SPECIFICATION

[◉] Preliminary Specification
[ ] Final Specification

Description **10.4” 800xRGBx600 TFT-LCD Module**

Part Number **P1040SVF1MB00**

Customer		Industrial Product Dept, PDBU Tianma Microelectronics Co., Ltd.	
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Comments:			

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

REVISION HISTORY

Rev	Date	Page	Revision Items	Editor
1.0	2024/8/27	-	Preliminary spec	Xu Jitao
1.1	2025/5/20	13	Update 7 Optical Characteristics： 1、Luminance：400 cd/m2 typ.→350 cd/m2 typ.； 350 cd/m2 min.→300 cd/m2 min. 2、White Chromaticity： (0.309，0.334)±0.05 →（TBD，TBD）±0.04	Yang Mengjun
		2	Update 1 General Specifications 1、Luminance：400 cd/m2 typ.→350 cd/m2 typ.	
		3、4	Update Input / Output Terminals 1、Pin Assignment for LCD Interface and Note3 2、Pin Assignment for Back Light Interface	
		17	Update Mechanical Drawing	

CONTENTS

1. Summary

1.1 General Description

This is a 10.4 inch a-Si TFT-LCD module with Normal-Black technology. It is composed of a TFT-LCD panel, a driver circuit, a PCB, a front bezel and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle
- Interface: LVDS
- LED driver integrated
- Surface treatment: Anti-Glare
- This product will apply 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	10.4 inches	-
	Resolution	800(RGB) x 600	-
	Pixel Pitch	0.264 x 0.264	mm
	TFT Active Area	211.20 x 158.40	mm
	Technology Type	a-Si	-
	Pixel Configuration	R.G.B Vertical Stripe	-
	Display Mode	SFT, Normally Black	-
	Surface Treatment	Anti-Glare	-
	Viewing Direction	All direction	-
Mechanical Characteristics	LCM (W x H x D)	236.0 x 176.9 x (6.02)	mm
	Weight	T.B.D.	g
Optical Characteristics	Luminance	350 Typ.	cd/m^2
	Contrast Ratio	1200:1 Typ.	-
	NTSC	(50) Typ.	%
	Viewing Angle	88/88/88/88 Typ.	degree
Electrical Characteristics	Interface	1port LVDS	-
	Color Depth	262K/16.7M	color
	Power Consumption	TBD	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
LCD Module connector	MSB24013P20HA (STM)
Matching connector	P24013P20 or DF19G-20S-1C

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	SEL	I	VCC：8bit； GND/NC： 6bit	
5	RIN0-	I	LVDS receiver negative signal channel 0	
6	RIN0+	I	LVDS receiver positive signal channel 0	
7	GND	P	Ground	
8	RIN1-	I	LVDS receiver negative signal channel 1	
9	RIN1+	I	LVDS receiver positive signal channel 1	
10	GND	P	Ground	
11	RIN2-	I	LVDS receiver negative signal channel 2	
12	RIN2+	I	LVDS receiver positive signal channel 2	
13	GND	P	Ground	
14	CLKIN-	I	LVDS receiver negative signal clock	
15	CLKIN+	I	LVDS receiver positive signal clock	
16	GND	P	Ground	
17	IN3-	I	LVDS receiver negative signal channel 3 (NC for 6bit LVDS input)	
18	IN3+	I	LVDS receiver positive signal channel 3 (NC for 6bit LVDS input)	
19	NC	-	No connection	
20	NC	-	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: Display direction:

PCBA=> 

Note4: The 4-pin SEL on the PCB has a 10K Ω resistor connected to GND.
Note5: The module is set to DE mode.
Note6: The module is set to VESA format.

3.2 CN2 Pin assignment (Back Light)

Connector Information	
LCD Module connector	MSB24038P5 (STM)
Matching connector	P24038P5

Table 3.2.1 Connector information

No	Symbol	I/O	Description	Comment
1	NC	N	No connection	
2	PWM	I	Luminance control	
3	EN	I	3.3V-on/0V-off	
4	GND	P	Ground	
5	VLED	P	Power Supply 12V	

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 for Signal	VCC	-0.3	3.96	V	Note1
Power Voltage for LED Driver	VLED	-0.3	27	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℃
Absolute Humidity	AH	--	≤70	g/m³	Ta＞70℃

