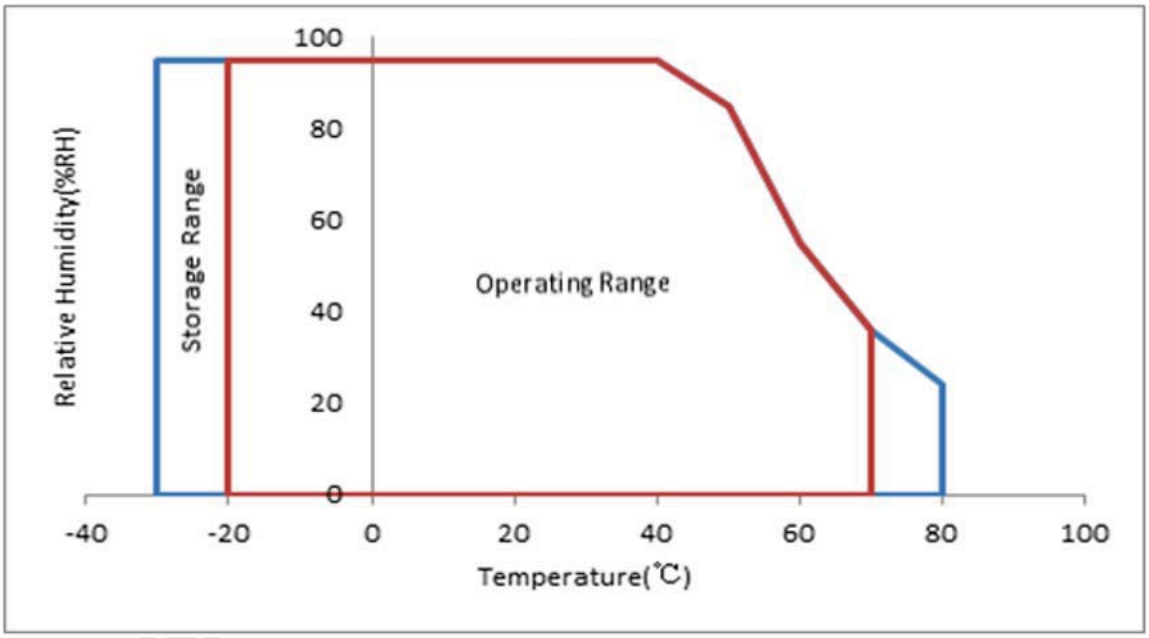


Table 4.2 Absolute Maximum Ratings chart

Note1: Input voltage include all in put 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 DC Characteristics for Panel Driving

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Digital supply Voltage		VCC	3.2	3.30	3.40	V	
Analog supply Voltage		AVDD	10.3	10.4	10.5	V	
Gate on voltage		VGH	15	16	17	V	
Gate off voltage		VGL	-7.20	-7.00	-6.80	V	
Input Signal Voltage	Low Level	V_{IL}	0	-	0.3xVCC	V	R0~R7,G0~G7,0~B7,DE, DCLK,HSYNC,VSYNC,MODE, RESET,LR,UD, DITHB
	High Level	V_{IH}	0.7xVCC	-	VCC	V	
Current of digital supply voltage		I_{VCC}	-	-	10	mA	VCC=3.3V,blackpattern
Current of analog supply voltage		I_{AVDD}	-	-	30	mA	AVDD=10.4V,blackpattern
Current of Gate on voltage		I_{VGH}	-	-	0.3	mA	VGH=16.0V,blackpattern
Current of Gate off voltage		I_{VGL}	-	-	0.3	mA	VGL=-7.0V,blackpattern

Table 5.1.1 Operating Voltages

Note1: Indicated the subsequent version may be updated.

5.2 DC Characteristics for Backlight Driving

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	I_F	-	160.0	200	mA	24 LEDs (3 LED Serial, 8 LED Parallel)
Forward Current Voltage	V_F	9	9.6	10.8	V	
Backlight Power Consumption	W_{BL}	-	1536	2160	mW	
Operating Life Time	--	20000	30000	--	hrs	Note 2, Note 3

