SPECIFICATION

[ ] Preliminary Specification
[◉] Final Specification

Description **10.1” 1280(RGB) x 800 TFT-LCD Module**

Part Number **P1010WXF1VA00**

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

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1.0	2023/11/28	-	Preliminary spec	Hongwei Liu
2.0	2025/04/16	All	Final Spec. release	Hongwei Liu

CONTENTS

1. Summary

1.1 General Description

This is a 10.1 inch a-Si TFT-LCD module with Normal- Black technology. It is composed of a TFT-LCD panel, a driver circuit, PCB, LED backlight and a CTP unit.

1.2 Features

- Ultra-wide viewing angle
- Interface:LVDS
- Projected capacitive touch panel
- Interface: USB
- Lamination type: Air-bonding
-
- 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	10.1 inch	
	Resolution	1280(RGB) x 800	
	Pixel Pitch	0.1695x0.1695	mm
	TFT Active Area	216.96x135.60	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	SFT, Normally Black	
	Surface Treatment	HC	
	Viewing Direction	All direction	
Mechanical Characteristics	LCM (W x H x D)	LCM：229.80x149.0 x 6.2	mm
		CTP+LCM：258.66x177.30x8.25	mm
	Weight	462.9	g
Optical Characteristics	Luminance	1200	cd/m^2
	Contrast Ratio	1200:1	
	NTSC	50	%
	Viewing Angle	89/89/89/89	degree
Electrical Characteristics	Interface	LVDS, 6/8bit selectable	
	Color Depth	262k/16.7 Million	color
	Power Consumption	LCD:1155 Backlight:6600	mW
Touch Spec	Type	GG	
	Lamination Type	Air-bonding	
	Number of simultaneous touches	≤5 points @ 7mm copper cylinders	
	Minimum Touch Area	Φ7mm	
	Finger Touch Pitch	≥14mm	
	Interface	USB	

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
Matching connector	**JAE FI-SE20P-HFE-E3000 or equivalent**

Table 3.1.1 Connector information

No	Symbol	I/O	Description	Comment
1	IND3+	I	Positive LVDS Differential data input(3)	Note1
2	IND3-	I	Negative LVDS Differential data input(3)	
3	NC	-	No Connection	
4	SEL6/8	I	6bit/8bit mode select H : 6-bit mode L : 8-bit mode （default）	
5	VSS	P	Power Ground	Note 2
6	PINC	I	Positive LVDS Differential clock input	
7	NINC	I	Negative LVDS Differential clock input	
8	VSS	P	Power Ground	
9	IND2+	I	Positive LVDS Differential data input(2)	
10	IND2-	I	Negative LVDS Differential data input(2)	
11	VSS	P	Power Ground	
12	IND1+	I	Positive LVDS Differential data input(1)	
13	IND1-	I	Negative LVDS Differential data input(1)	
14	VSS	P	Power Ground	
15	IND0+	I	Positive LVDS Differential data input(0)	
16	IND0-	I	Negative LVDS Differential data input(0)	
17	VSS	P	Power Ground	
18	NC	-	No Connection	
19	VDD	P	Power Supply	
20	VDD	P	Power Supply	

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.

4.1 CN2 Pin assignment (Back Light)

Connector Information	
Matching connector	**JAE FI-S6P-HFE-E1500**

Table 3.2.1 Connector information

No	Symbol	I/O	Description	Wire Color
1	VLED	P	Backlight power supply	Note1
2	VLED	P	Backlight power supply	
3	VLSS	P	VLED Ground	Note2
4	VLSS	P	VLED Ground	Note1
5	LED_EN	I	Backlight on/off control	
6	LED_PWM	I	Backlight dimming control	

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.

4.2 CN3 Pin assignment (PCAP)

Connector Information	
Matching connector	**MOLEX 53261-0871**

Table 3.3.1 Connector information

No	Symbol	I/O	Description	Remark
1	VDD1	P	Power for ctp	Note1
2	D-	I/O	USB data- pin	
3	D+	I/O	USB data+ pin	
4	VSS1	P	Power Ground	Note2
5	NC	-	No Connection	
6	NC	-	No Connection	
7	NC	-	No Connection	
8	NC	-	No Connection	

Table 3.3.2 Pin Assignment for PCAP 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
LCD Power Voltage	VCC	-0.5	5.0	V	Note1
LCD Input voltage	V_{IN}	-0.5	5.0	V	
CTP Input voltage	VDD1	-0.3	5.5	V	
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

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

6.1 DC Characteristics for Panel Driving

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Power supply Voltage		VDD	3.20	3.30	3.40	V	
Power supply ripple		Vp-p	-	-	100	mV	
Power supply current		I_{VDD}	-	350	525	mA	White pattern
Power consumption		P	-	1155	1785	mW	White pattern
Differential input voltage		$\|V_{ID}\|$	200	400	600	mV	
Differential input common voltage		R_{xVCM}	0.6	1.2	2.4-$\|V_{ID}\|$/2	V	
Differential input threshold voltage	Low level	R_{xVTL}	-100	-	-	mV	
	High level	R_{xVTH}	-	-	100	mV	
Inrush current		Irush	-	-	1.5	A	VIN Rise time：470us

