SPECIFICATION

[ ] Preliminary Specification
[◉] Final Specification

Description **15.0” 1024xRGBx768 TFT-LCD Module**

Part Number **P1500XGF2MB10**

Customer		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	2024/6/17	-	Preliminary Spec Issued	Chen Siyuan
1.1	2024/10/11	4	Delete min data and add PWM 100% in the remark table of “5.2 DC Characteristics for Backlight Driving”.	Chen Siyuan
1.2	2025/1/14	1	Adding power consumption data and weight information	Chen Siyuan
		4	Adding TBD information to 5.1 and 5.2 items	
		16	Updating the packaging information	
1.3	2025/3/6	15	Optimizing 2D drawing （Zooming Pinout Number, which can be more clearly seen by customer）	Chen Siyuan
2.0	2025/5/20	-	Final Specification Issued	Chen Siyuan
		1	Updating BLU Power Consumption in “2”	
		3	Updating “Back Light Input voltage-VIN” (0→“-0.3”) in “4”	
		4	Updating Note in 5.1 (Delete previous Note1 and Converse previous Note2 to Note1)	
		4	Updating BLU Power Consumption in “5.2”	
		6	Updating “Note” (Delete previous Note3~5 and add new Note 3~6)	
		11	Updating “Uniformity” in “7”, and Confirming the “Luminance” in “7”	
2.1	2025/6/3	4	Correcting “Inrush Value” in “5.2 DC Characteristics for Backlight Driving”: From 1.5A to 2.0A. Based on TIANMA current testing value.	Chen Siyuan
2.2	2025/8/6	11	Correcting If value in Part 7	Chen Siyuan
		16	Correcting “Total weight” Information in Part 10	
	2025/8/15	9	Add Note1	
		10	Add fuse information	

CONTENTS

1. Summary

1.1 General Description

This is a 15.0 inch a-Si TFT-LCD module with Normal- Black technology. It is composed of a TFT-LCD panel, a driver circuit, PCB, and an LED backlight unit.

1.2 Features

- Ultra-wide viewing angle
- Interface: LVDS
- LED driver integrated
- Surface treatment: AG
- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03 (File number: E333987)
- 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	15.0 inches	
	Resolution	1024(RGB)*768	
	Pixel Pitch	0.297*0.297	mm
	TFT Active Area	304.128*228.096	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	SFT, Normally Black	
	Surface Treatment	Anti-Glare	
	Viewing Direction	ALL	
Mechanical Characteristics	LCM (W x H x D)	326.5*253.5*9.0 (typ.)	mm
	Weight	875	g
Optical Characteristics	Luminance	500 (typ.)	cd/m^2
	Contrast Ratio	1200:1 (typ.)	
	NTSC	60 (typ.)	%
	Viewing Angle	88/88/88/88 (typ.)	degree
Electrical Characteristics	Interface	LVDS	
	Color Depth	16.7 Million	color
	Power Consumption	LCD: 914.1; Backlight: 6960	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
LCD Module connector	MSB240420HE
Matching connector	Housing:P240420、Terminal:2404PS

Table 3.1.1 Connector information

No	Symbol	I/O	Description	Comment
1	VDD	P	Power Supply, 3.3V (typical)	
2	VDD	P	Power Supply, 3.3V (typical)	
3	NC	N	No Connect	
4	NC	N	No Connect	
5	Rin1-	I	- LVDS differential data input	
6	Rin1+	I	+ LVDS differential data input	
7	VSS	P	Ground	
8	Rin2-	I	- LVDS differential data input	
9	Rin2+	I	+ LVDS differential data input	
10	VSS	P	Ground	
11	Rin3-	I	- LVDS differential data input	
12	Rin3+	I	+ LVDS differential data input	
13	VSS	P	Ground	
14	ClkIN-	I	- LVDS differential clock input	
15	ClkIN+	I	+ LVDS differential clock input	
16	GND	P	Ground	
17	Rin4-	I	- LVDS differential data input	
18	Rin4+	I	+ LVDS differential data input	
19	VSS	P	Ground	
20	VSS	P	Ground	

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: Scanning Direction.

PCB side ➔

Note4: VSS and GND should be connect to same ground.

3.2 CN2 Pin assignment (Back Light)

Connector Information	
LCD Module connector	MSB24038P5
Matching connector	Housing:P24038、Terminal:24038PS

Table 3.2.1 Connector information

No	Symbol	I/O	Description	Wire Color
1	VCC	P	Power Supply, 12V (typical)	
2	GND	P	Ground	
3	Enable	I	Backlight on/off control signal(1:on, 0:off)	
4	Dimming	I	Dimming control signal	
5	NC	N	No Connect	

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	VDD	-0.3	3.6	V	
Back Light Power voltage	VCC	-0.3	27	V	
Back Light Input voltage	VIN	-0.3	5.5	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

Note1: Back Light Input voltage include Enable, Dimming..
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

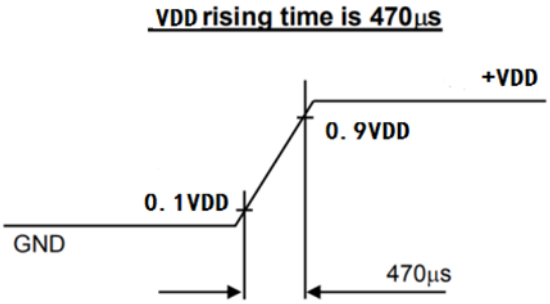
5. Electrical Characteristics

5.1 DC Characteristics for Panel Driving

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage		VDD	3.0	3.3	3.6	V	Include ripple
Input Signal Voltage	Low Level	VIL	VSS	--	0.3×VDD	V	
	High Level	VIH	0.7×VDD	--	VDD	V	
VDD Current	60Hz	IDD	--	277	415.5	mA	White pattern
Power Consumption	60Hz	PDD	--	914.1	1371.15	mW	
Inrush current		Irush	--	--	1.5	A	Note2

