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Datasheet

Tianma

P1330FHF1MA00

TI-01-016

SPECIFICATION

[ ] Preliminary Specification
[◉] Final Specification

Description **13.3” 1920xRGBx1080 TFT-LCD Module**

Part Number **P1330FHF1MA00**

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	2020-09-02	-	Preliminary release.	Amin Yuan
1.1	2021-02-08	-	Update all information	Amin Yuan
1.2	2021-03-11	-	Update General Specifications and Mechanical Drawing.	Amin Yuan
1.3	2021-12-20	-	Update B/L &Timing information	Aaron Huang
2.0	2023-05-08	3-4	Change [I/O] from “-” to “N”. (PIN 34,38,39,40)	Yao Zhang
		4	Change notes of **3.1 Input / Output Terminals for LCD**	
		10	Update 7.Optical Characteristics	
		5-9	Update **5 Electrical Characteristics ~ 6 Timing chart**	
		-	Final release	
2.1	2023-08-10	9	Add Figure6.2.2.3 LVDS Receiver Input clk&data Skew Margin	Yao Zhang

CONTENTS

1. Summary

1.1 General Description

This is a 13.3 inch a-Si TFT-LCD module with Normal- black technology. It is composed of a TFT-LCD panel, PCB, and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle
- High resolution
- High luminance
- Interface: LVDS

- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03 (File number: E250878)
- 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	13.3 inches	
	Resolution	1920(RGB)x1080	
	Pixel Pitch	0.153*0.153	mm
	TFT Active Area	293.76*165.24	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	Transmissive, Normally Black	
	Surface Treatment	HC	
	Viewing Direction	All	
	Gray Scale Inversion Direction	-	
Mechanical Characteristics	LCM (W x H x D)	308.00*186*9.20	mm
	Weight	560.7	g
Optical Characteristics	Luminance	1000	cd/m^2
	Contrast Ratio	1000:1	
	NTSC	72	%
	Viewing Angle	88/88/88/88	degree
Electrical Characteristics	Interface	LVDS 2 port	
	Color Depth	16.7 Million	color
	Power Consumption（Typ）	LCD:2200 Backlinght: 12992	mW

Table 2.1 General TFT Specifications

Note 1: Viewing direction for best image quality is different from TFT definition. There is a 180 degree shift.

Note 2: Requirements on Environmental Protection: Q/S0002+HF

Note 3: LCM weight tolerance: ± 5%

3. Interface

3.1 Input / Output Terminals for LCD

Connector Information	
LCD Module connector	DF81-40S-0.4H
Matching connector	DF81D-40P-0.4SD or equivalent

Table 3.1.1 Connector information

Pin No.	Symbol	I/O	Description	Remarks
1	GND	P	Ground	Note 1
2	DA0-	I	Pixel data A0-	
3	DA0+	I	Pixel data A0+	
4	GND	P	Ground	
5	DA1-	I	Pixel data A1-	
6	DA1+	I	Pixel data A1+	
7	GND	P	Ground	
8	DA2-	I	Pixel data A2-	
9	DA2+	I	Pixel data A2+	
10	GND	P	Ground	
11	CKA-	I	Pixel clock A-	
12	CKA+	I	Pixel clock A+	
13	GND	P	Ground	
14	DA3-	I	Pixel data A3-	
15	DA3+	I	Pixel data A3+	
16	GND	P	Ground	
17	DB0-	I	Pixel data B0-	
18	DB0+	I	Pixel data B0+	
19	GND	P	Ground	
20	DB1-	I	Pixel data B1-	
21	DB1+	I	Pixel data B1+	
22	GND	P	Ground	
23	DB2-	I	Pixel data B2-	
24	DB2+	I	Pixel data B2+	
25	GND	P	Ground	
26	CKB-	I	Pixel clock B-	
27	CKB+	I	Pixel clock B+	
28	GND	P	Ground	
29	DB3-	I	Pixel data B3-	
30	DB3+	I	Pixel data B3+	
31	GND	P	Ground	
32	GND	P	Ground	
33	GND	P	Ground	
34	NC	N	NC	

35	VCC	P	Power supply(3.3V type)	
36	VCC	P	Power supply(3.3V type)	
37	VCC	P	Power supply(3.3V type)	
38	NC	N	NC	
39	NC	N	NC	
40	NC	N	NC	

Table 3.1.2 Pin Assignment for LCD Interface

Note1: I——Input, O——Output, P——Power/Ground

3.2 Input / Output Terminals for Backlight(CN2)

Connector Information	
Matching connector	FH34SRJ-10S-0.5SH(50) or equivalent

Table 3.2.1 Connector information

Pin No.	Symbol	I/O	Description	Remarks
1	A1	P	LED Anode1	Note 1
2	A2	P	LED Anode2	
3	A3	P	LED Anode3	
4	A3	P	LED Anode4	
5	NC	N	No connect	
6	NC	N	No connect	
7	K1	P	LED Cathode 1	
8	K2	P	LED Cathode 2	
9	K3	P	LED Cathode 3	
10	K4	P	LED Cathode 4	

Table 3.2.2 Pin Assignment for Back Light Interface

Note1： N ——NC, P——Power/Ground

4. Absolute Maximum Ratings

GND=0V

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	0.3	4.5	V	
BL_POWER Input	VCC_LED+	-0.3	28	V	
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tst	-30	80	℃	

Table 3 Absolute Maximum Ratings

Note1:
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.

5. Electrical Characteristics

5.1 Driving TFT LCD Panel

(Ta= 25°C)

Parameter	Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage	VCC	3.2	3.3	3.4	V	-
LCD Power Consumption	P	-	2.2	-	W	Note1

Note1: Test at White pattern; VCC= 3.3V;

5.2 Backlight Unit Driving Condition

ND=0V, Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Voltage	VLED	17.5	20.3	23.5	V	Note 1
Forward Current	I_F	-	640	-	mA	
Life Time	-	-	50000	-	Hrs	

Table 5.2.1 LED Backlight Characteristics

Note 1: 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.