Table 5.1 Operating Voltages

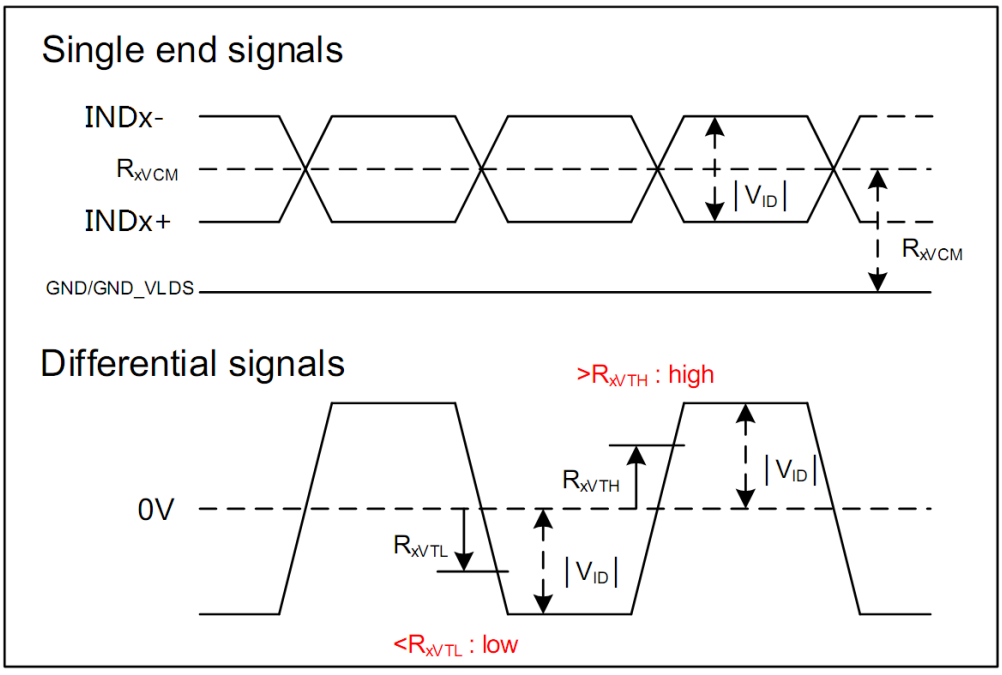


Figure5.1 LVDS DC characteristics

6.2 DC Characteristics for Backlight Driving

Item		Symbol	Min	Typ	Max	Unit	Remark	
Backlight power supply voltage		VLED	11.5	12	12.5	V		
Backlight power supply current		I_LED	-	550	-	mA		
Backlight power consumption		P_LED	-	6600	-	mW		
Input voltage for VLED_PWM signal	High level	-	2.0	-	5.0	V		
	Low level	-	0	-	0.4	V		
Input voltage for VLED_EN	High level	-	2.0	-	5.0	V		
	Low level	-	0	-	0.4	V		
VLED_PWM frequency		Fpwm	200	-	10k	HZ		
VLED_PWM duty		D	0.2		100	%		
Operating Life Time		--	30000	50000	--	hrs	Note1	

Table 5.2.1 LED Backlight Characteristics

Note1: Optical performance should be evaluated at Ta=25℃ only.
Note2: If LED is driven by high current, high ambient temperature & humidity condition, The life time of LED will be reduced.
Note3: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.

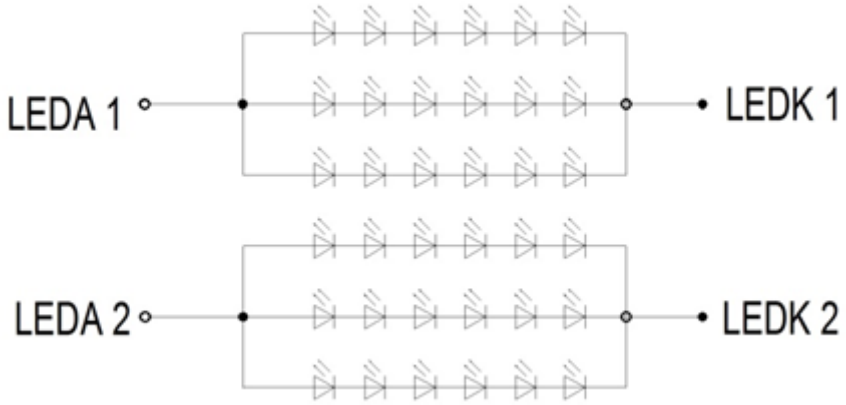


Figure 5.2.2 LED connection of backlight

Note 1: According to LED driver IC characteristics, the minimum value of VELD_PWM duty may vary with VLED_PWM frequency, higher the frequency, bigger the duty.
Note 2: 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% of initial brightness.
Typical operating life time is estimated data

6.3 DC Characteristics For CTP

Item	Min	Typ	Max	Unit	Note
Power supply voltage	4.7	5.0	5.3	V	
IO voltage	4.7	5.0	5.3	V	Note 1
Operating mode current	--	103	--	mA	Note 2

Table 5.3.1 PCAP Operating Voltages

Note1: If there are other voltage requirements, can be realized by changing the design, the adjustable range is 4.7V to 5.3V.
Note2: All current measurement is average current at Operating mode.