Table 4.1 Absolute Maximum Ratings

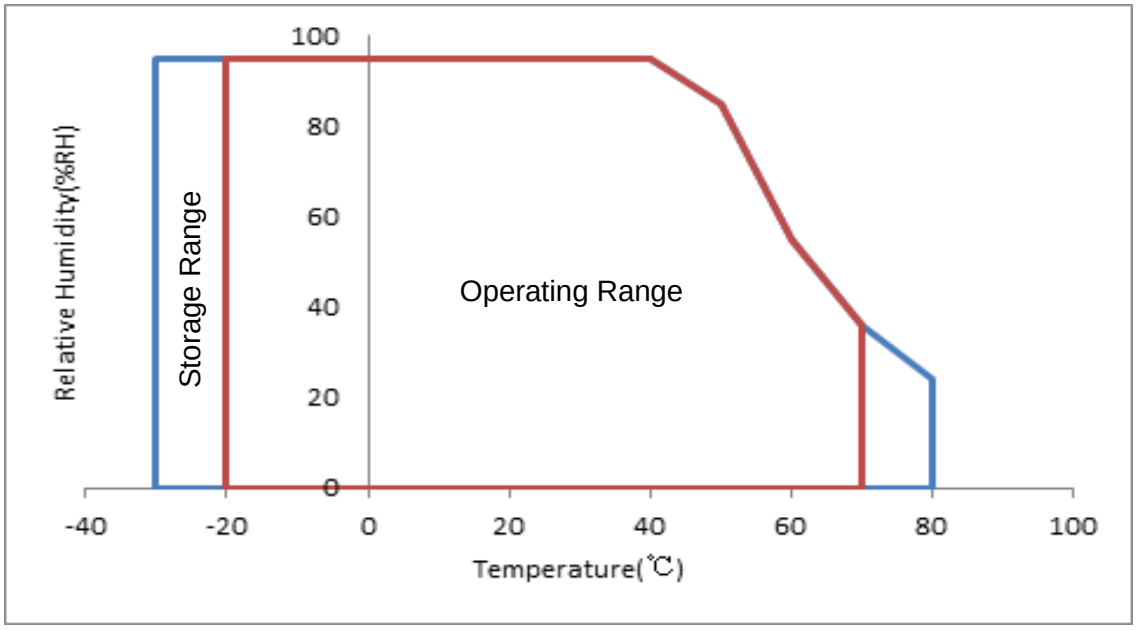


Figure 4.2 Absolute Maximum Ratings chart

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

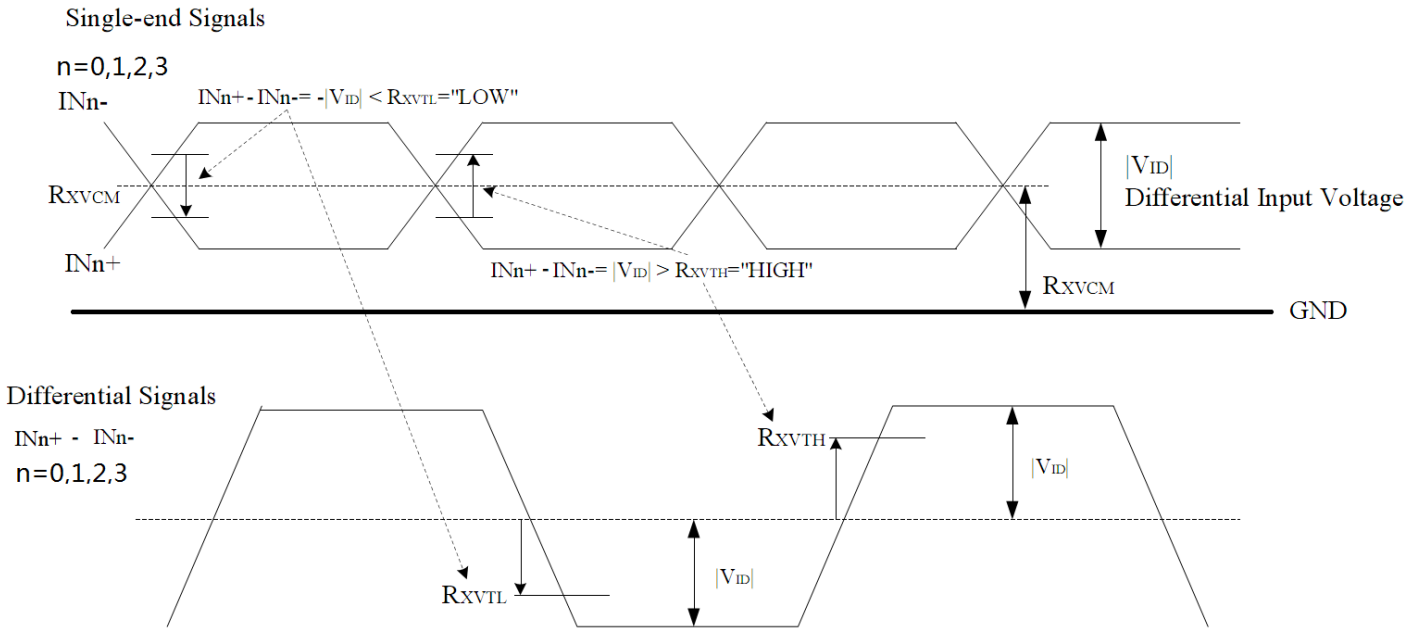
5. Electrical Characteristics

5.1 DC Characteristics for Panel Driving

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage		VCC	3.2	3.3	3.4	V	Include ripple
Low level input voltage		VIL	0	-	0.2*VCC	V	Note1
High level input voltage		VIH	0.8*VCC	-	VCC	V	
LVDS Differential input high threshold		R_{xVTH}	--	--	+37	mV	
LVDS Differential input low threshold		R_{xVTL}	-37	--	--	mV	
Differential input voltage		$\lvert V_{ID} \rvert$	0.2	--	0.4	V	
LVDS input common mode voltage		R_{xVCM}	600	1200	1375	mV	RXVCM+1/2*|VID|<=1650mV RXVCM-1/2*|VID|>=400mV
Power Consumption	60Hz	P_{VDD}	--	TBD	--	mW	white pattern

Table 5.1.1 Operating Voltages

Note1: Including SEL.
Note2: LVDS DC characteristics.



5.2 DC Characteristics for Backlight Driving

Parameter	Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage	VCC	10.8	12.0	13.2	V	Note1
Power supply current	IDD	-	TBD	-	mA	
PWM frequency	f_{PWM}	100	-	30k	Hz	
PWM duty ratio	DR_{PWM}	7	-	94	%	
Logic Low Level (EN, PWM)	VIL	-	-	0.7	V	
Logic High Level (EN, PWM)	VIH	1.6	-	-	V	
Operating Life Time	--	-	50000	-	H	Note 2 Note3

Table 5.2.1 LED Backlight Characteristics

Note1: When designing of the power supply, take the measures for the prevention of surge voltage.
Note2: Optical performance should be evaluated at Ta=25℃ only.
Note3: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.