Table 5.1.1 Operating Voltages

Note1: To test the current dissipation, using the "white pattern" shown



5.2 DC Characteristics for Backlight Driving

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Backlight Driving Input Voltage		VCC	10.8	12	13.2	V	
VCC Current		Icc	--	580	870	mA	100% Dimming
Backlight Power Consumption		P	--	6960	10440	mW	100% Dimming
PWM frequency		F	200	--	10K	Hz	
PWM duty		D	5	--	100	%	
Enable、Dimmingl	High level	--	2	-	5.5	V	Enable、Dimmingl
	Low level	--	-	-	0.8	V	
LED Forward Current		If	-	80	-	mA	
LED life time		--	--	50000	-	Hrs	PWM 100%
Inrush current		Irush	--	--	2.0	A	Note5

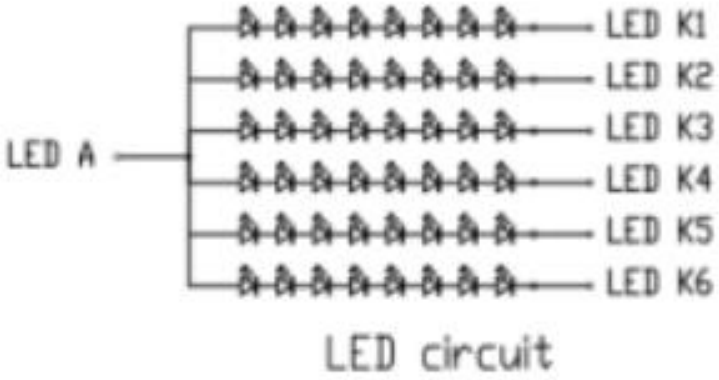
Table 5.2.1 LED Backlight Characteristics

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.

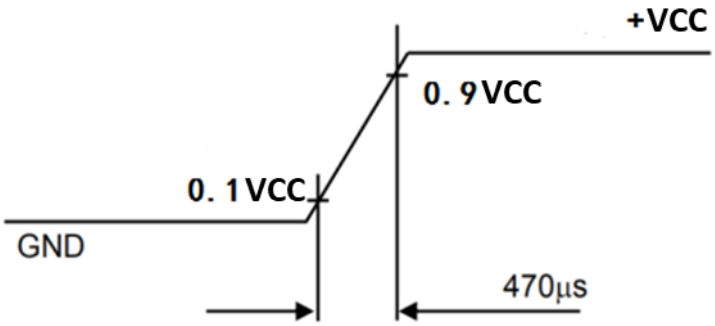
Note4: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.



LED circuit

Note5: To test the current dissipation, using the “white pattern” shown

VCC rising time is 470μs



5.3 Recommended Power ON/OFF Sequence

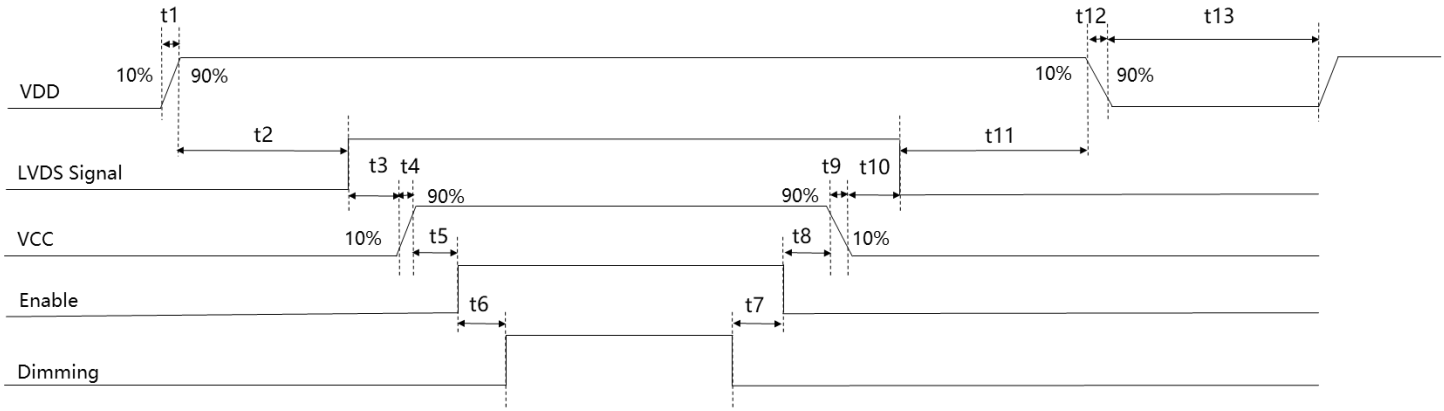


Figure 5.3.1 Power on/off sequence

Symbol	Min	Typ	Max	Unit	Remark
t1	0.5	-	10	ms	
t2	100	-	-	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	200	-	-	ms	
t12	-	-	200	ms	
t13	1000	-	-	ms	

Table 5.3.1 Power on/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: Keep Enable low level until the display has stabilized.
Note4: If there is a voltage variation (voltage drop) at the rising edge of VDD below 3.0V, there is a possibility that a product does not work due to a protection circuit.
Note5: Display signals (Rin1-/+, Rin2-/+, Rin3-/+, Rin4-/+ and ClkIN-/+) must be set to Low or High impedance , except the VALID period (See above sequence diagram), in order to avoid the circuitry damage.
If some of display and function signals of this product are cut while this product is working, even if the signal input to it once again, it might not work normally. If a customer stops the display and function signals, VDD also must be shut down.
Note6: In order to avoid unstable data display, the backlight is recommended to turn on within the VALID period of display. Recommended value: t3 ≥ 200 ms.