No.	Item	Specification	NOTE
1	Linearity	±1.5mm at the center , 2.0mm at the border	Copper stickΦ7
2	Veracity	±1.5mm at the center , 2.0mm at the border	Copper stickΦ7
3	Sensitivity	±1.5mm at the center , 2.0mm at the border	Copper stickΦ7

6.4 Recommended Power ON/OFF Sequence

Power ON Sequence

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD on to VDD stable	Tp1	0.5	-	10	ms	
VDD stable to signal on	Tp2	0	-	50	ms	
Signal on to VLED_EN on	Tp3	200	-	-	ms	
PWM on to VLED_EN on	Tp4	0	-	200	ms	
VLED to PWM on	Tp5	10	-	-	ms	
VLED on to VELD stable	Tp6	0.5	-	10	ms	
VDD off time	Tp7	0	-	10	ms	
VDD off to next VDD on	Tp8	500	-	-	ms	
Signal off before VDD off	Tp9	0	-	50	ms	
VLED_EN off before signal off	Tp10	200	-	-	ms	
VLED_EN off before PWM off	Tp11	0	-	200	ms	
PWM off before VLED off	Tp12	10	-	-	ms	

Table 5.4.1 Power on sequence

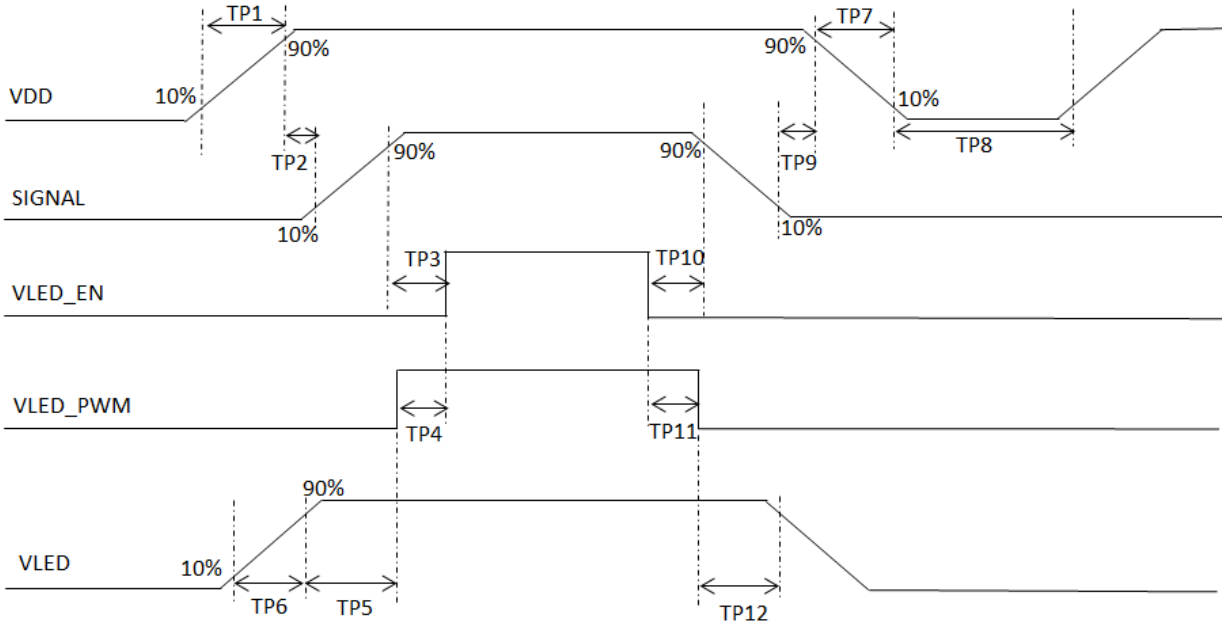


Figure 5.4.1 Power off sequence

Note1: The low level of these signals and analog powers are GND level.
Note2 All of the power and signals should be kept at GND level before power on. If there are residual voltages on them, the LCD might not work properly.
Note3: The power on/off sequence is the first version. It will be updated when the design is fixed.
Note4: BL is the voltage applied to backlight. Keep it turned off until the display has stabilized.