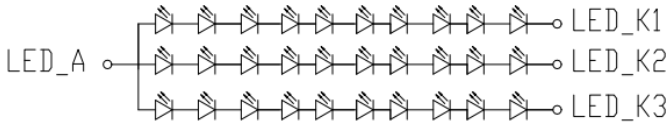


Figure 5.2 LED circuit

5.3 Recommended Power ON/OFF Sequence

Symbol	Min	Typ	Max	Unit	Remark
t1	1	-	5	ms	
t2	20	-	50	ms	
t3	200	-	-	ms	
t4	1	-	-	ms	Note 1
t5	2	-	-	ms	
t6	2	-	-	ms	
t7	2	-	-	ms	
t8	2	-	-	ms	
t9	1	-	-	ms	
t10	200	-	-	ms	
t11	50	-	100	ms	
t12	1	-	5	ms	
t13	2000	-	-	ms	

Table 5.3.1 Power on/off sequence

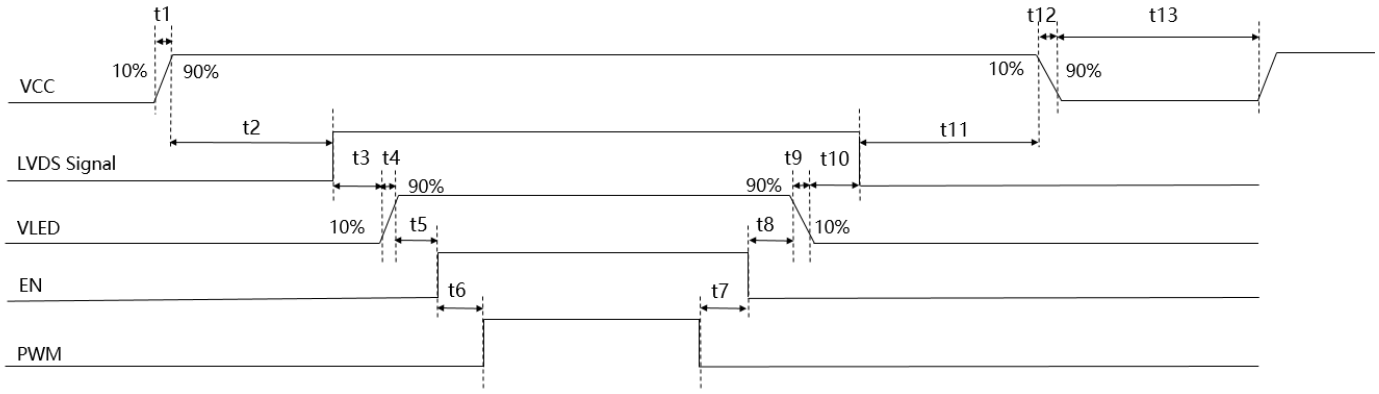


Figure 5.3.1 Power on/off sequence

Note1: t1< t2.
Note2: The low level of these signals and analog powers are GND level.
Note3: 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.
Note4: The power on/off sequence is the first version. It will be updated when the design is fixed.
Note5: BL is the voltage applied to backlight. Keep it turned off until the display has stabilized.
Note6: Calculate t13 from GND level to GND level.

5.4 LCD Module Block Diagram

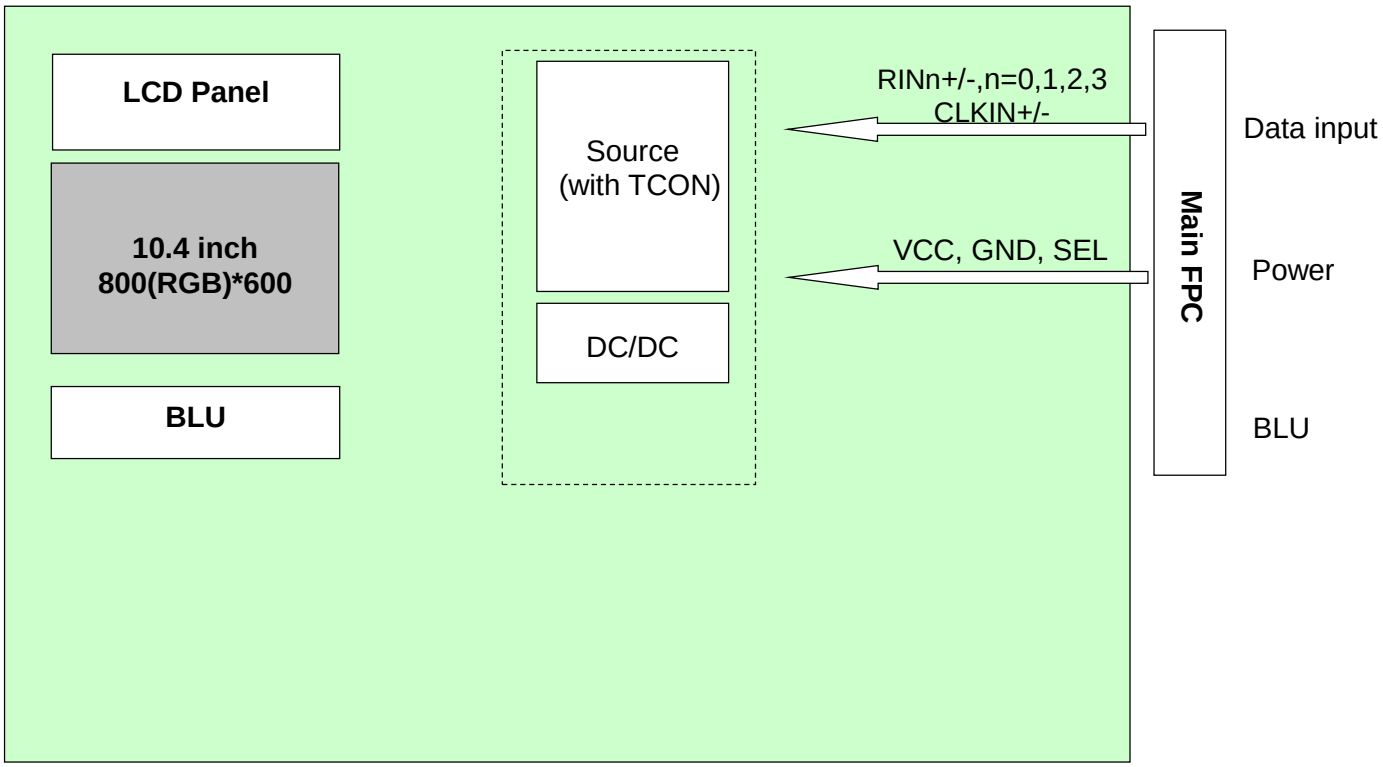


Figure 5.4.1 LCD Module Block Diagram

6. Timing Characteristics

6.1 AC characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Dclk Frequency	RXFCLK	36.3	-	50.3	MHZ	
Input Data Skew Margin	TRSKM	-0.2	-	0.2	UI	|VID| = 200mV RxVCM = 1.2V 1UI=1/(RxFCLKx7)
Clock High Time	TLVCH	-	4/(7*RXFCLK)	-	ns	
Clock Low Time	TLVCL	-	3/(7*RXFCLK)	-	ns	