5.3 BLOCK DIAGRAM

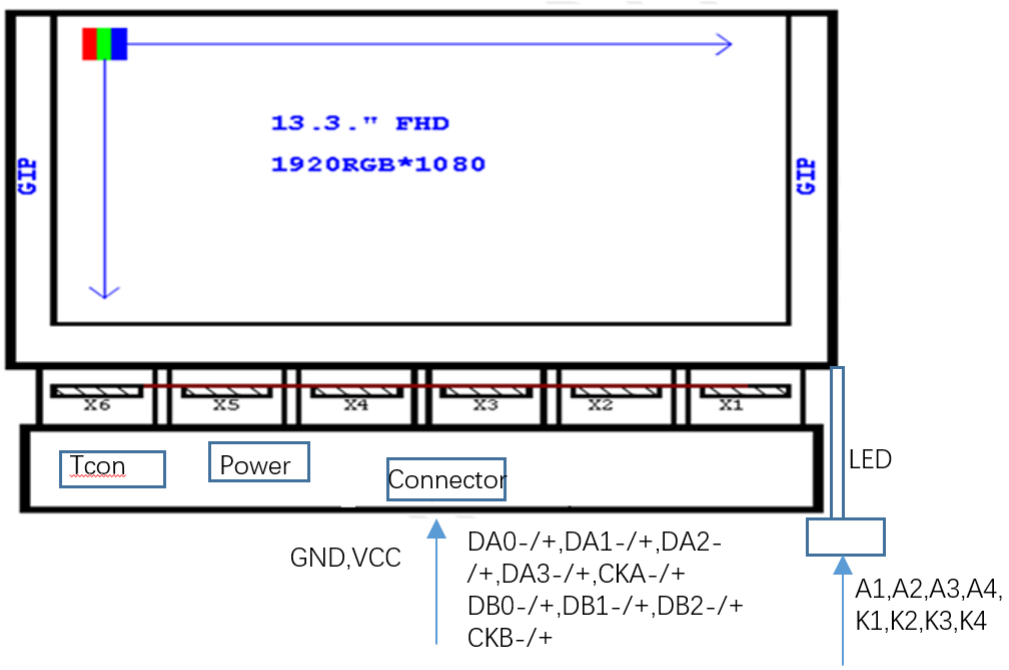


Figure5.3. Block Diagram

6. Timing chart

6.1 Timing Characteristics

	Item	Description	WUXGA (1920x1080)			Unit
			Min	Typ	Max	
Frame	TV-Total	V total line number	1088	1110	1142	Line
	TV-Active	Data duration		1080		Line
	TV-Blank	V-Blank	8	30	62	
Line	TH-Total	H total pixel number	2070	2076	2080	CLK
	TH-Active	Data duration		1920		CLK
	TH-Blank	H-Blank	150	156	160	

Note:

1. Minimum and maximum values are margined for DE mode.
2. Maximum horizontal and vertical line values are not allowed to go beyond maximum timing controller operating condition.