5.4 LCD Module Block Diagram

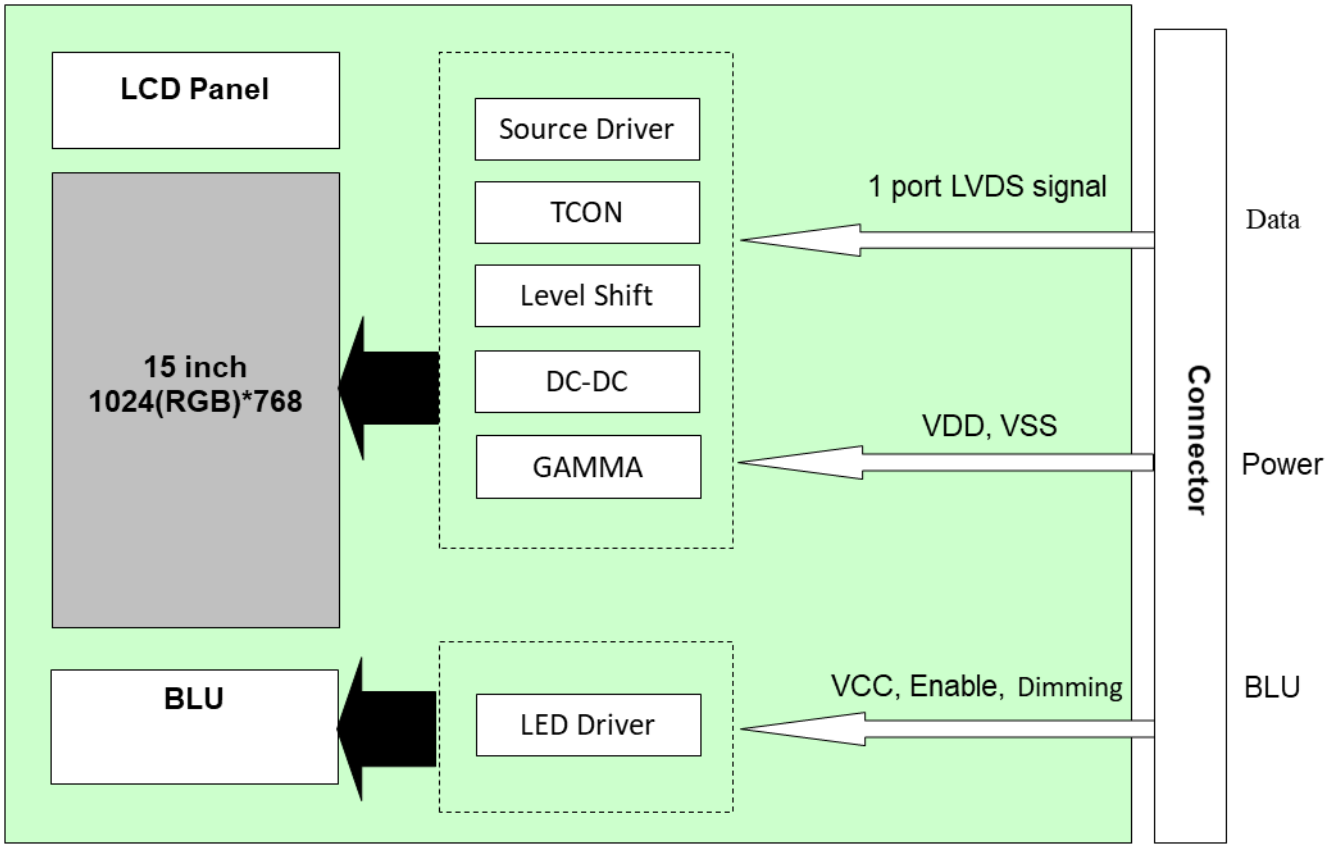


Figure 5.4.1 LCD Module Block Diagram

5.5 LVDS DC electrical characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Differential Input high Threshold voltage	R_{xVTH}	-	-	+0.1	V	R_{xVCM}=1.2V
Differential Input Low Threshold voltage	R_{xVTL}	-0.1	-	-	V	
Input voltage range (signaled-end)	R_{xVIN}	0	-	2.4	V	
Differential Input common Mode voltage	R_{xVCM}	1.0	1.2	2.4-$\|V_{ID}\|$/2	V	
Differential Input voltage	$\|V_{ID}\|$	0.1	-	0.6	V	

Table 5.5.1 LVDS DC Characteristics

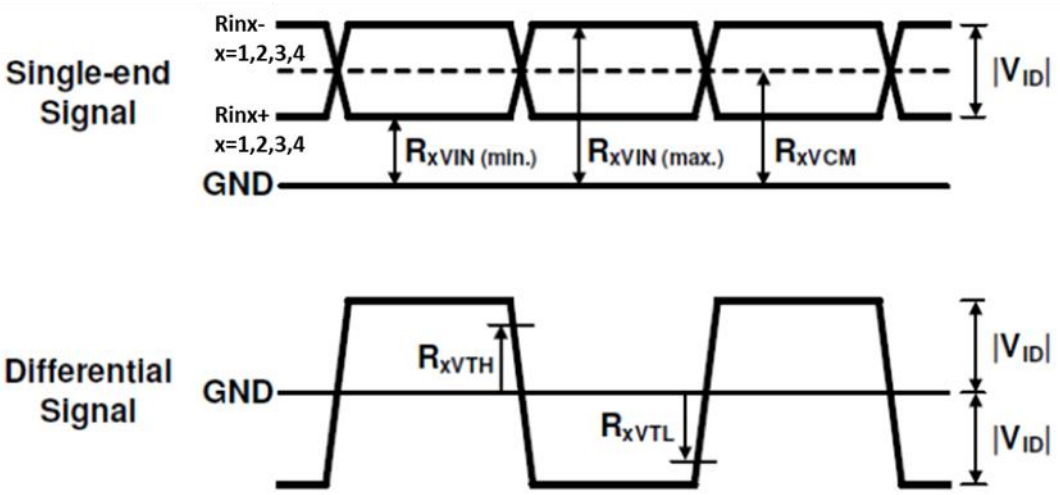


Figure 5.5.1 LVDS DC Characteristics

Note:
|(Rinx+)-(Rinx-)|<RxVTL="LOW"
|(Rinx+)-(Rinx-)|>RxVTH="HIGH"
|VID|= |(Rinx+)-(Rinx-)|
VCM = |(Rinx+)-(Rinx-)|/2