Table 6.1.1 AC characteristics

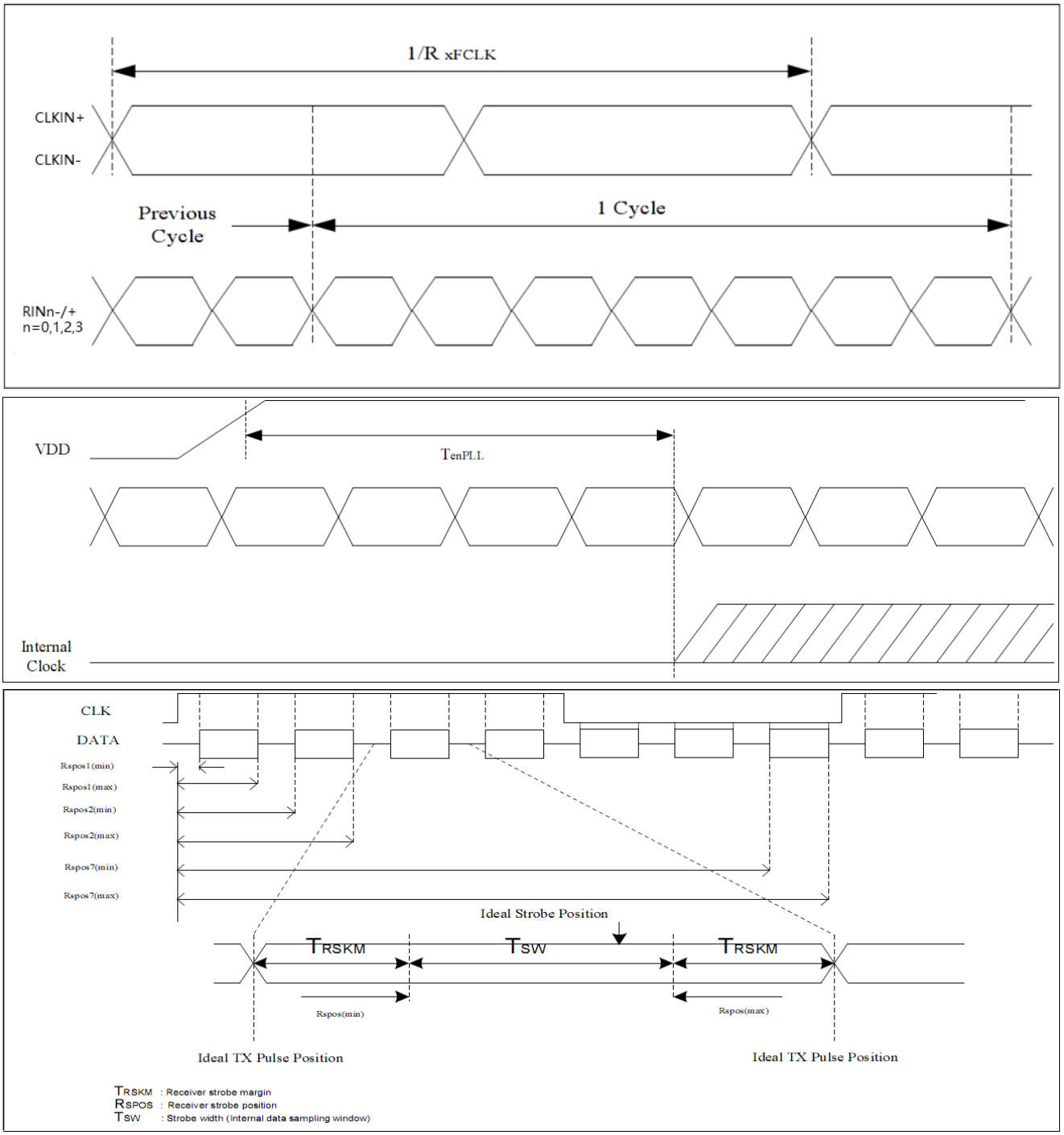


Figure 6.1.1 AC characteristics

6.2 Data Input Timing Parameter Setting

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK frequency		Fclk	36.3	39.6	50.3	MHz	Tclk=1/Fclk
Horizontal section	Horizontal total	Th	945	1000	1150	Tclk	
	Horizontal blanking	Thb	145	200	350	Tclk	
	Valid Data Width	Thd		800		Tclk	
Vertical section	Vertical total	Tv	640	660	730	TH	
	Vertical blanking	Tvb	40	60	130	TH	
	Valid Data Width	Tvd		600		TH	
Frame Rate		F		60		Hz	