6.5 LCD Module Block Diagram

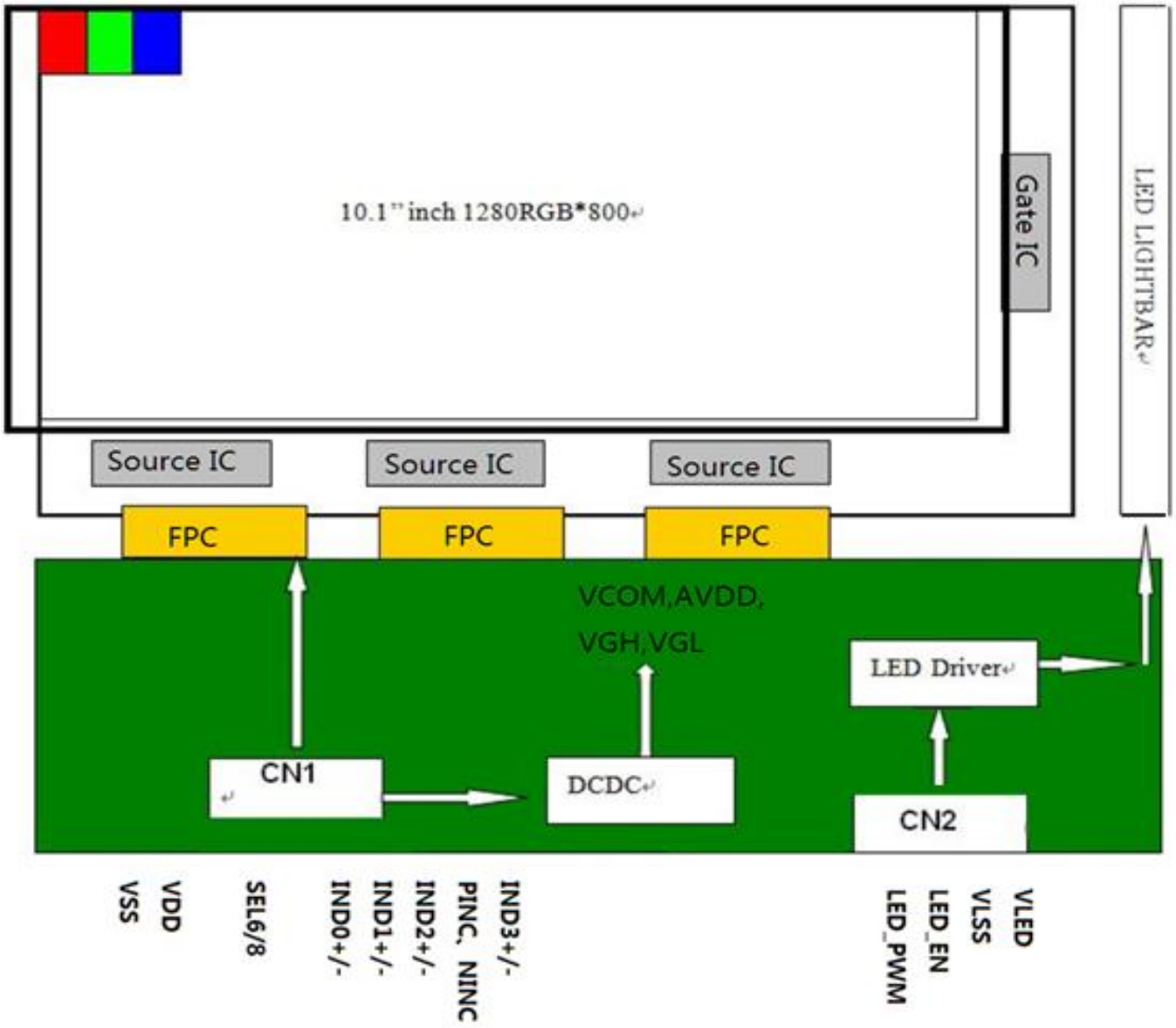


Figure 5.5.1 LCD Module Block Diagram

6. Timing Characteristics

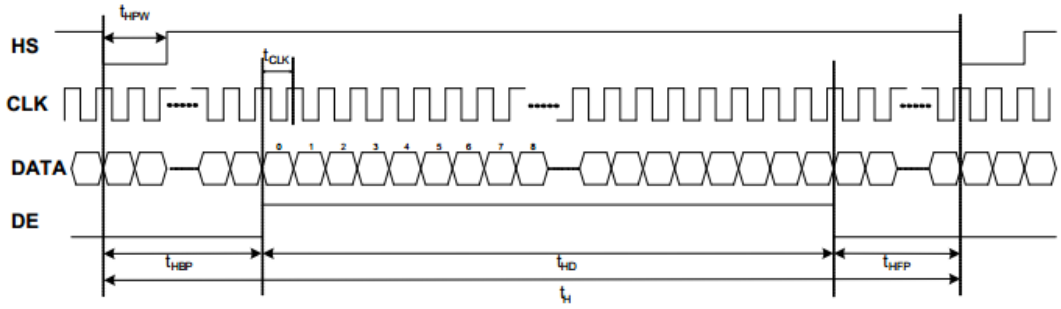
7.1 LVDS signal timing characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remark
CLK frequency	1/tclk	70.1	71.9	75.0	MHz	
Horizontal blanking time	tHBT	136	144	164	tclk	thbp + tHFP
Horizontal back porch	tHBP	5	5	164- tHFP	tclk	
Horizontal display area	tHD	-	1280	-	tclk	
Horizontal front porch	tHFP	131	139	159	tclk	
Horizontal period	tH	1416	1422	1444	tclk	
Horizontal pulse width	tHPW	1	1	256	tclk	
Vertical blanking time	tVBT	5	42	101	tH	tVBP + tVFP
Vertical back porch	tVBP	2	2	101- tVFP	tH	
Vertical display area	tVD	-	800	-	tH	
Vertical front porch	tVFP	3	40	99	tH	
Vertical period	tV	803	842	901	tH	
Vertical pulse width	tVPW	-	1	128	tH	
Frame Rate	F	-	60	-	HZ	