5.6 LVDS AC electrical characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Clock frequency	RxFCLK	54.8	-	88.1	MHz	
Input data Position0	tRIP1	-|tRMG|	0.0	|tRMG|	ns	Note1
Input data Position1	tRIP0	T/7-|tRMG|	T/7	T/7+|tRMG|	ns	
Input data Position2	tRIP6	2T/7-|tRMG|	2T/7	2T/7+|tRMG|	ns	
Input data Position3	tRIP5	3T/7-|tRMG|	3T/7	3T/7+|tRMG|	ns	
Input data Position4	tRIP4	4T/7-|tRMG|	4T/7	4T/7+|tRMG|	ns	
Input data Position5	tRIP3	5T/7-|tRMG|	5T/7	5T/7+|tRMG|	ns	
Input data Position6	tRIP2	6T/7-|tRMG|	6T/7	6T/7+|tRMG|	ns	
Input data skew margin	TRSKM	-400	-	+400	ps	RxCLK = 85MHz RxVTH – RxVTL =200 mV
Input spread spectrum ratio	SSR	-	-	+/-3	%	
Input modulation frequency	FM	-	-	300k	Hz	
Jitter tolerance	Tjitter_tol			200	ps	

Table 5.6.1 LVDS AC Characteristics

NOTE1：“|tRMG|” in table 5.6 refers to the symbol “TRSKM”,”T” in table 5.6 refers to “1/RxFLCK”

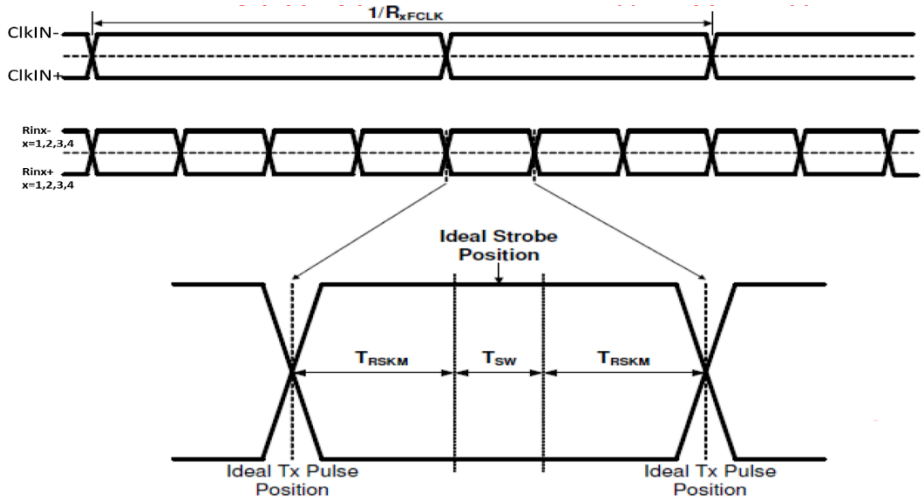


Figure 5.6.1 LVDS AC Characteristics

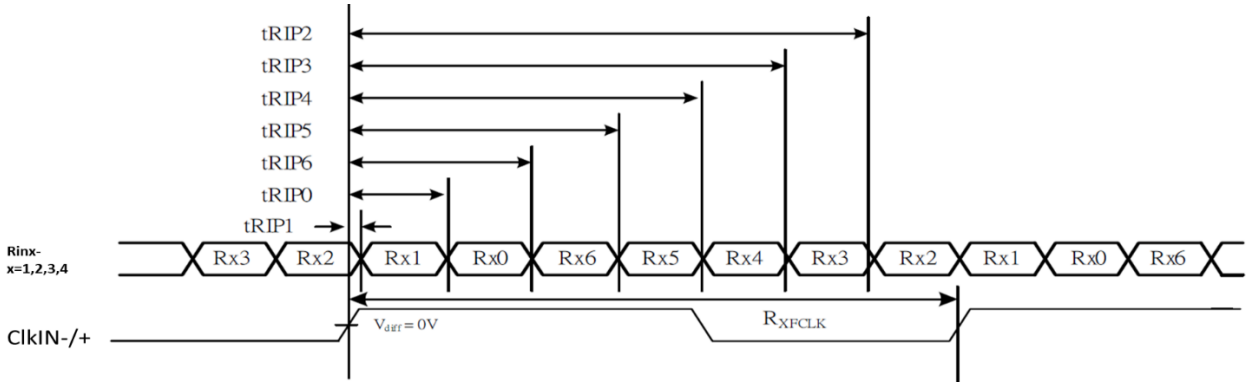


Figure 5.6.2 LVDS AC Characteristics

5.7 Fuse

Parameter	Fuse Type	Rating	Clear-time at 25℃	
VDD for LCD	F0603HI2000V032T	32V 2A	4 A	60 seconds(max)
VCC for BL	F0603HI2000V032T	32V 2A	4 A	60 seconds(max)

6. Timing Characteristics

6.1. LVDS signal timing characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Remark
DCLK frequency		Fclk	54.8	57.6	88.1	MHz	Tclk=1/Fclk
Horizontal section	Horizontal total	Th	1150	1200	1300	Tclk	
	Horizontal blanking	Thb	126	176	276	Tclk	
	Valid Data Width	Thd	1024			Tclk	
Vertical section	Vertical total	Tv	794	800	1129	TH	
	Vertical blanking	Tvb	26	32	361	TH	
	Valid Data Width	Tvd	768			TH	
Frame Rate		FR	60			Hz	