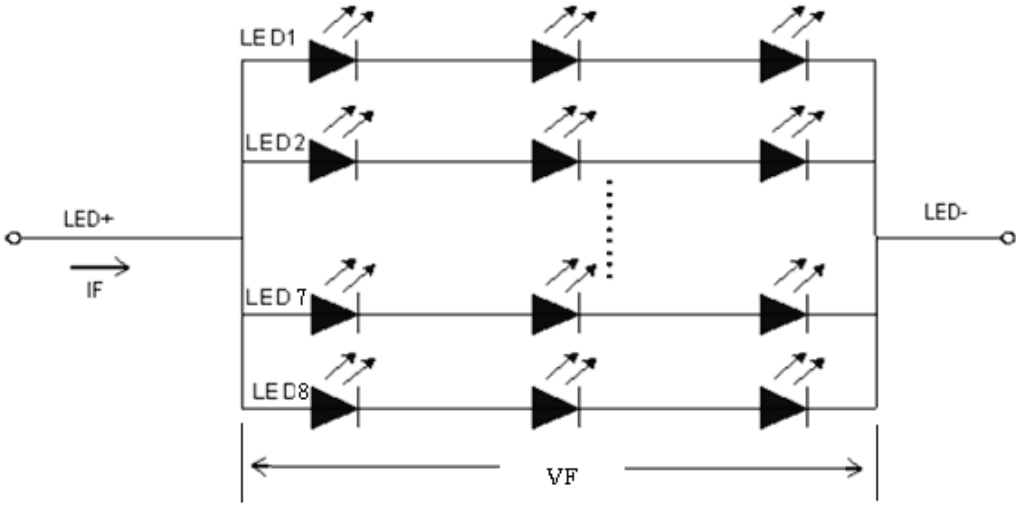
Table 5.2.1 LED Backlight Characteristics

Note1: I_F is defined for each channel.

Note2: Optical performance should be evaluated at Ta=25℃ only.

Note3: If LED is driven by high current, high ambient temperature & humidity condition,The life time of LED will be reduced.

Note4: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.



5.3 LCD Module Block Diagram

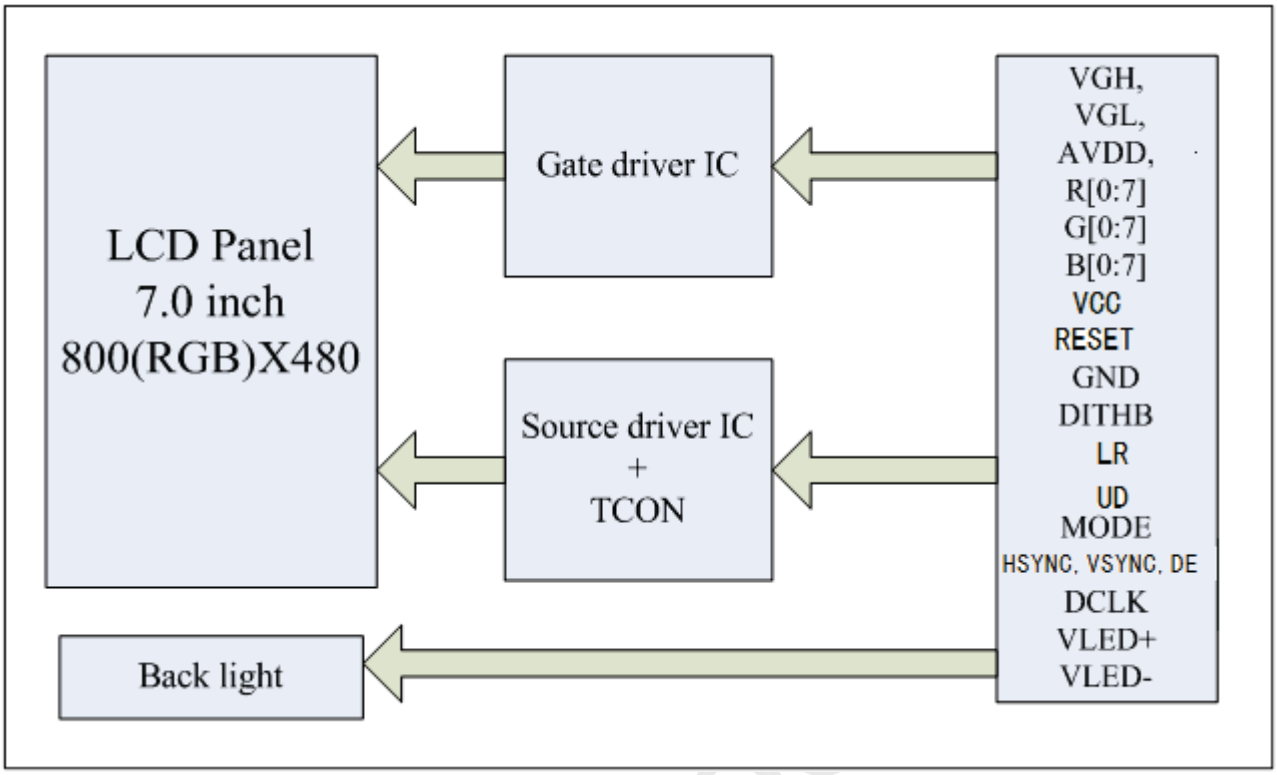


Figure 5.5.1 LCD Module Block Diagram

6. Interface Timing Characteristics

6.1 AC characteristics

VCC=3.3V, GND=0V, Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK frequency	F_{clk}	28	30.0	40.0	MHz	
DCLK cycle time	T_{cph}	25	33.3	36	ns	
DCLK pulse width	T_{cw}	40%	50%	60%	T_{cph}	
VSYNC setup time	T_{vst}	8			ns	
VSYNC hold time	T_{vhd}	8	-	-	ns	
HSYNC setup time	T_{hst}	8			ns	
HSYNC hold time	T_{hhd}	8	-	-	ns	
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	
DE hold time	T_{ehd}	8	-	-	ns	