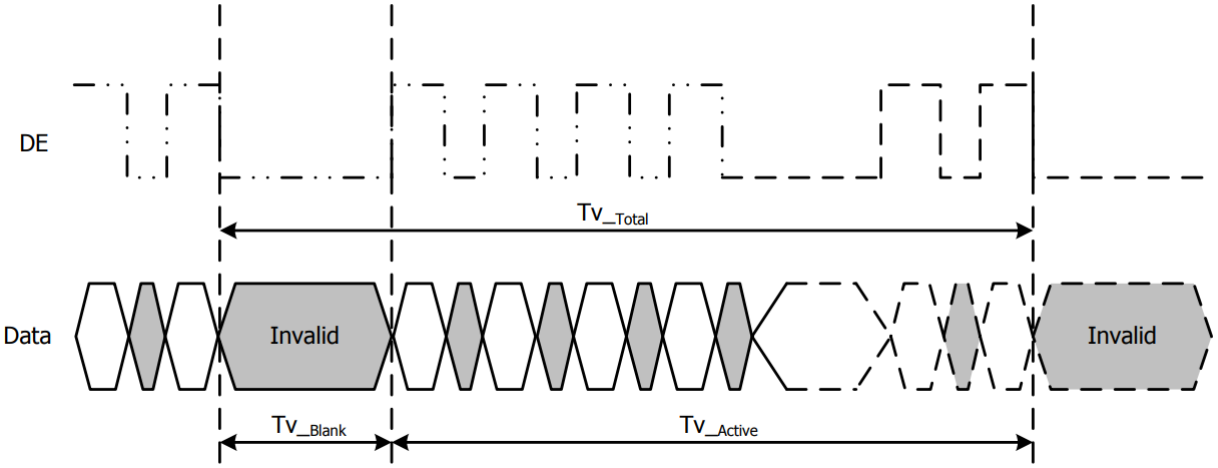


Figure6.1.1: Vertical Input Timing

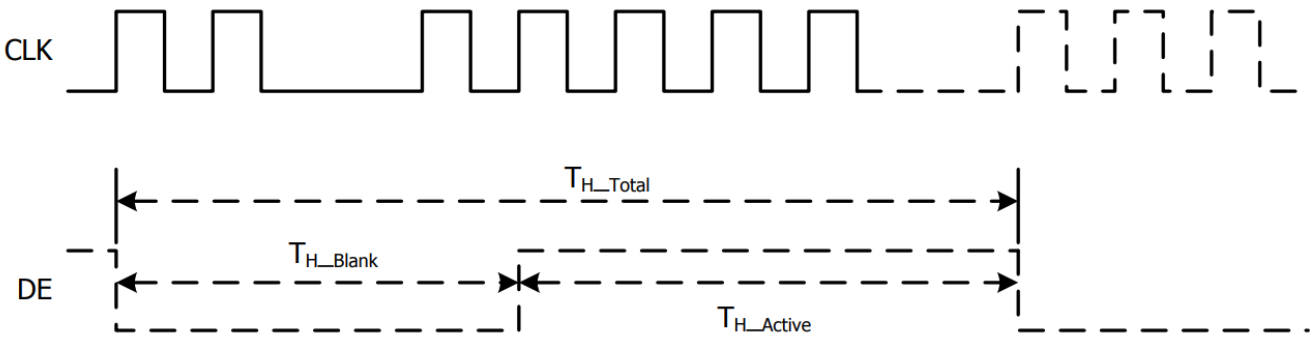


Figure6.1.2: Horizontal Input Timing

6.2 Input Signal Timing Chart

6.2.1 LVDS DC SPECIFICATION

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
LVDS input threshold voltage	High	V_{TH}	-	-	100	mV	at V_{CMLVDS}=1.2V
	Low	V_{TL}	-100	-	-	mV	
Input differential voltage		|VID|	100	-	600	mV	-
Single-End Input Voltage Range		$LVDS_{VIN}$	0	-	VCC	V	
Differential input common mode voltage		V_{CMLVDS}	-	1.2	VCC-0.4-|VID|/2	V	

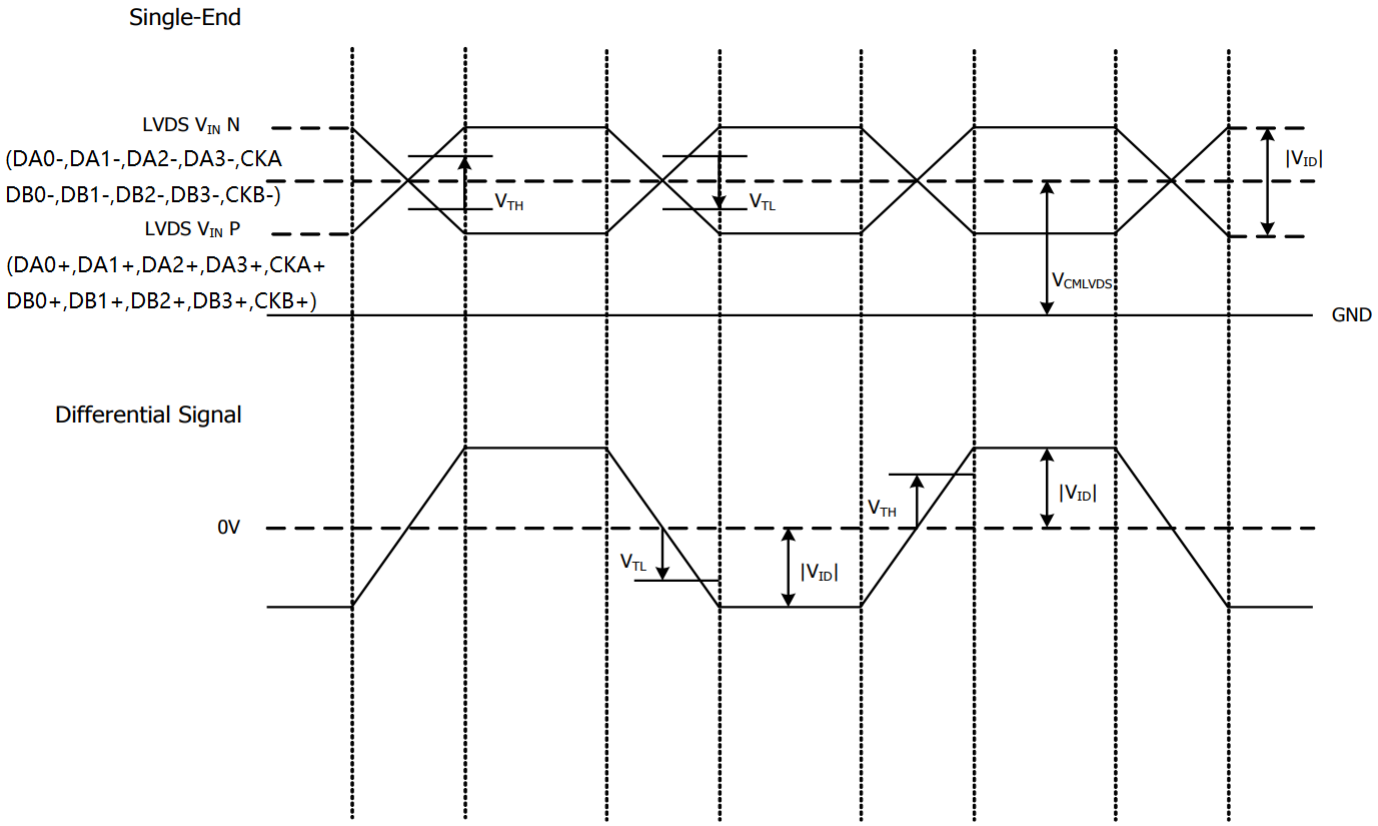


Figure6.2.1. LVDS Waveform

6.2.2 LVDS AC SPECIFICATION

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Clock Period	tLVCP		12.7	T	14.7	ns
Clock Frequency	1/tLVCP		68		71	MHz
Clock High Time	tLVCH			4T/7		ns
Clock Low Time	tLVCL			3T/7		ns
PLL Wake-Up Time	tLVPLL				1	ms
Strobe Width	tSW	V_{CMLVDS} =1.2V |VID|=400mV @65MHz	200			ps
Receiver Strobe Margin	tRSM		400			ps