Table 6.1.1 Input Timing Parameters

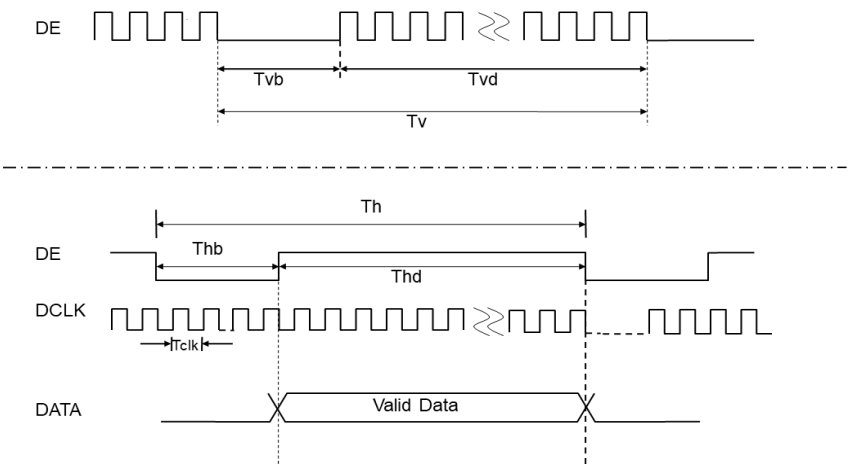


Figure 6.1.1 Clock and Data Input Timing Diagram

6.2. LVDS data mapping

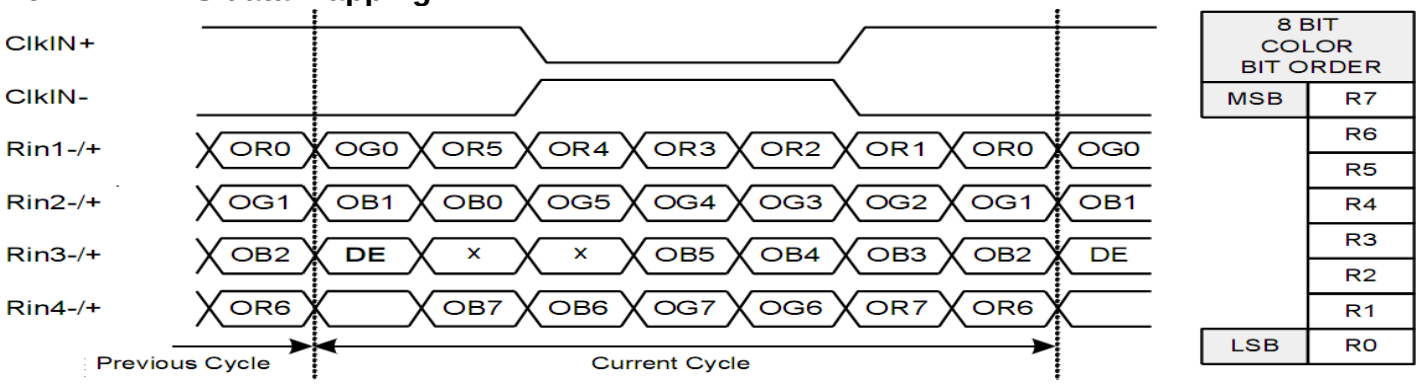


Figure 6.2.1 LVDS data mapping (VESA standard)

7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	80	88	-	degree	Note2,3
		θB		80	88	-		
		θL		80	88	-		
		θR		80	88	-		
Contrast Ratio		CR	θ=0°	800	1200	-		Note 3
Response Time		T_{ON}	25℃	-	30	35	ms	Note 4
		T_{OFF}						
Chromaticity	**White**	x	Backlight is on	0.256	0.306	0.356		Note 1,5
		y		0.272	0.322	0.372		
	Red	x		0.579	0.629	0.679		Note 1,5
		y		0.281	0.331	0.381		
	Green	x		0.280	0.330	0.380		Note 1,5
		y		0.528	0.578	0.628		
	Blue	x		0.102	0.152	0.202		Note 1,5
		y		0.010	0.060	0.110		
Uniformity		U		75	80		%	Note 6
NTSC		-		55	60		%	Note 5
Luminance		L		400	500	-	cd/m^2	Note 7

Table 7.1 Optical Parameters

Test Conditions:

1. I_F= **640** 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.

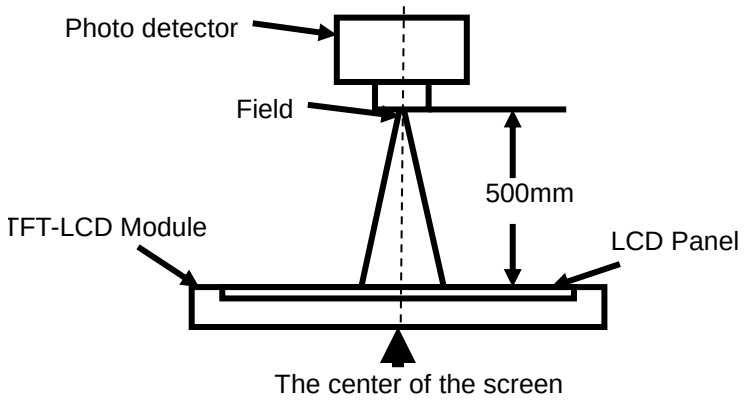


Fig1. Measurement Set Up

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

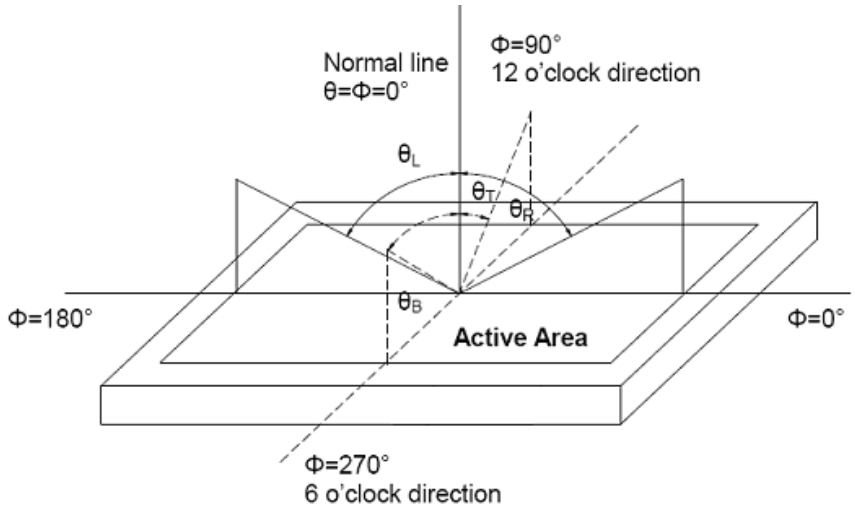


Fig2. Measurement viewing angle

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 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%.

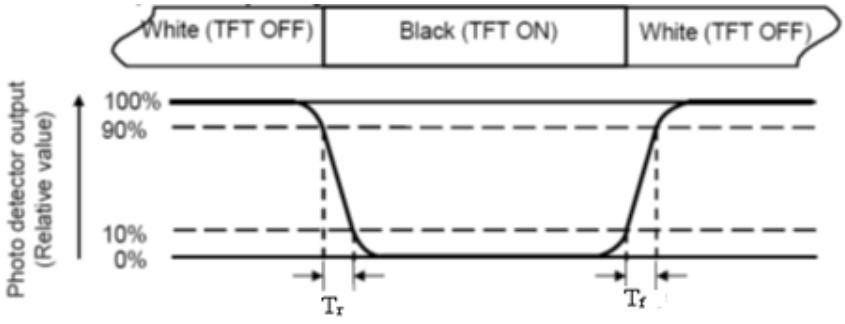


Fig3. Response Time Testing(TN)

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%.

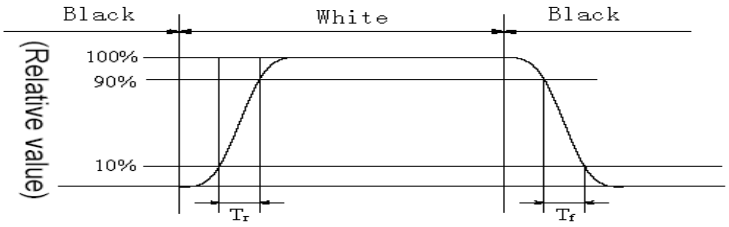


Fig4. Response Time Testing(SFT)

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

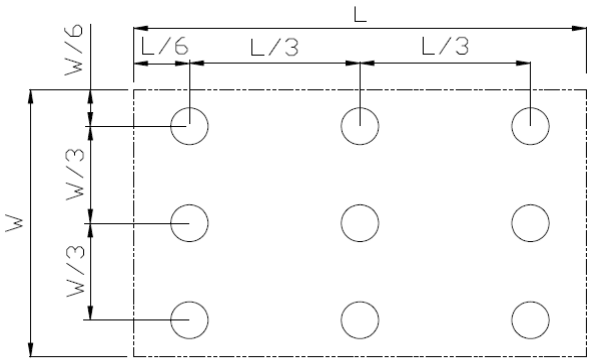


Fig5. Luminance Uniformity Measurement Locations(9 points)