Table 6.1.1 Input Setup Timing Parameters Requirement

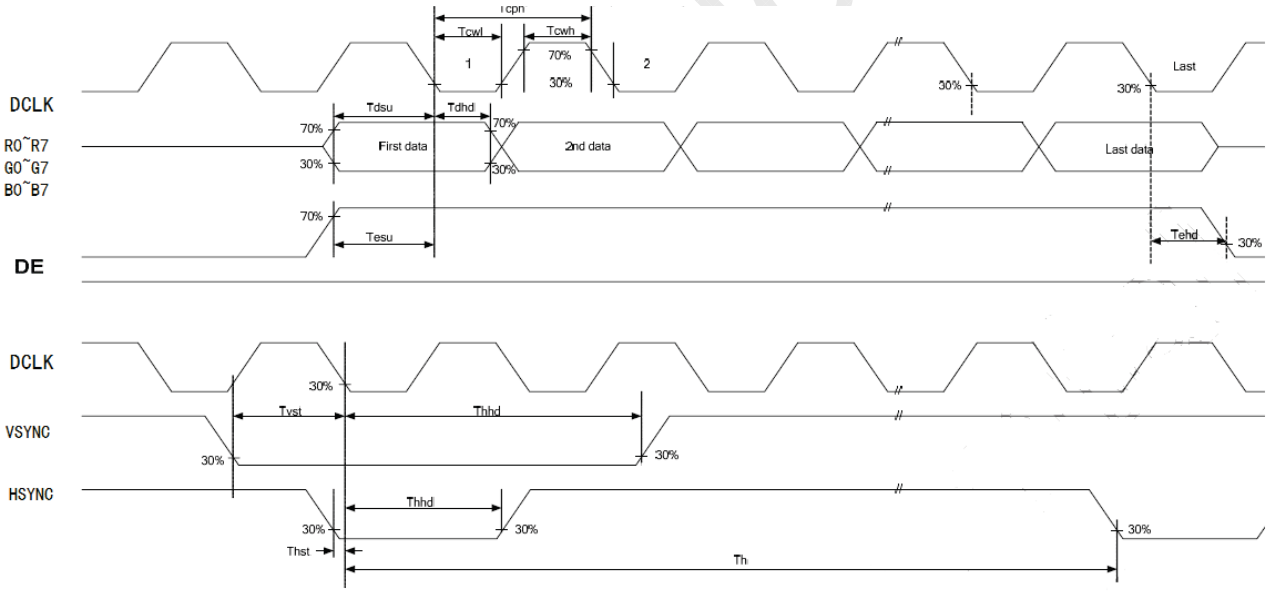


Figure 6.1.1 Clock and Data Input Timing Diagram

6.2 Data Input Timing Parameter Setting

TCON (Embedded In Source IC) Input Timing (DCLK, HSYNC, VSYNC, DE)

VCC=3.3V, GND=0V, Ta=25℃

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK	FCLK	28	30	40	MHZ	
	TCLK	20	33.3	36	ns	
HSD	th	862	1056	1200	tclk	
	thd	800	800	800	tclk	
	thpw	1	-	40	tclk	
	thb	46	46	46	tclk	
	thfp	16	210	354	tclk	
VSD	tv	513	525	650	th	
	tvd	480	480	480	th	
	tvpw	1	3	20	th	
	tvb	23	23	23	th	
	tvfp	7	22	147	th	

Note 1: DE timing refer to HSYNC, VSYNC input timing.