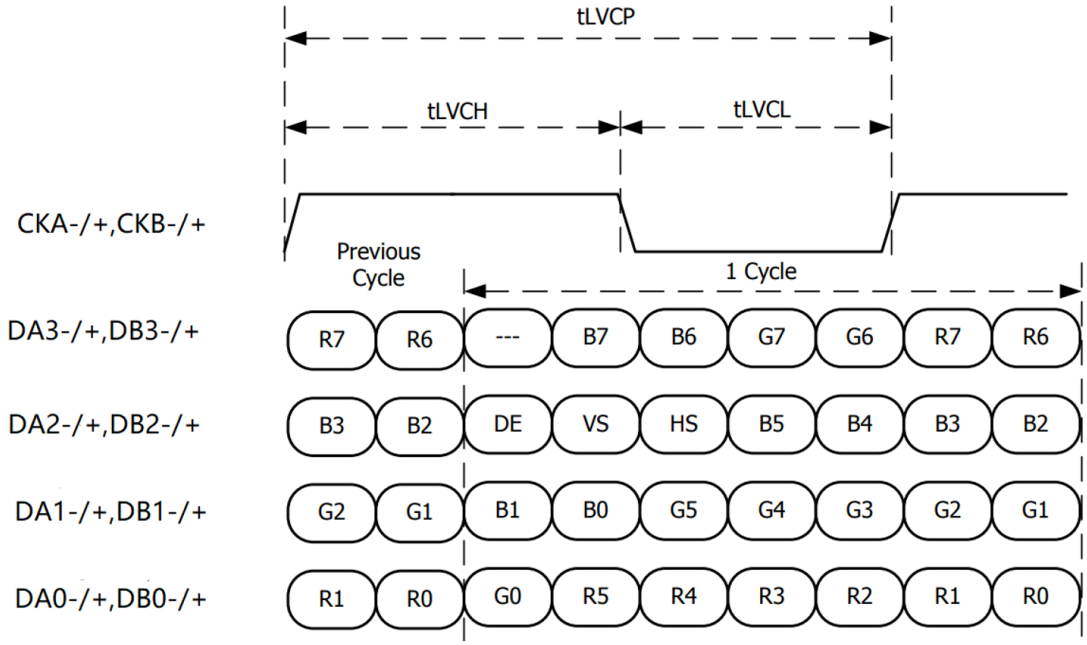
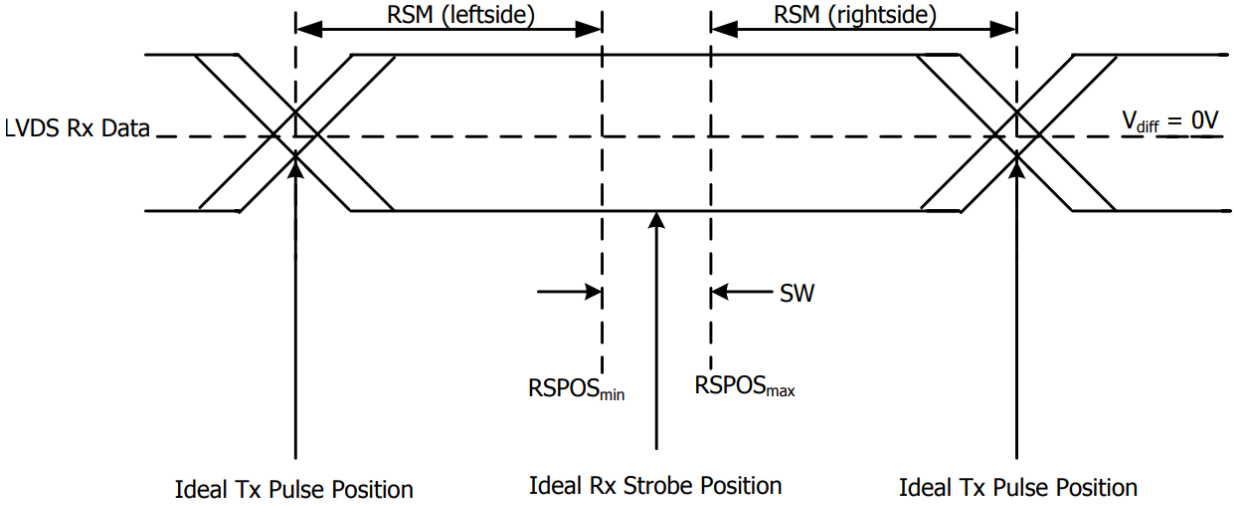
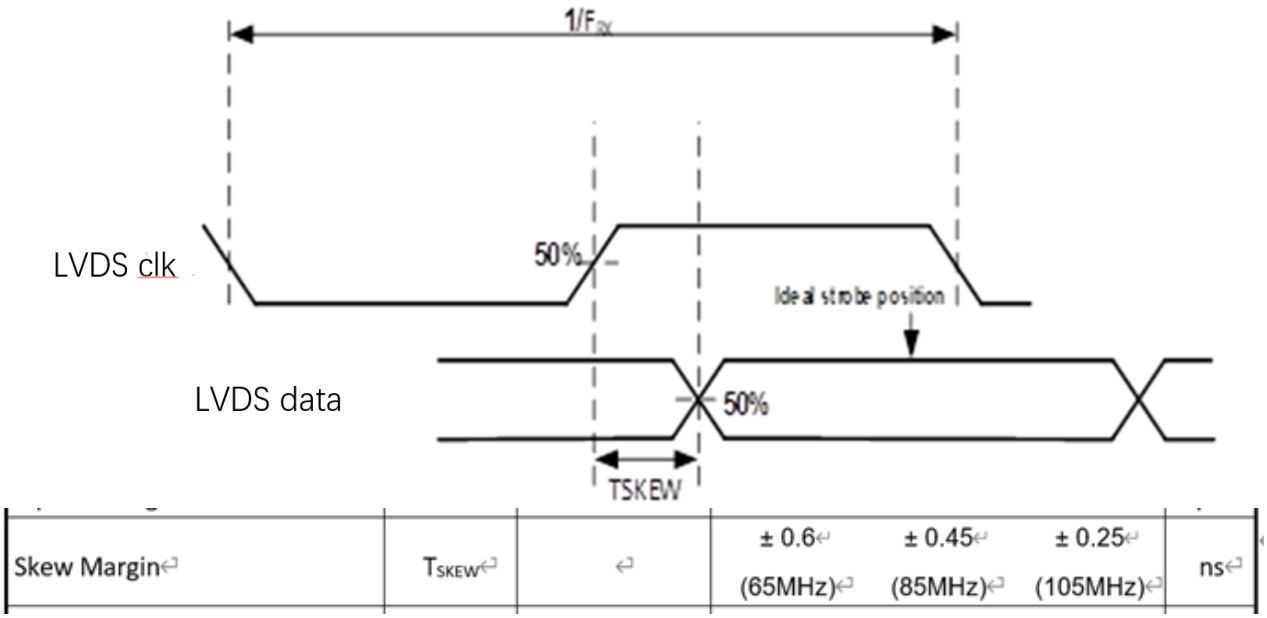