Table 6.2.1 Data Input Timing Parameters

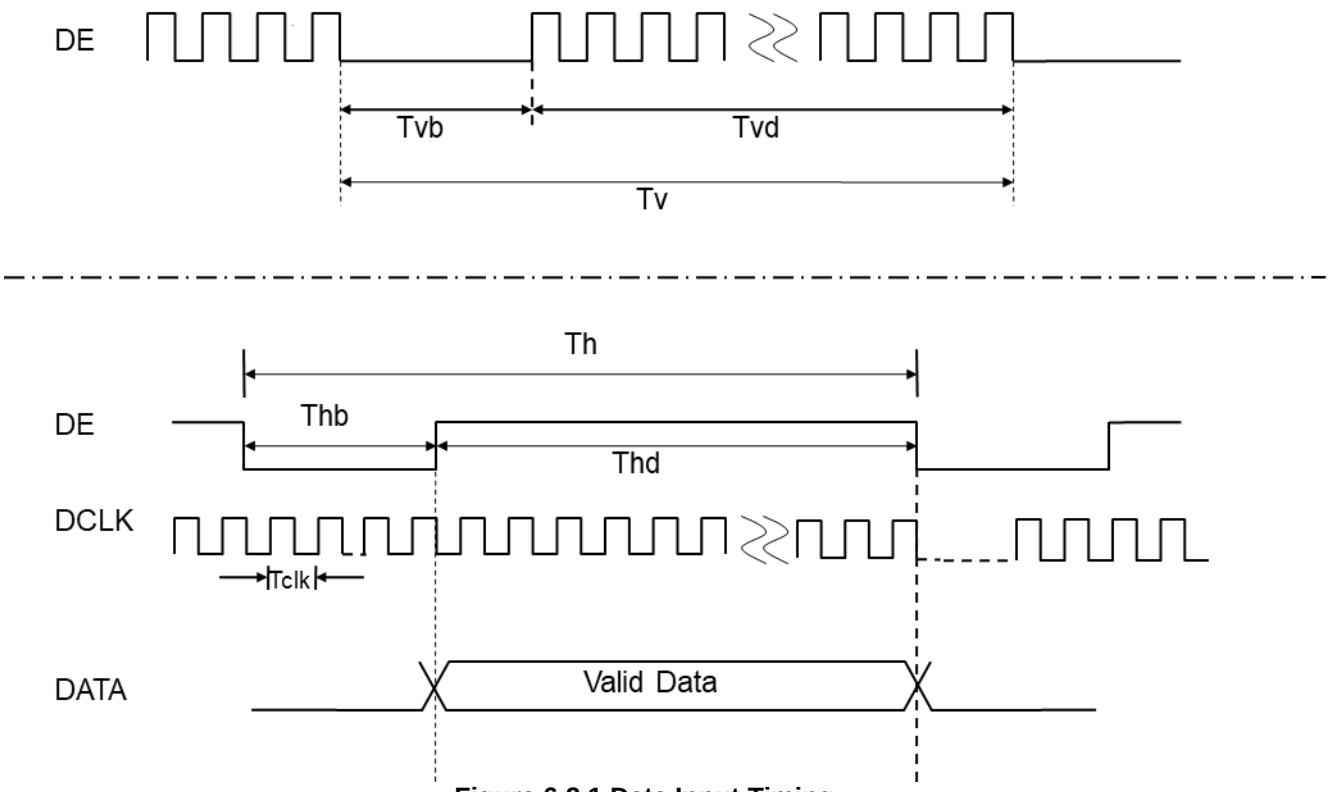


Figure 6.2.1 Data Input Timing

6.3 LVDS data mapping

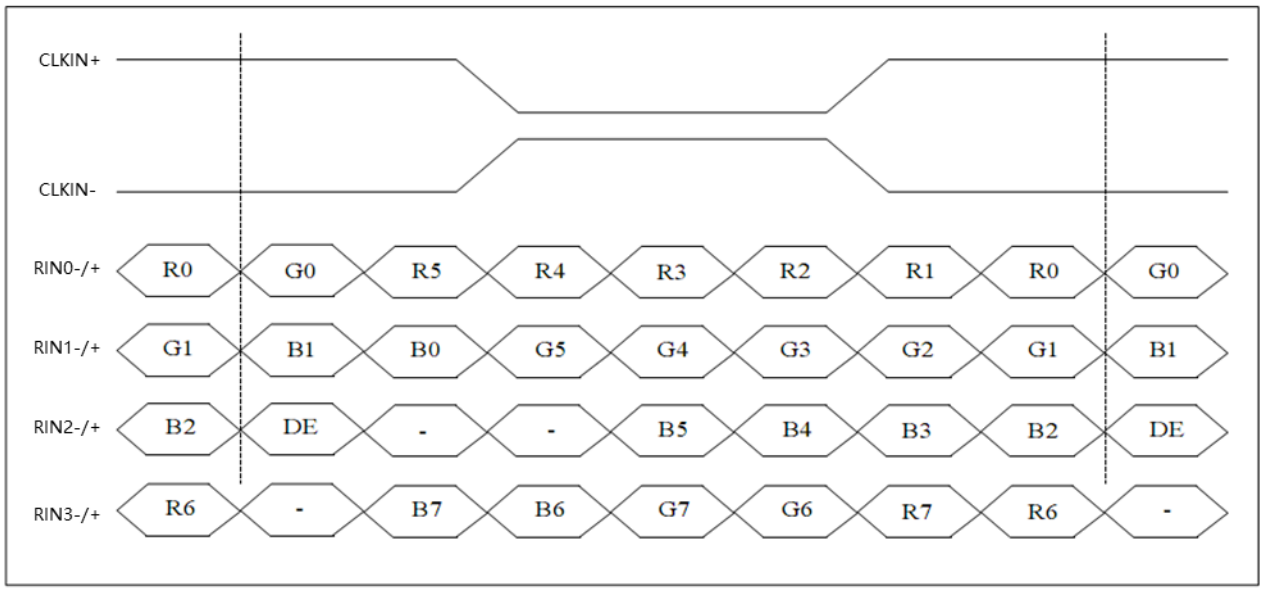


Figure 6.3.1 8-bit RGB LVDS VESA input timing (DE Mode)