Table 6.2.1 Data Input Timing Parameters

6.3 TCON Vertical Input Timing Diagram HV

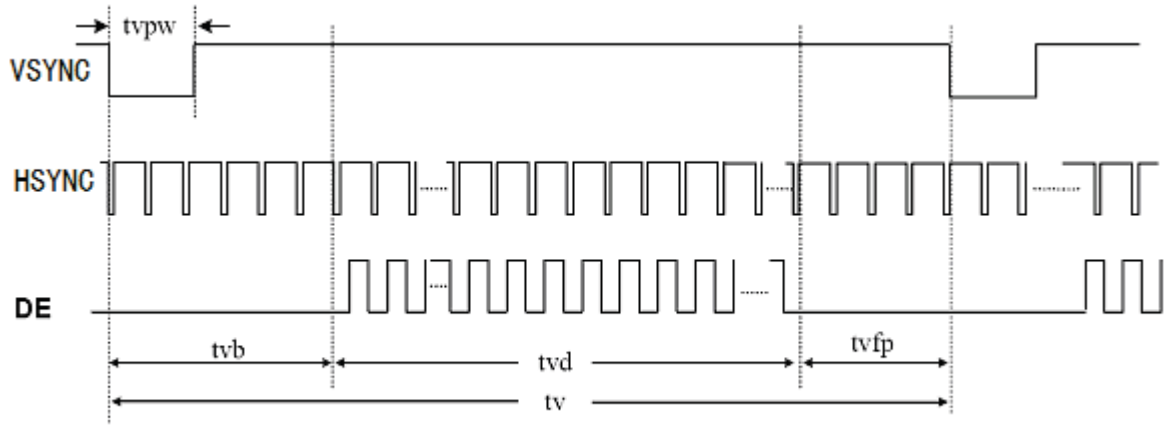


Figure 6.3.1 TCON Vertical