Figure6.2.2.1 LVDS Clock Period with VESA Format



Definitions:
RSM Receiver Skew Margin
RSPOS Receiver Strobe Position
SW Strobe Width (Setup and Hold Time; Internal data sampling window)

Figure6.2.2.2 LVDS Receiver Input Skew Margin



Skew Margin	T_{SKEW}		± 0.6 (65MHz)	± 0.45 (85MHz)	± 0.25 (105MHz)	ns

Figure6.2.2.3 LVDS Receiver Input clk&data Skew Margin

6.3 POWER ON/OFF SEQUENCE

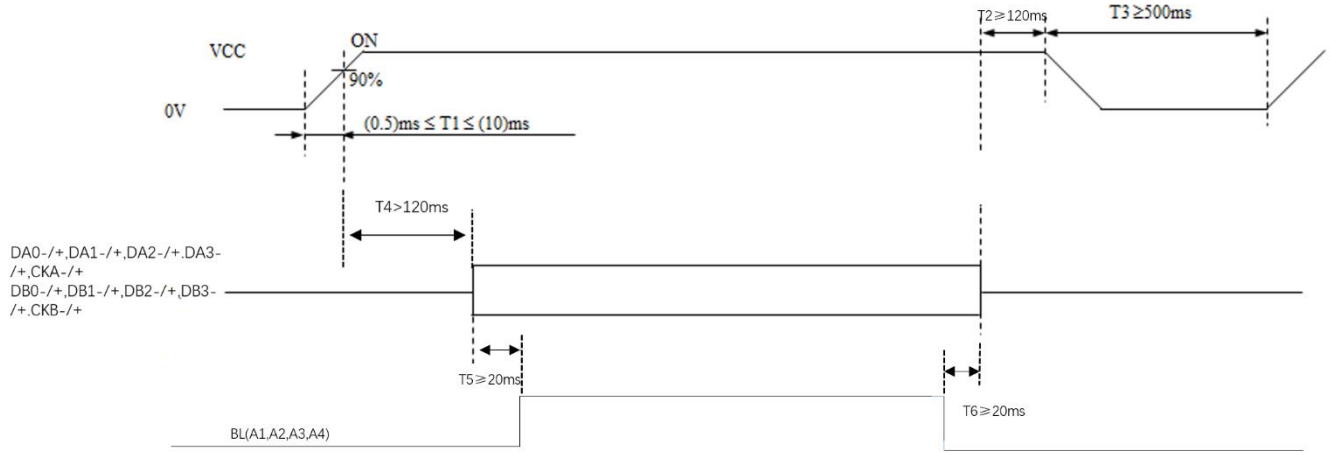


Figure6.3 Power on/off Sequence

7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	80	88	-	Degree	Note2
		θB		80	88	-		
		θL		80	88	-		
		θR		80	88	-		
Contrast Ratio		CR	θ=25°	600	1000	-	-	Note1,3
Response Time		T_{ON}	25℃	-	25	35	ms	Note 4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.256	0.306	0.356	-	-
		y		0.275	0.325	0.375		
	Red	x		0.598	0.648	0.698	-	
		y		0.288	0.338	0.388		
	Green	x		0.253	0.303	0.353	-	
		y		0.582	0.632	0.682		
	Blue	x		0.099	0.149	0.199	-	
		y		0.030	0.080	0.130		
Uniformity		U	-	75	80	-	%	Note1,5
NTSC		-	-	65	72	-	%	
Luminance		-	-	800	1000	-		

Test Conditions:

1. The ambient temperature is 25℃.
2. The test systems refer to Note 1 (Excluding viewing angle and response time test).
3. Viewing Angle and Response Time test method follow the normal LCD test method.

Note 1: (1) Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen (Excluding Uniformity test). All input terminals LCD panel must be ground when measuring the center area of the panel.

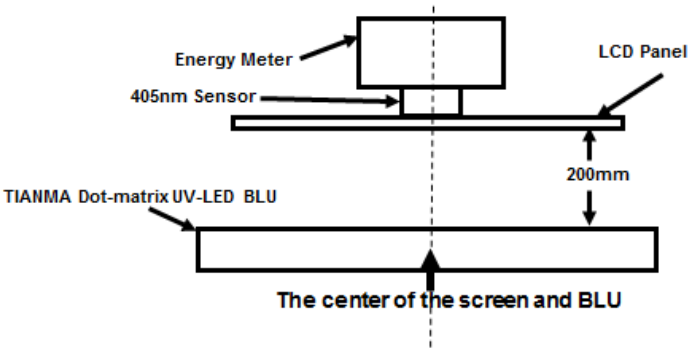


Fig.1

(2)Test instrument and recipe.