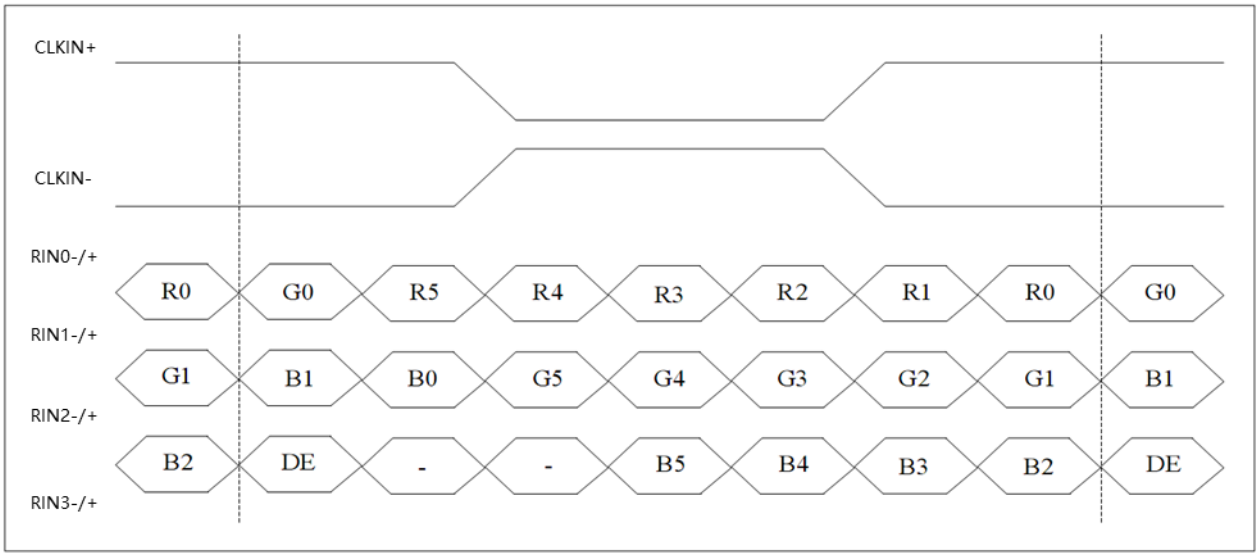


Figure 6.3.3 6-bit RGB LVDS input timing (DE Mode)

7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	78	88	--	degree	Note2,3
		θB		78	88	--		
		θL		78	88	--		
		θR		78	88	--		
Contrast Ratio		CR	θ=0°	1000	1200	--		Note 3
Response Time		T_{ON}	25℃	--	35	45	ms	Note 4
		T_{OFF}						
Chromaticity	**White**	x	Backlight is on	TBD-0.04	TBD	TBD+0.04		Note 1,5
		y		TBD-0.04	TBD	TBD+0.04		
	Red	x		0.549	0.599	0.649		Note 1,5
		y		0.273	0.323	0.373		
	Green	x		0.285	0.335	0.385		Note 1,5
		y		0.543	0.593	0.643		
	Blue	x		0.102	0.152	0.202		Note 1,5
		y		0.065	0.115	0.165		
Uniformity		U		75	80	--	%	Note 6
NTSC		-		45	50	--	%	Note 5
Luminance		L		300	350		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.

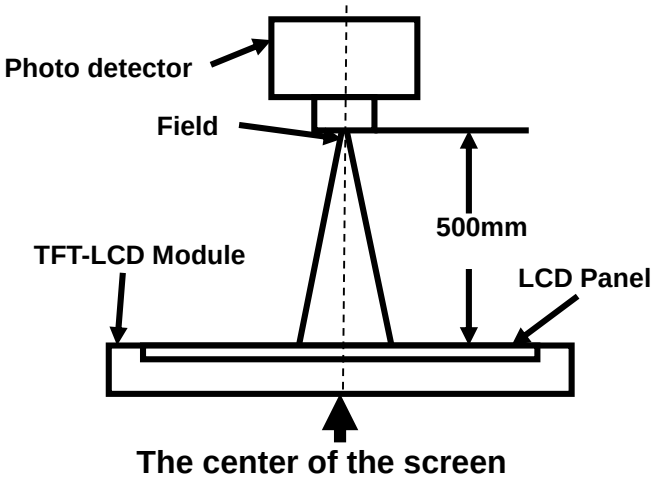


Fig1. Measurement Set Up

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

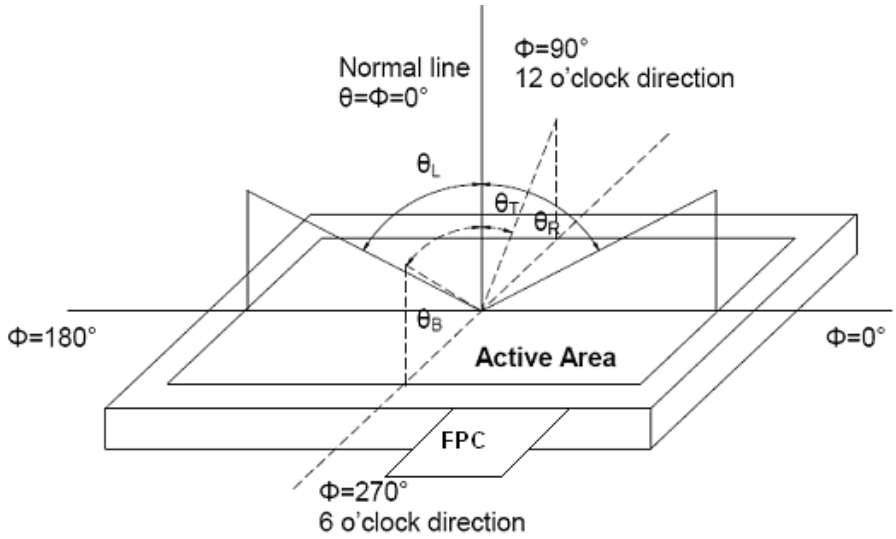


Fig2. Measurement viewing angle

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

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%.