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

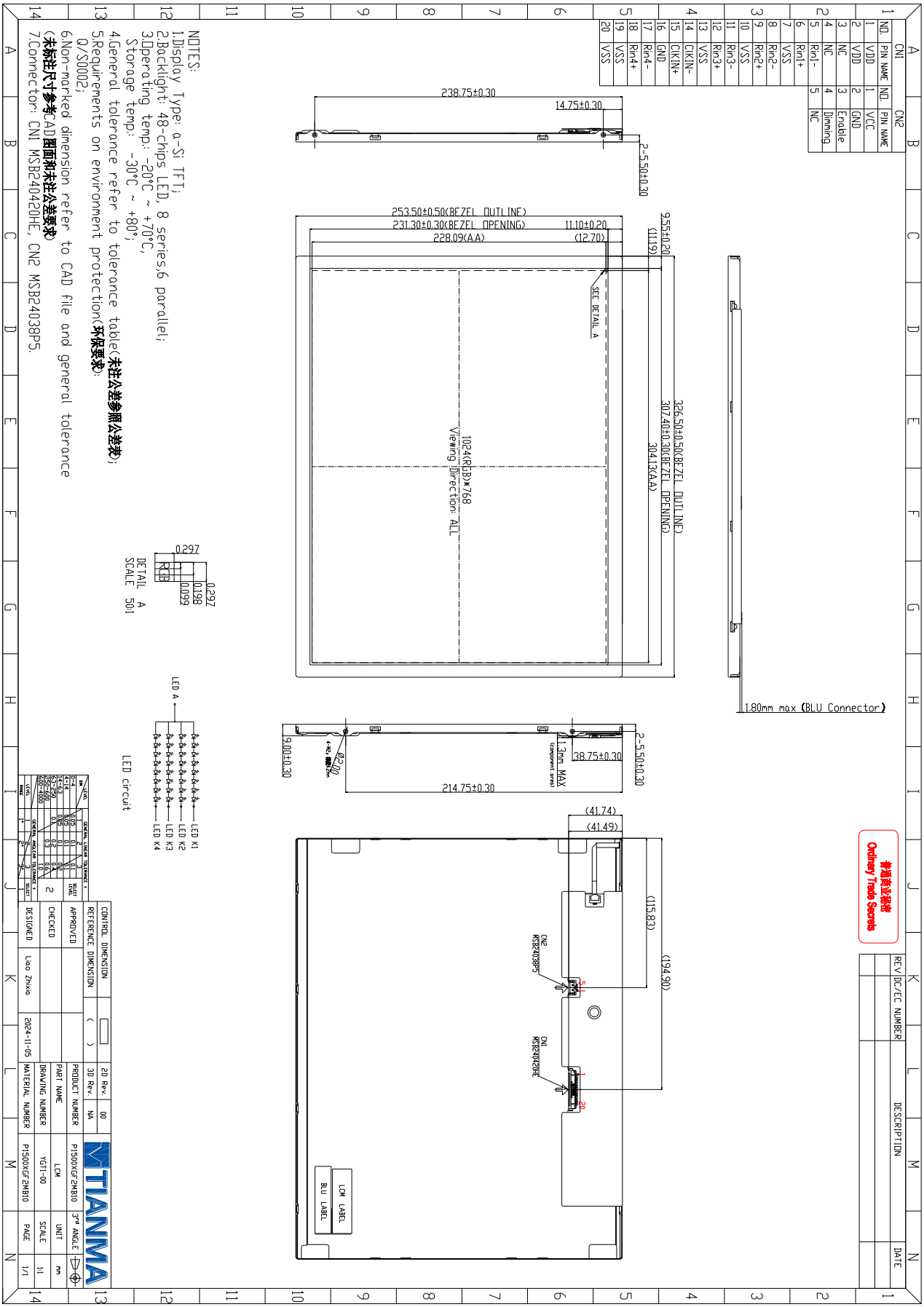
8. Reliability Test

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）	GB/T 4857.23-2012
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