As shown in the Fig.1, all optics are measured under a collimating dot-matrix LED backlight, which emitting a wave of 405nm. Energy meter AccuMAX^{TM} –XS-405 is used to measure the following mentioned energy value, the LCD panel is 200mm away from the UV-LED surface. The transmissive energy value of LCD at white state is 2mW/cm^2.(Fig.1)

Note 2: Definition of viewing angle range and measurement system.

viewing angle is measured at the center point of the LCD.(Fig.2)

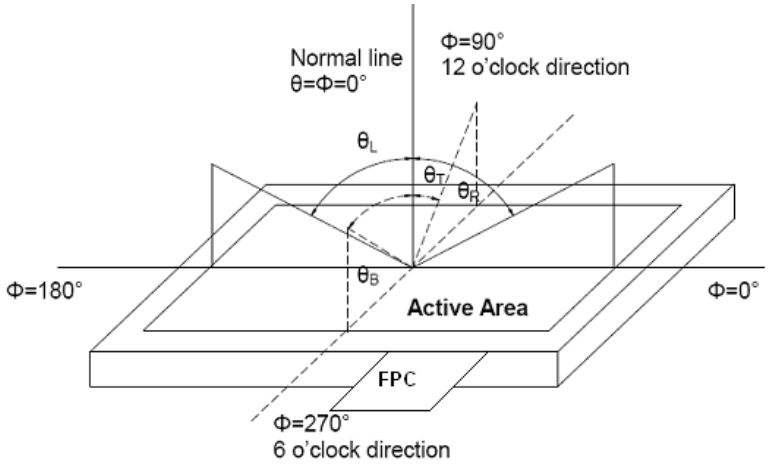


Fig.2

Note 3: Definition of contrast ratio

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

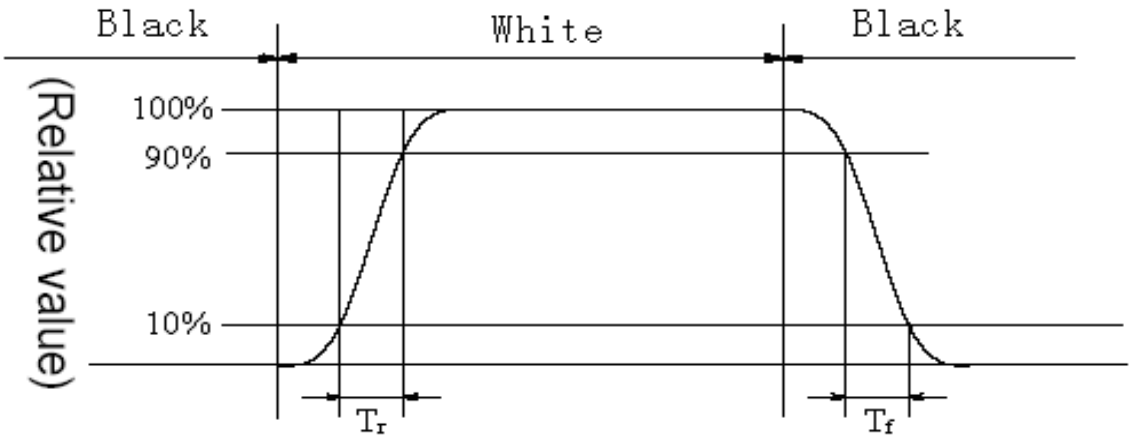
"White state ": The state is that the LCD should be driven by Vwhite.

"Black state": The state is that the LCD should be driven by Vblack.

Vwhite: To be determined Vblack: To be determined.

Note 4: 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_{ON}) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 10% to 90%.

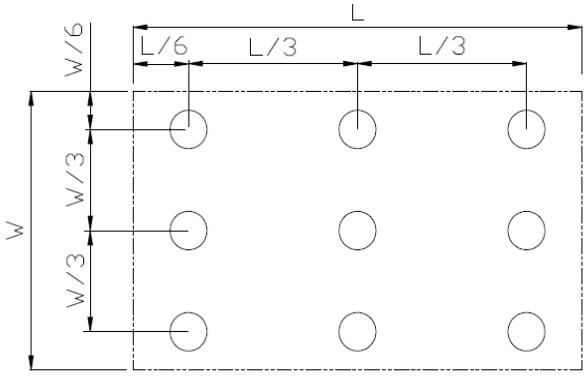


Note 5: Definition of Energy Uniformity

Active area is divided into 9 measuring areas (Fig. 4). Every measuring point is placed at the center of BLU center.

Energy Uniformity (U) = Emin / Emax

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



Emax: The measured Maximum Energy value of all the measurement positions.

Emin: The measured Minimum Energy value of all the measurement positions.

Note 6: Definition of transmittance:

$$\text{Transmittance} = \frac{\text{Energy value measured when LCD is on the “White” state}}{\text{Energy value measured from BLU}}$$

8. Environment/Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts=70℃,240H	IEC60068-2-1:2007,GB2423.2-2008
2	Low Temperature Operation	Ta=-20℃,240H	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta=80℃,240H	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta=-30℃,240H	IEC60068-2-1:2007 GB2423.1-2008
5	Operation at High Temperature and Humidity	60℃90%RH/240H	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-20℃/30min、70℃/30min 100cycles、1H/Cycle，5min	IEC60068-2-14:1984,GB2423.22-2002
7	Electro Static Discharge (operation)	C=150pF,R=330Ω; Contact:±4Kv, 5times; Air:±8KV,5times;	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration (non-operation)	Frequency range:10～55Hz, Stroke:1.5mm Sweep:10Hz ～ 55Hz ～ 10Hz 2hours for each direction of X.Y.Z (6 hours total)	IEC60068-2-6:1982 GB/T2423.10—1995
9	Shock (non-operation)	60G 6ms, ±X,±Y,±Z 3 times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995