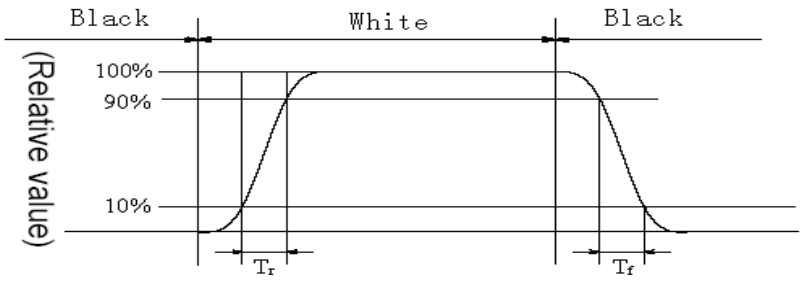


Fig4. Response Time Testing

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

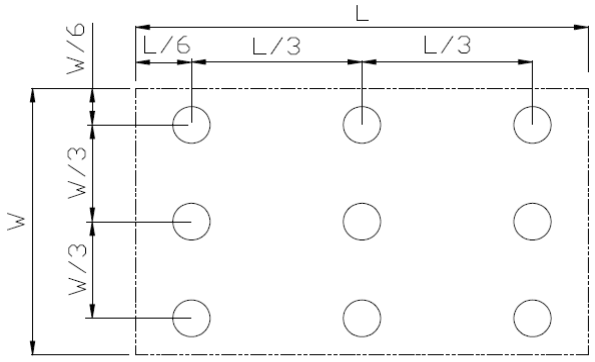


Fig5. Luminance Uniformity Measurement Locations (9 points)

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

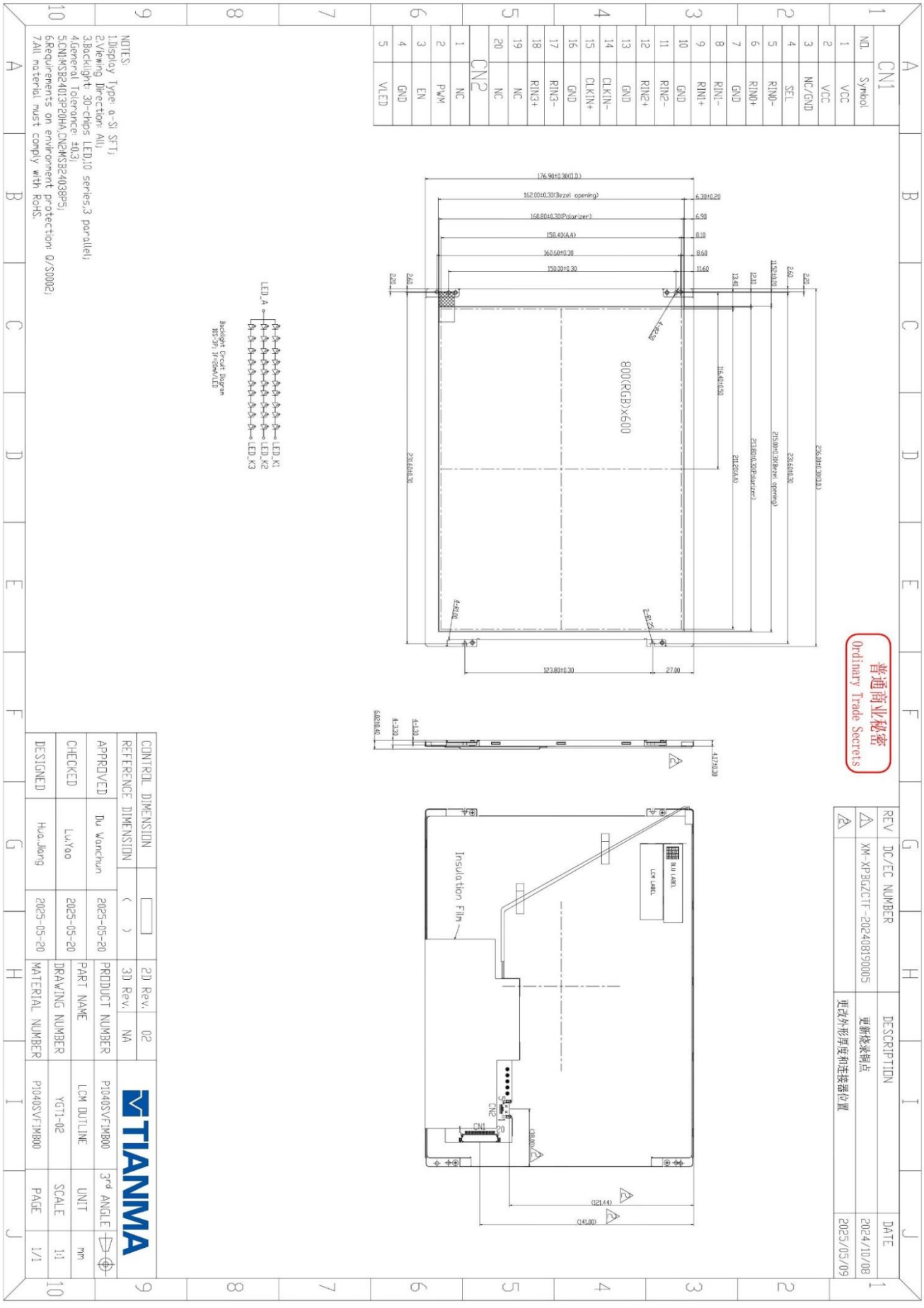
8. Reliability Test

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：±6kv，5times； （Environment：15℃~35℃，30%~60%，86Kpa~106Kpa）	IEC61000-4-2:2008 GB/T17626.2-2018
8	Vibration(non-operation)	频率(Hz)10~55Hz； Stroke:1.5mm； Sweep:10Hz~55HZ~10HZ； X/Y/Z 各轴 120min	IEC60068-2-6:1982 GB/T2423.10—1995
9	Shock(non-operation)	Half Sine Wave 50G 20ms, ±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Vibration	5-20-200HZ，PSD：0.01-0.01-0.001 Total:0.781g2/HZ, x/y/z 30min）	IEC60068-2-34 GB/T2423.11
11	Package Drop Test	Height: 60 cm,1 corner, 3 edges, 6 surfaces	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 guaranteed, but not for all of the cosmetic specification.