Input Timing Diagram HV

6.4 TCON Horizontal Input Timing Diagram

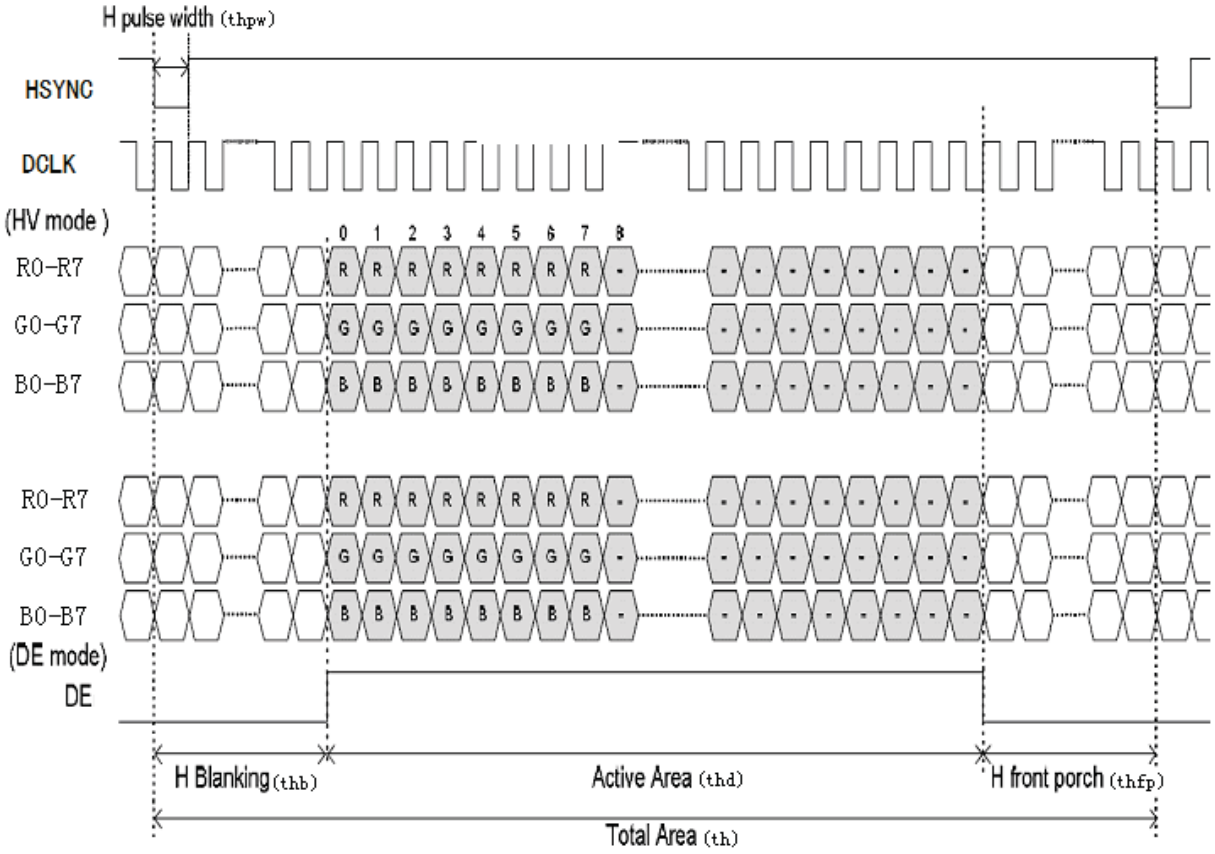
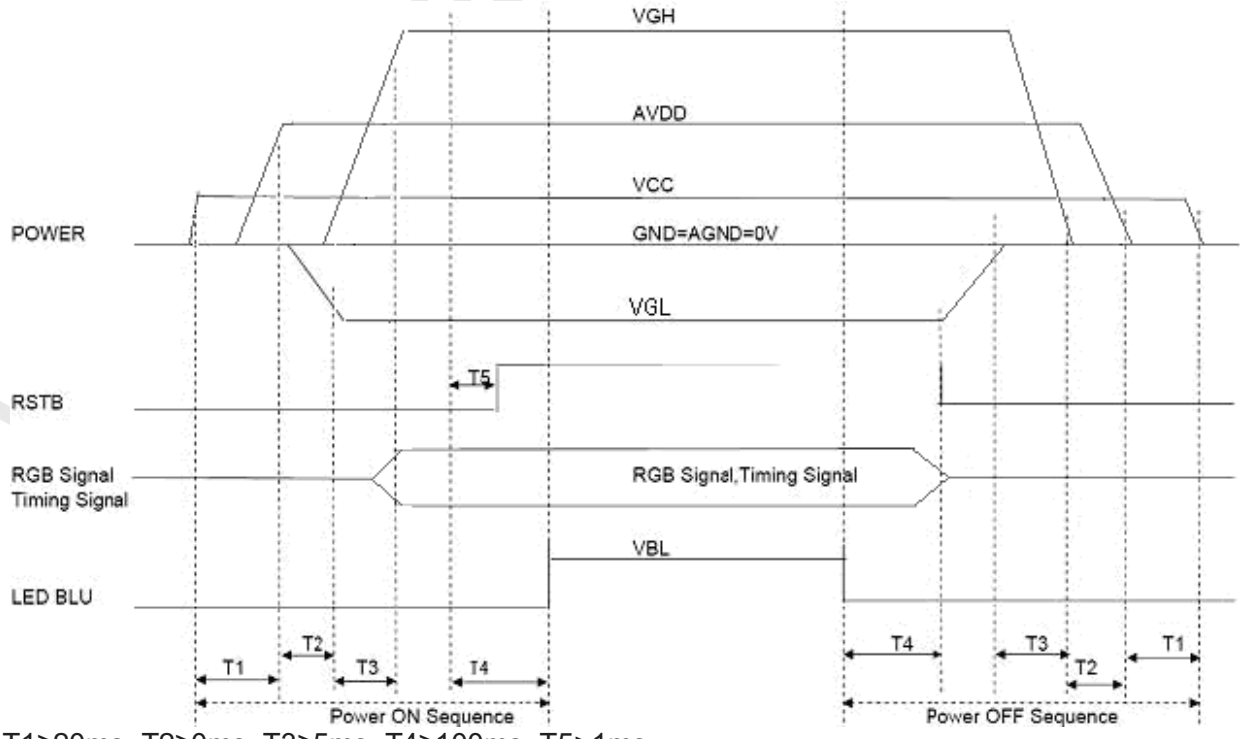