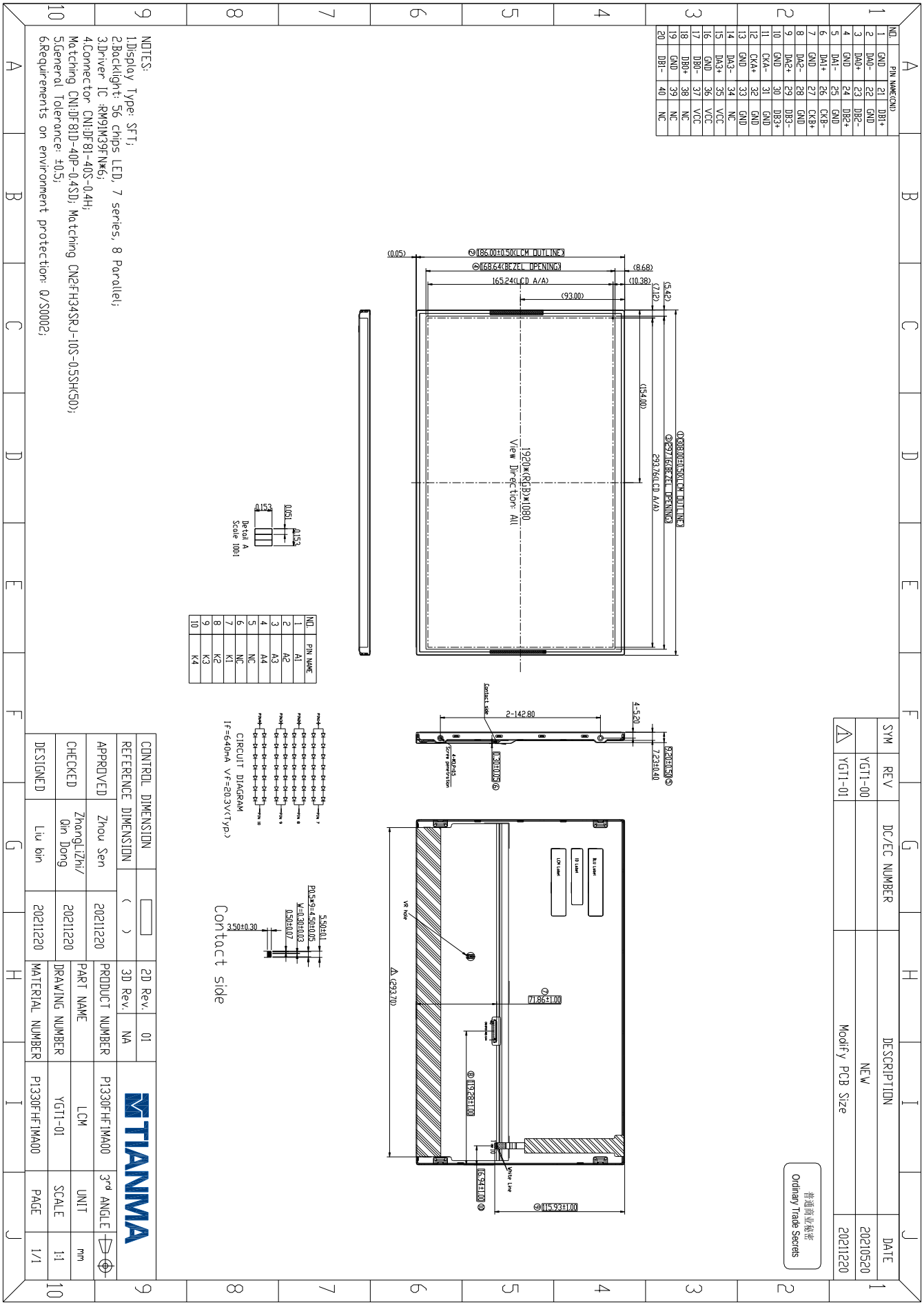
Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.

Note4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

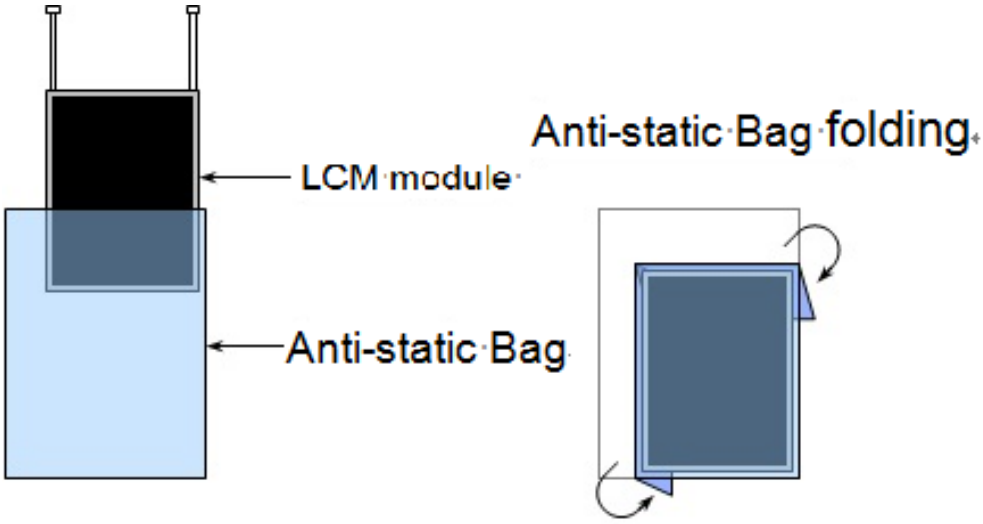
9. Mechanical Drawing



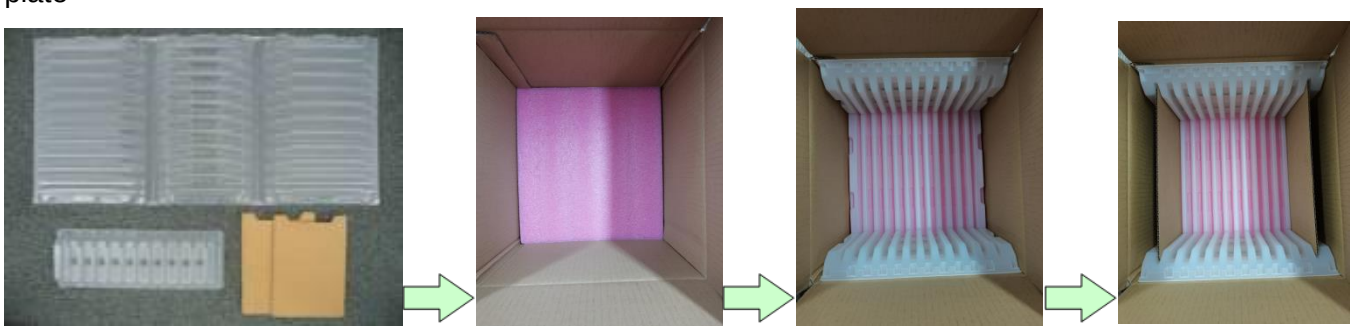
10. Packing Drawing

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	P1330FHF1MA00	308x186x9.77	0.5607	10	
2	Partition board	Corrugated paper	308x186	0.033	2	
3	Anti-static Bag	LD-PE	360x255	0.021	10	
4	Base tray	PP	330×811×42	0.305	1	
5	Top tray	PP	355×330×42	0.135	1	
6	Carton	Corrugated paper	360×335×253	1.01	1	
7	EPE	EPE	356×331×20	0.047	1	
8	Barcode Label	Paper	52x100	0.001	1	
9	Total weight	7.381kg±10%				