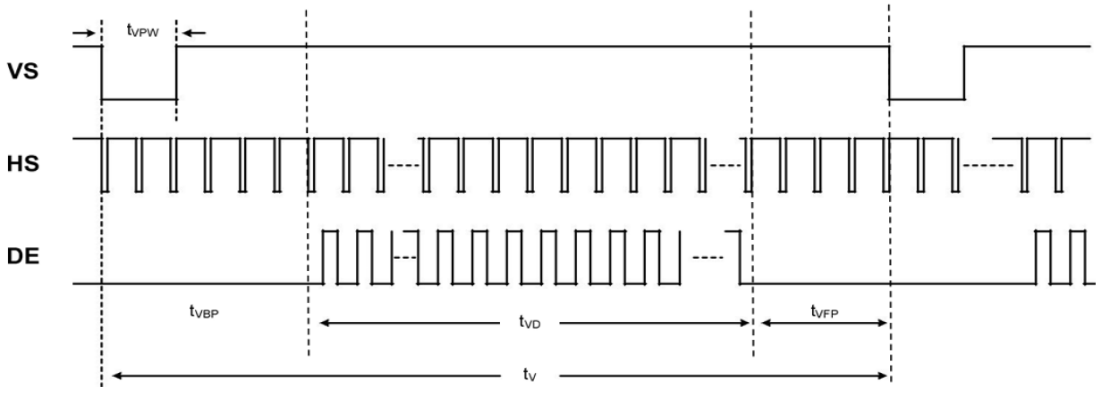
Table 6.1.1 Input Setup Timing Parameters Requirement