Figure 6.4.1 TCON Horizontal Input Timing Diagram

6.5 Power On/Off Sequence



Note 1: T1≥20ms, T2≥0ms, T3≥5ms, T4≥100ms, T5>1ms

Figure 6.5.1 Power On/Off Sequence

7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	50	60	-	degree	Note2,3
		θB		60	80	-		
		θL		60	80	-		
		θR		60	80	-		
Contrast Ratio		CR	θ=0°	600	800	-		Note 3
Response Time		T_{ON}	25℃	-	15	-	ms	Note 4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.269	0.319	0.369		Note 1,5
		y		0.295	0.345	0.395		
	Red	x		0.539	0.589	0.639		Note 1,5
		y		0.303	0.353	0.403		
	Green	x		0.295	0.345	0.395		Note 1,5
		y		0.545	0.595	0.645		
	Blue	x		0.100	0.150	0.200		Note 1,5
		y		0.047	0.097	0.147		
Uniformity		U		75	85		%	Note 6
NTSC		-		45	50		%	Note 5
Luminance		L		400	450		cd/m^2	Note 7

Table 7.1 Optical Parameters

Test Conditions:

1. I_F= 160 mA, V_F=9.6 V 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.

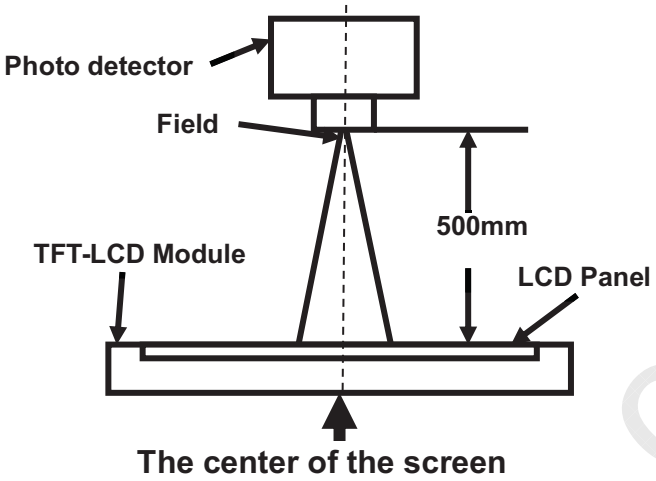


Fig1.Measurement Set Up

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

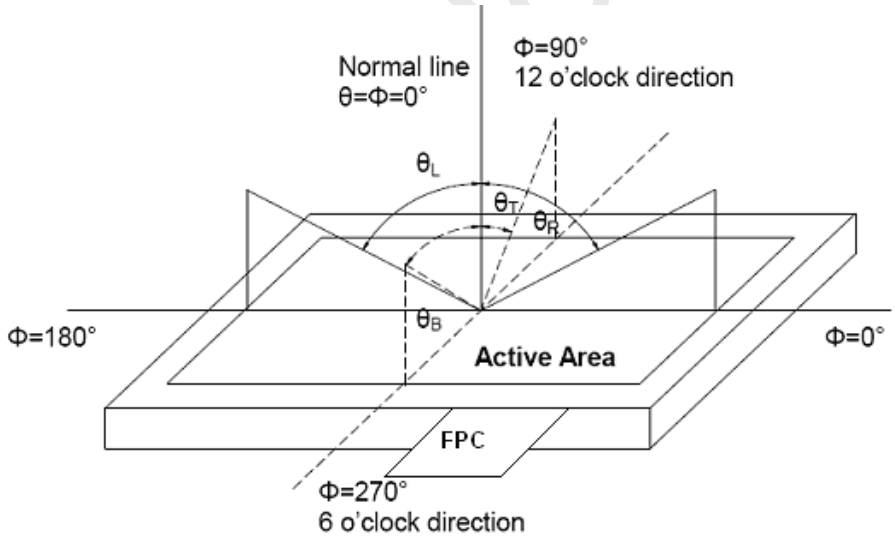


Fig2. Measurement viewing angle

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 TN 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 90% to 10%. And fall time (T_f) is the time between photo detector output intensity changed from 10% to 90%.

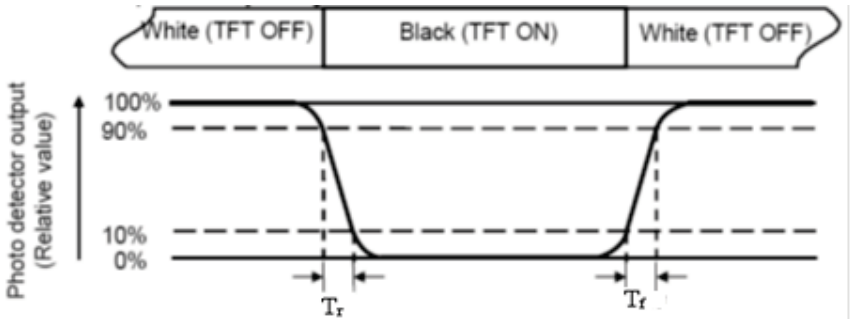


Fig3. Response Time Testing(TN)

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%.

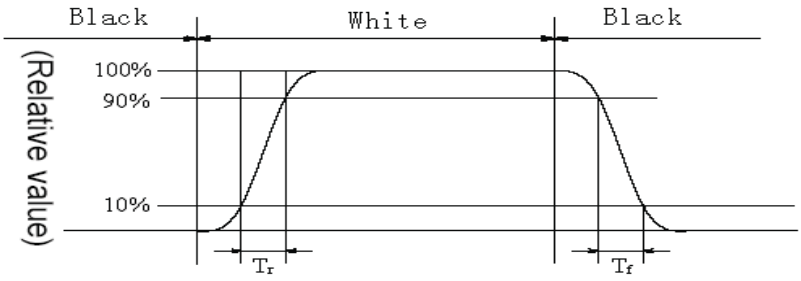


Fig4.Response Time Testing(SFT)