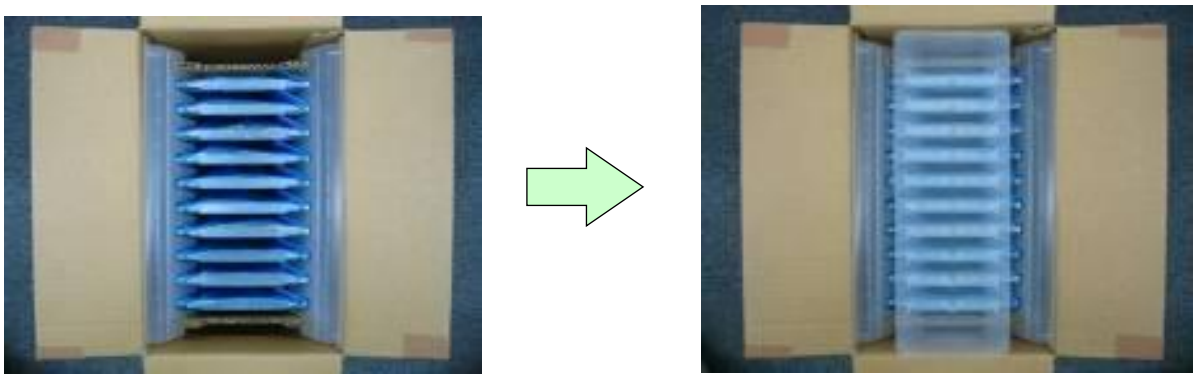
1、Put the LCM module into the packaging bag



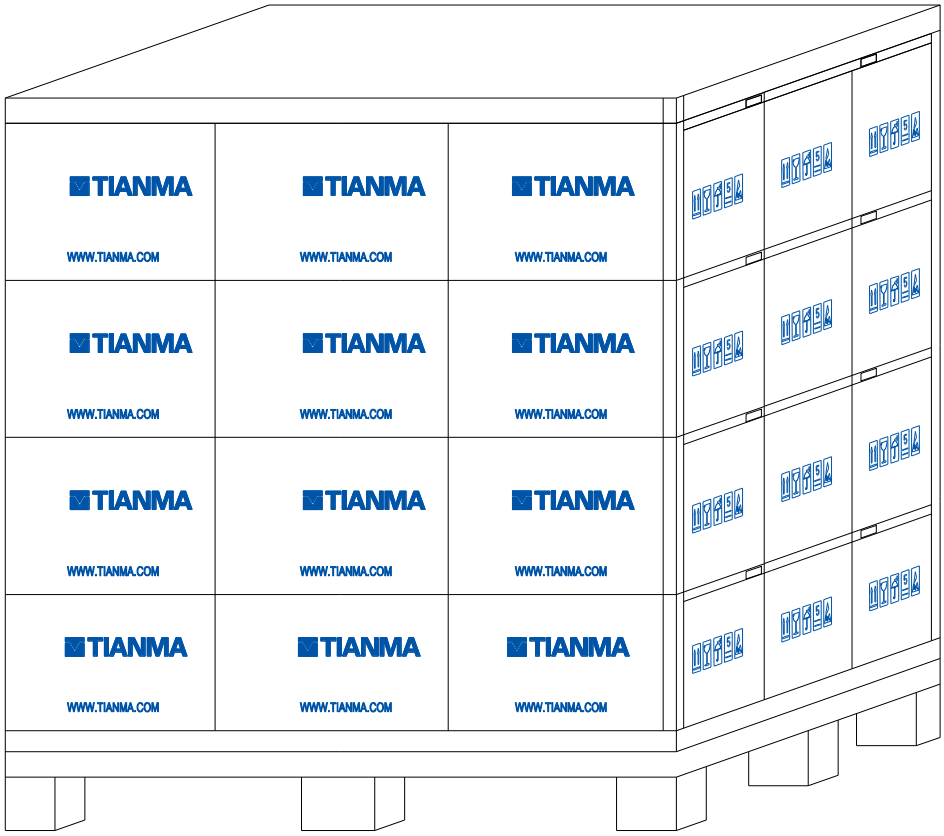
2、Assemble the cardboard box into shape, bind the bottom with adhesive tape, put the EPE board into the box, put the bottom plate into the box, and finally insert the diaphragm into the grooves on both sides of the bottom plate



3、Put the modules in the anti static bag into the Carton,Put the upper cover plate into the plate wall part of the component to press the finished product



4、Close the cover of the Carton, use the sealing tape for "H" shape sealing, and affix the box label.



11. Precautions for Use of LCD Modules

11.1 Handling Precautions

1.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

1.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

1.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

1.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

1.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

- Isopropyl alcohol
- Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

- Water
- Ketone
- Aromatic solvents

1.1.6 Do not attempt to disassemble the LCD Module.

1.1.7 If the logic circuit power is off, do not apply the input signals.

1.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

10.1.8.1 Be sure to ground the body when handling the LCD Modules.

10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.

10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

10.1.8.4 The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

11.2 Storage precaution

1.1.9 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

1.1.10 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : 0℃ ～ 40℃ Relatively humidity: ≤80%

1.1.11 The LCD modules should be stored in the room without acid, alkali and harmful gas.

11.3 Transportation precaution

1.1.12 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

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