7.2 Input Timing Parameter Diagram

Horizontal input timing

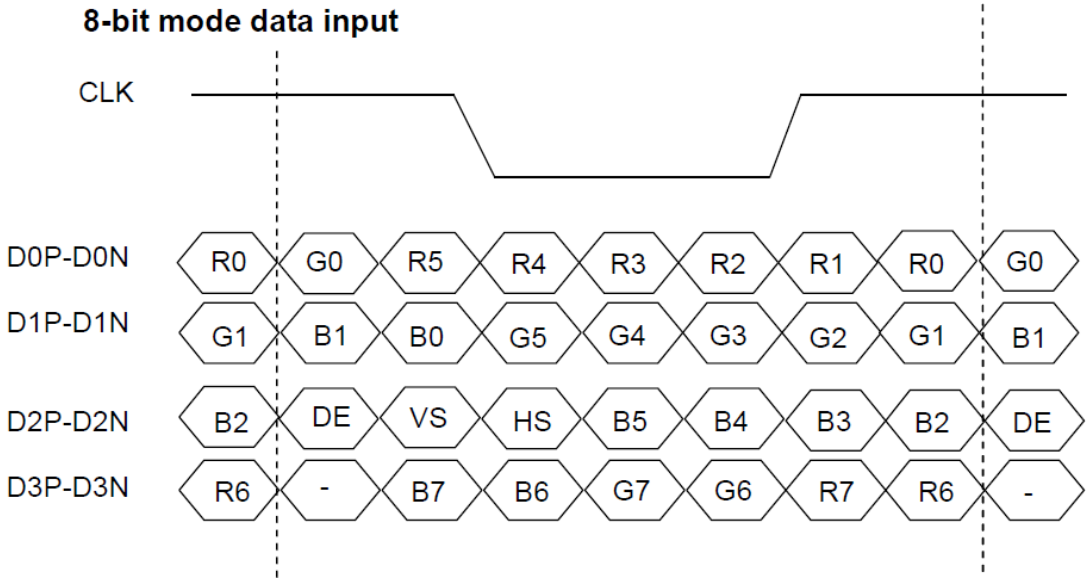


Vertical input timing

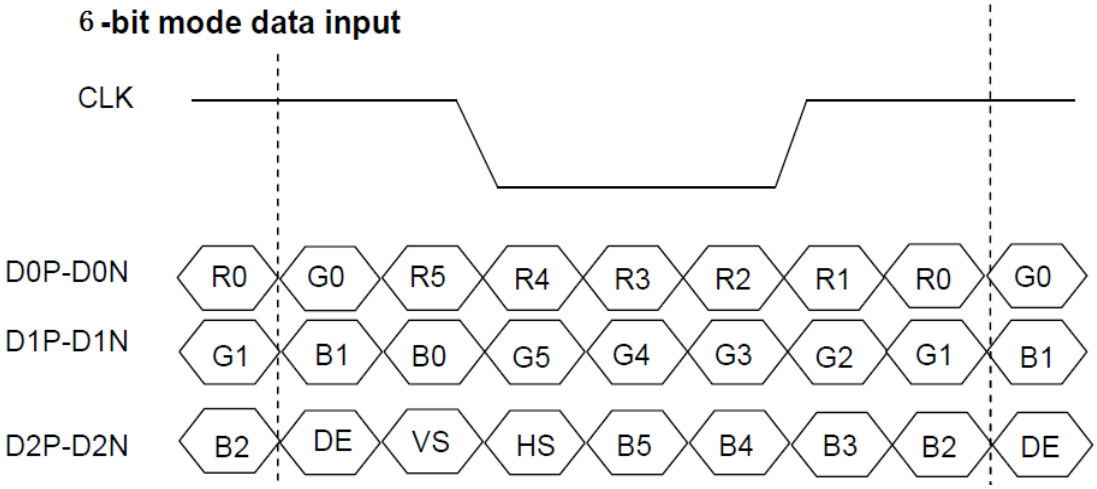


7.3 LVDS data input format

8-bit mode data input



6 -bit mode data input



7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	80	89	-	degree	Note2,3
		θB		80	89	-		
		θL		80	89	-		
		θR		80	89	-		
Contrast Ratio		CR	θ=0°	900	1200	-		Note 3
Response Time		T_{ON+} T_{OFF}	25℃	-	20	30	ms	Note 4
Chromaticity	**White**	x	Backlight is on	0.252	0.302	0.352		Note 1,5
		y		0.277	0.327	0.377		
	Red	x		0.532	0.582	0.632		Note 1,5
		y		0.274	0.324	0.374		
	Green	x		0.300	0.350	0.400		Note 1,5
		y		0.532	0.582	0.632		
	Blue	x		0.104	0.154	0.204		Note 1,5
		y		0.044	0.094	0.144		
Uniformity		U		75	80	-	%	Note 6
NTSC		-		45	50	-	%	Note 5
Luminance		L		960	1200	-	cd/m^2	Note 7

Table 7.1 Optical Parameters

Test Conditions:

1. 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. The optical characteristics are measured at the center point of the LCD screen.

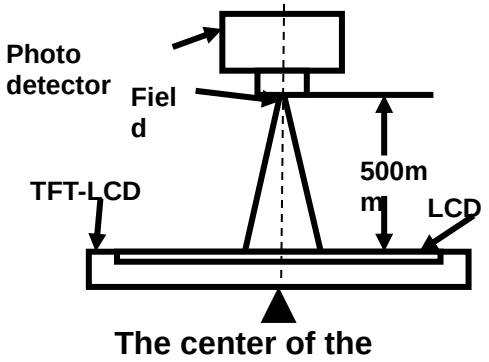


Fig1. Measurement Set Up

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

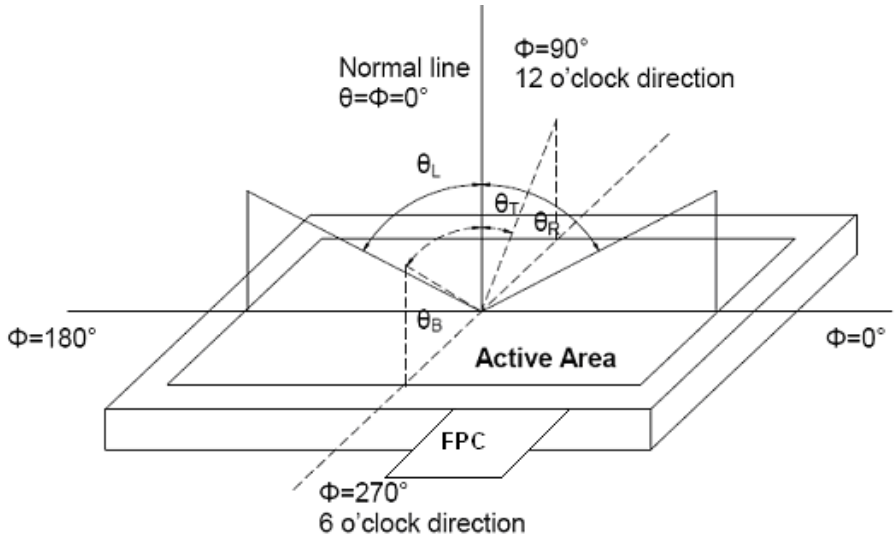


Fig2. Measurement viewing angle

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%.