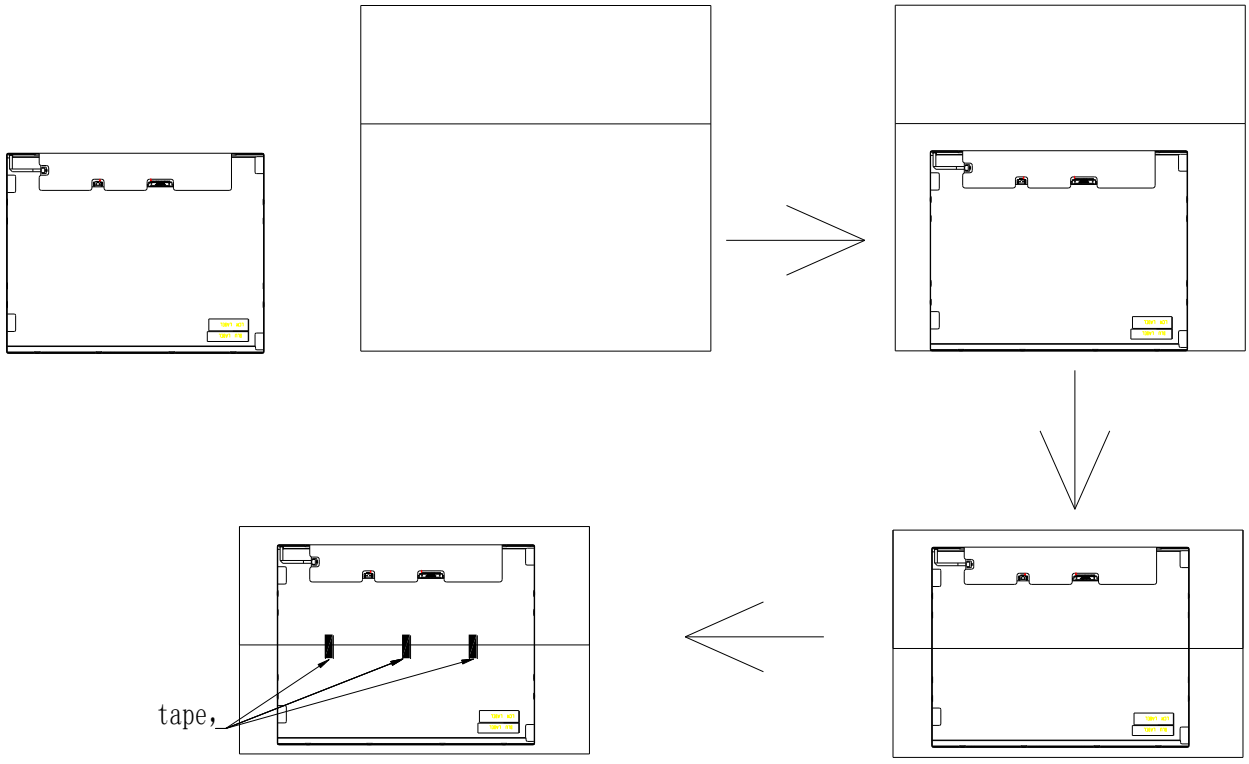


10. Packing Instruction

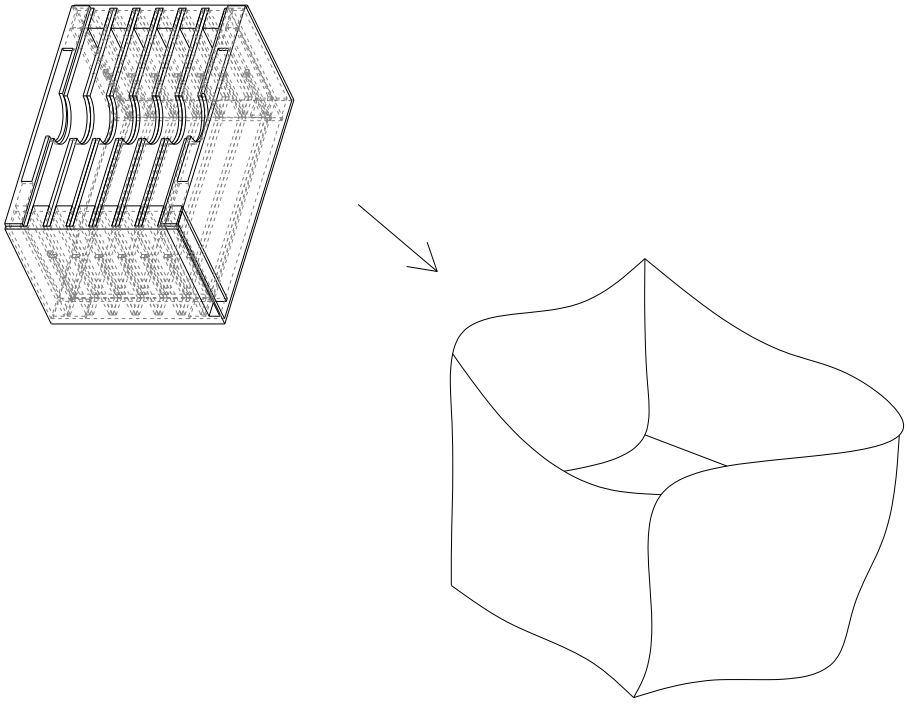
No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	P1500XGF2MB10	326.5×253.5×9.0	0.875	12	
2	Paper card	Corrugated Paper	544×348×285	1.650	1	
3	Dust-proof Bag	PE	700×545×0.05	0.021	1	
4	Carton	Corrugated Paper	544×273.5×312.5	0.75	1	
5	Paper board	Corrugated Paper	527×348×6	0.1	1	
6	Label	Label	100×52	0.001	1	
7	Tape	Tape	10×30	0.001	36	
8	ESD bubble bag	PE	350×350×6	0.18	12	
9	Total weight	15.218kg±10%				

Drawing notes:

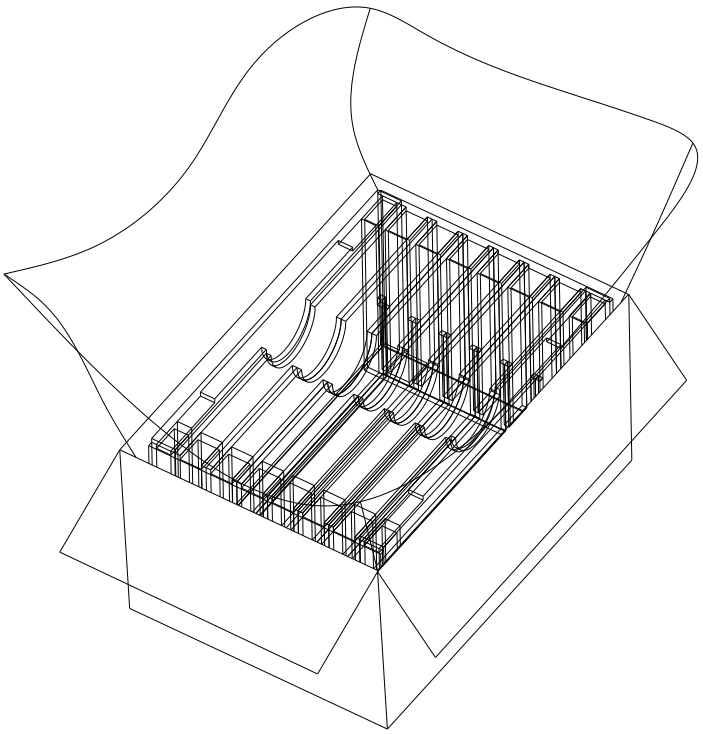
1、The protruding part of the casing of the module is placed on the open side of the bubble bag, put into the bubble bag, folded and attached with masking tape·



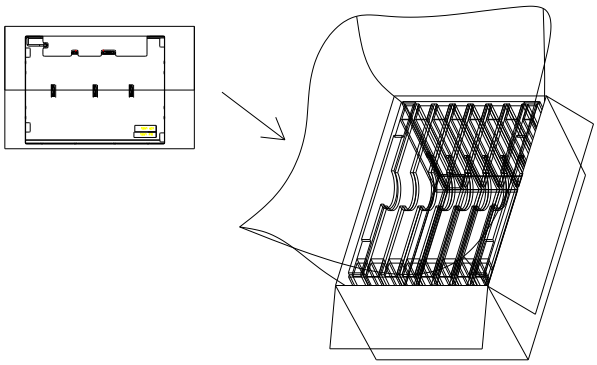
2、Place the paper card in a dust bag



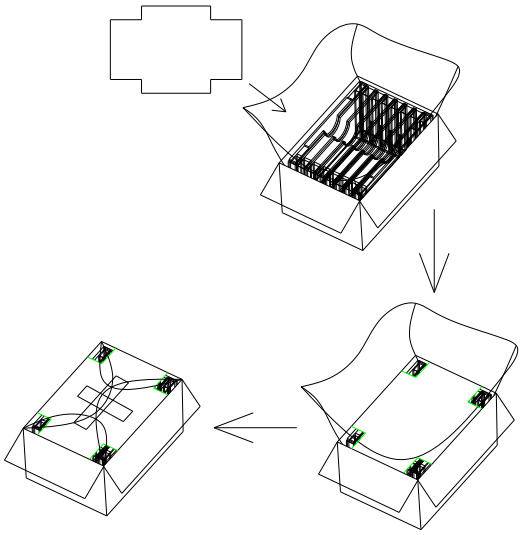
3、Put the combination of the paper card and dust bag in Step 2 into the cardboard box



4、Put the modules into cartons, and each carton is loaded with 12 modules,



5、Put the cardboard into the carton, cover it on the paper card, and fold the excess part of the dust bag over,and fixed with tape



6、Seal the box with tape and attach a label

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.