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

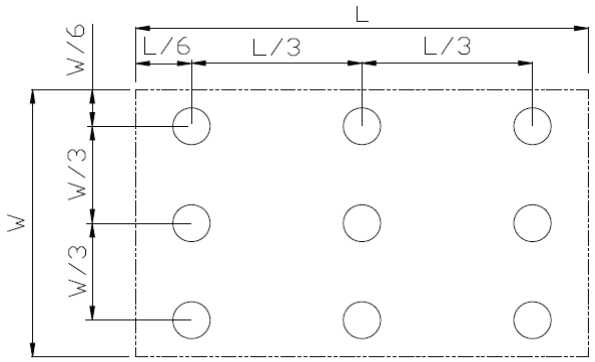


Fig5. Luminance Uniformity Measurement Locations(9 points)

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

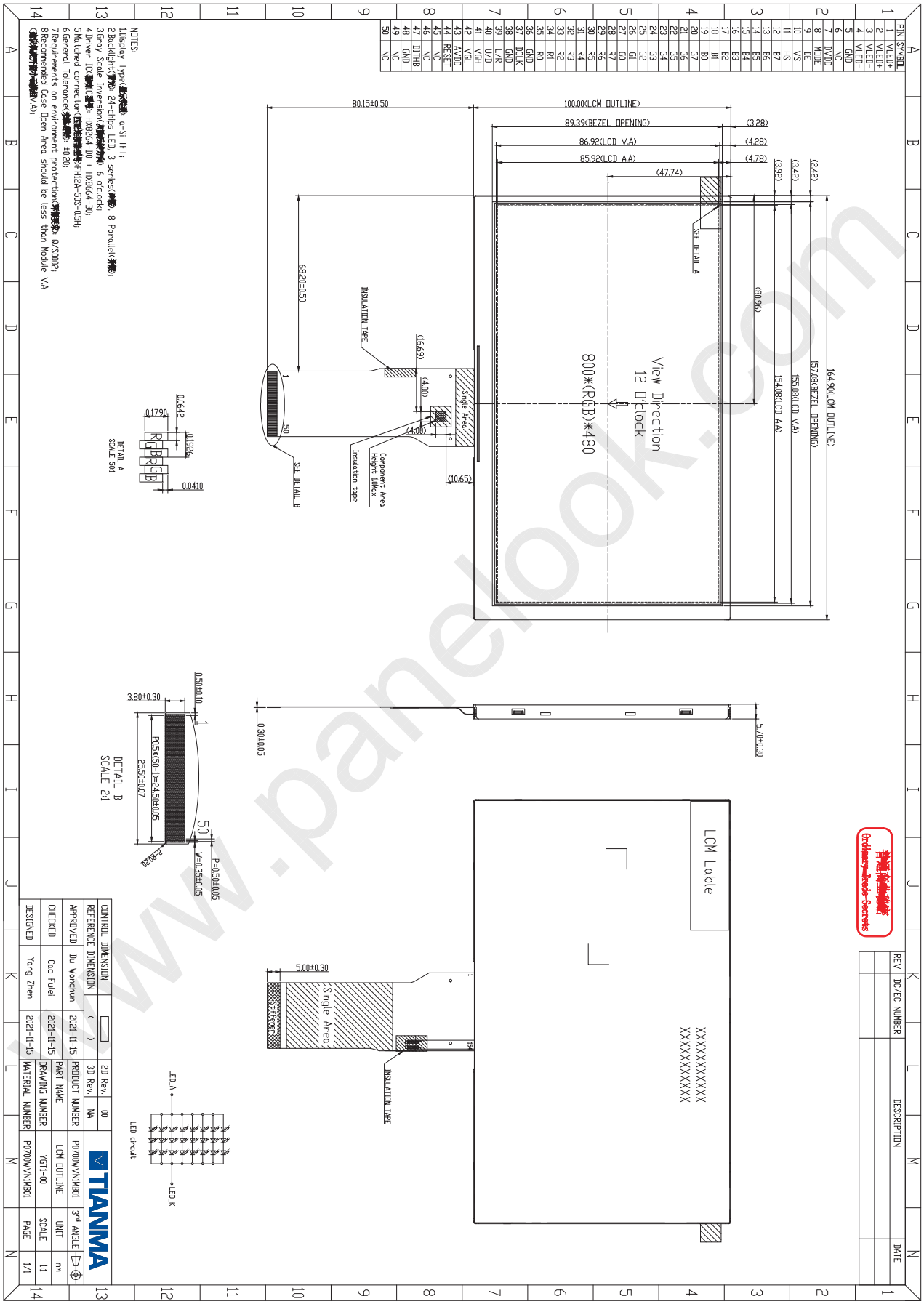
8. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	+70℃，240H	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	-20℃，240H	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	+80℃，240H	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	-30℃，240H	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity(non-operation)	+60℃，90%RH，240H	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, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=150pF，R=330Ω，5point/panel Air：±8kv，5times； Contact：±4kv，5times； （Environment：15℃~35℃，30%~60%，86Kpa~106Kpa）	IEC61000-4-2:2001 GB/T17626.2-2006
8	Package Vibration	5-20-200HZ，PSD：0.01-0.01-0.001 Total:0.781g2/HZ,x/y/z 30min）	
9	Package Drop Test	Height: X cm,1 corner, 3edges, 6 surfaces Note：X＞10Kg:60cm；≤10Kg:80cm	IEC60068-2-32:1990 GB/T2423.8—1995