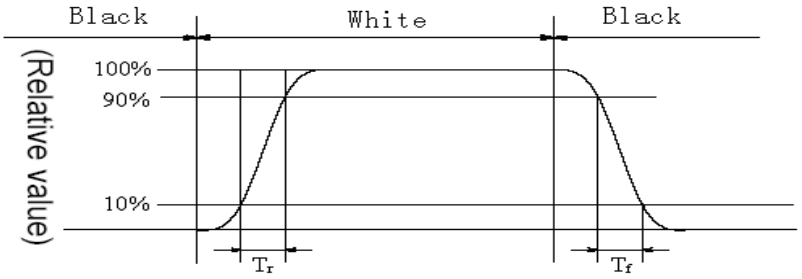


Fig4. Response Time Testing(SFT)

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

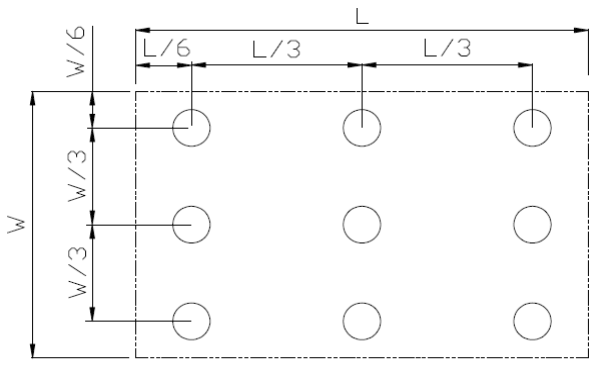


Fig5. Luminance Uniformity Measurement Locations(9 points)

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

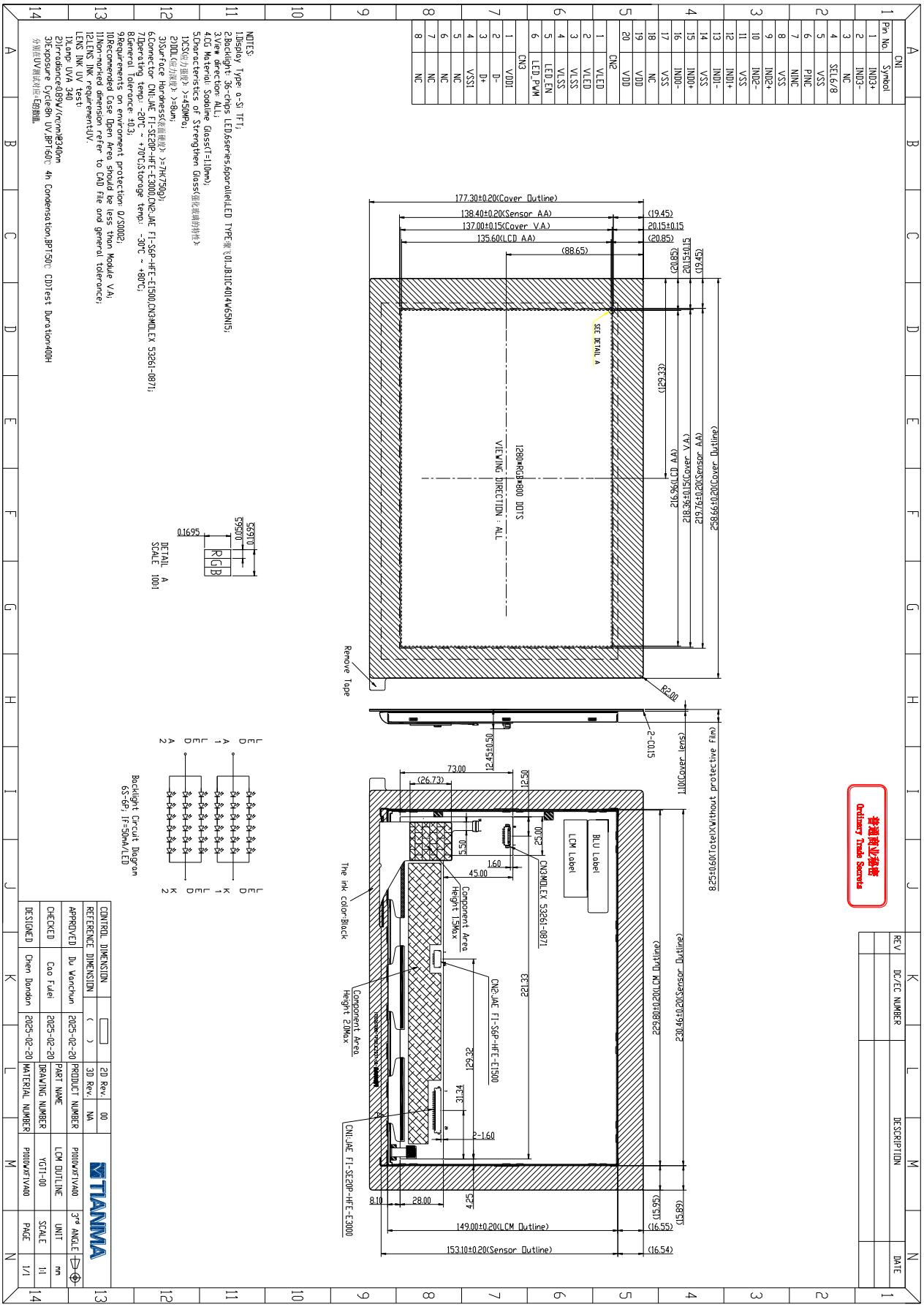
8. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	+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