9. Mechanical Drawing

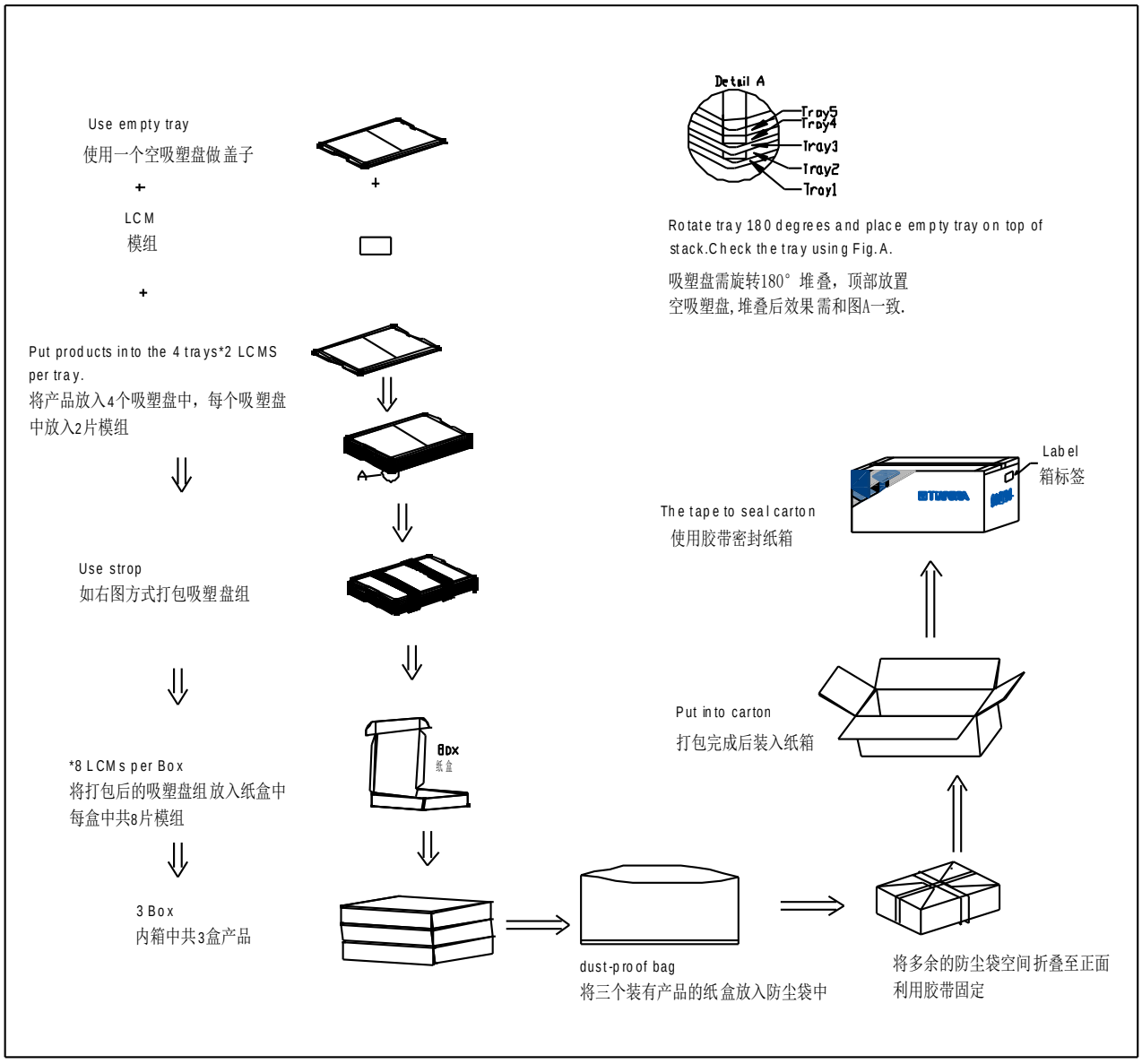


10. Packing Instruction

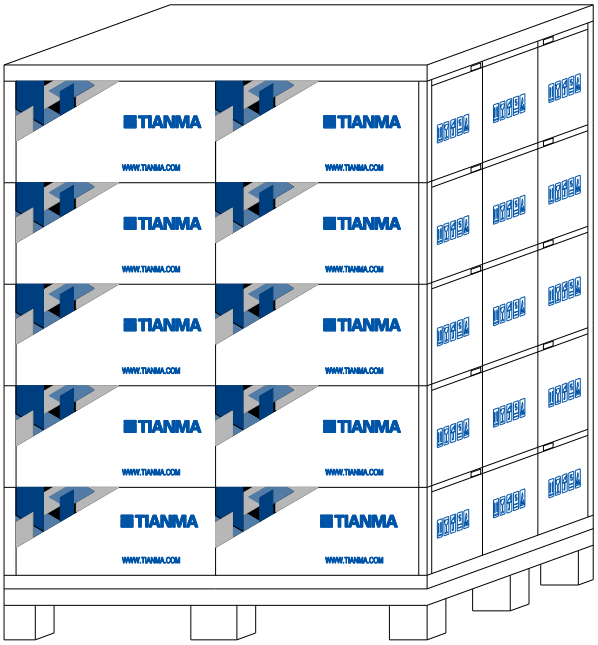
No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Q'ty	Remark
1	LCM module	P0104SVF1MB00	236.0x176.9x6.02	T.B.D	24	
2	Tray	PET	485×330×19	0.215	15	
3	BOX	CORRUGATED PAPER	520×345×74	0.44	3	
4	Dust proof bag	LD-PE	700x545x0.05	0.046	1	
5	Label	Tagboard	100×52	0.002	1	
6	Masking tape	PE	28×10	0.001	24	
7	Carton	CORRUGATED PAPER	544×365×250	1.01	1	
8	Total Weight	13.14Kg±5%				

Table 10.1 Packing Instruction

Packing procedure:



Cargo on pallet: Carton number is 2x3x5, pallet dimension is 1100mm x1100mm.



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.