Table 8.1 RA test condition

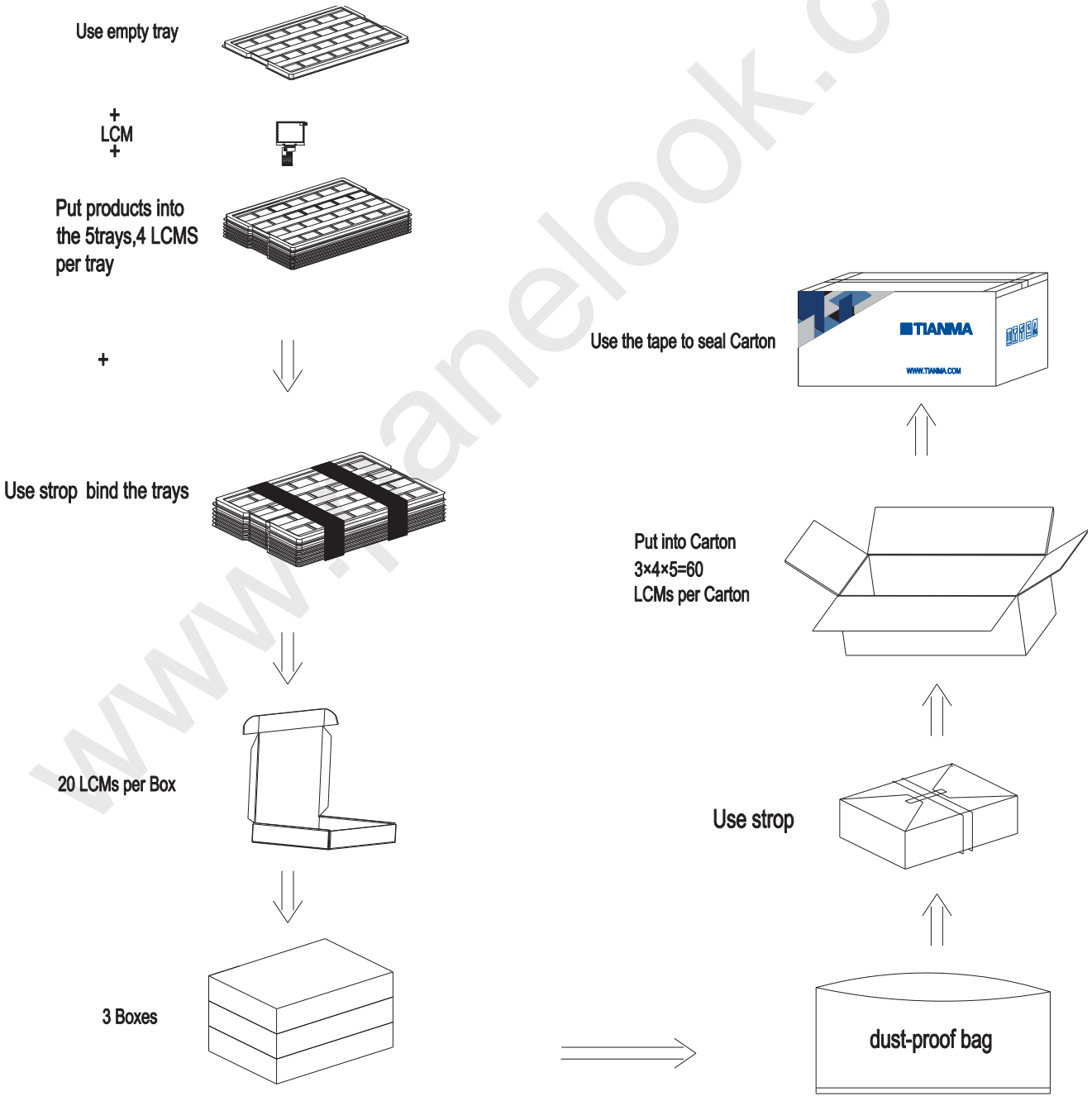
Note1: Temperature is the ambient temperature of sample
Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.
Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability 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	P0700WVN1MB01	164.90×100.00×5.70	0.160	60	
2	Tray	PET	485×330×17	0.22	18	Anti-static
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	0.227	3	
6	Label		100×52	0.002	1	
7	Total weight	14.2 Kg±0.5%				



2*3/layer*total 5layers

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. 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.