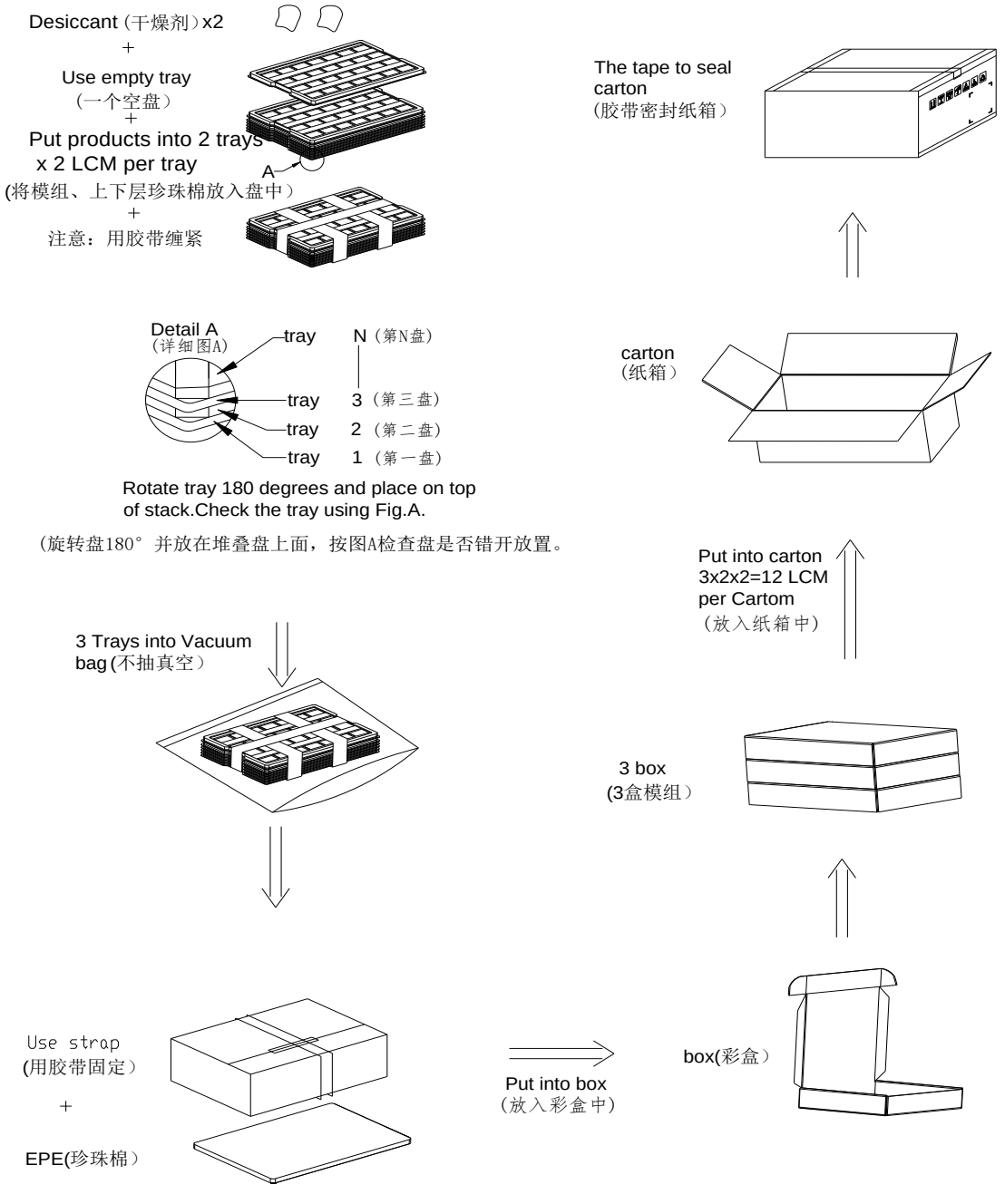
Note1: Temperature is the ambient temperature of sample
Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.
Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product's function only be guaranteed, but not for all of the cosmetic specification.

9. Mechanical Drawing



10. Packing Instruction

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Q'ty	Remark
1	LCM	P1010WXF1VA00	258.66X177.3	0.463	12	
2	Tray	PET	485X330X23	0.2525	9	
3	Anti-static EPE foam	EPE	485X330X5	0.0195	3	
4	Vacuum Bag	PE	600×500×0.08	0.05	3	
5	BOX	PAPER	520×345×74	0.3879	3	
6	Desiccant	Desiccant	45×35	0.002	6	
7	Carton	PAPER	544×365×250	1.01	1	
8	Anti-static EPE foam	EPE	291.29×247.66×1	0.0013	6	
9	Anti-static EPE foam	EPE	393.79×257.46×1	0.002	6	
10	Label	Paper	100×52	0.001	1	
11	Total weight	10.24±5% kg				



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 to limit or stop its function when over current is detected on the LED.