SPECIFICATION

[◉] Preliminary Specification
[ ] Final Specification

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

Part Number **P1330FHF2MB01**

jj

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

REVISION HISTORY

Rev	Date	Page	Revision Items	Editor
1.0	2025/10/11		Preliminary spec	Yanzhuo Zhao
1.1	2025/12/5	4,17	Update 1pin position	Yanzhuo Zhao

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, a driver circuit, a PCB, and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle
- High resolution
- Interface: eDP
- LED driver integrated
- Surface treatment: Anti-Glare
- This product will comply 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	0.153x0.153	mm
	TFT Active Area	293.76 x 165.24	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)	309.7×184.1×10.1(max)	mm
	Weight	TBD	g
Optical Characteristics	Luminance	500	cd/m^2
	Contrast Ratio	1500:1	-
	NTSC	72	%
	Viewing Angle	89/89/89/89(SFT)	degree
Electrical Characteristics	Interface	eDP 2lanes (version 1.2)	-
	Color Depth	16.7 Million	color
	Power Consumption	LCD:TBD Backlight: TBD	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
LCD Module connector	IPEX 20455-040E-66
Matching connector	IPEX 20453-040T-03 or equivalent

Table 3.1.1 Connector information

No	Symbol	I/O	Description	Comment
1	NC	N	No connection. TIANMA Internally use	-
2	NC	N	No connection. TIANMA Internally use	-
3	NC	N	No connection. TIANMA Internally use	-
4	NC	N	No connection	
5	NC	N	No connection	
6	NC	N	No connection	
7	NC	N	No connection	
8	NC	N	No connection	
9	NC	N	No connection	
10	NC	N	No connection	
11	NC	N	No connection	
12	LED_VCCS	P	Power supply for Backlight(12V)	
13	LED_VCCS	P	Power supply for Backlight(12V)	
14	LED_VCCS	P	Power supply for Backlight(12V)	
15	LED_VCCS	P	Power supply for Backlight(12V)	
16	NC	N	No connection	
17	NC	N	No connection	
18	LED_PWM	I	PWM signal input for dimming (Luminance control)	
19	LED_EN	I	Backlight ON/OFF control(High：ON; Low: OFF)	
20	BL_GND	P	BL Ground	
21	BL_GND	P	BL Ground	
22	BL_GND	P	BL Ground	
23	BL_GND	P	BL Ground	
24	HPD	O	Hot Plug Detect Output (The PCB has been pulled up to 2.5V)	
25	GND	P	Ground	
26	GND	P	Ground	
27	NC	N	No connection	
28	VCCS	P	Power supply for LCD panel(3.3V)	
29	VCCS	P	Power supply for LCD panel(3.3V)	
30	GND	P	Ground	
31	AUX-	I/O	Complement Signal Aux Channel	

32	AUX+	I/O	True Signal Aux Channel	
33	GND	P	Ground	
34	ML0+	I	True Signal Link Lane 0	
35	ML0-	I	Complement Signal Link Lane 0	
36	GND	P	Ground	
37	ML1+	I	True Signal Link Lane 1	
38	ML1-	I	Complement Signal Link Lane 1	
39	GND	P	Ground	
40	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.
BL_GND and H_GND is connected internally.
Note3: eDP signal needs to comply with CTS testing specifications.

3.2 Positions of socket

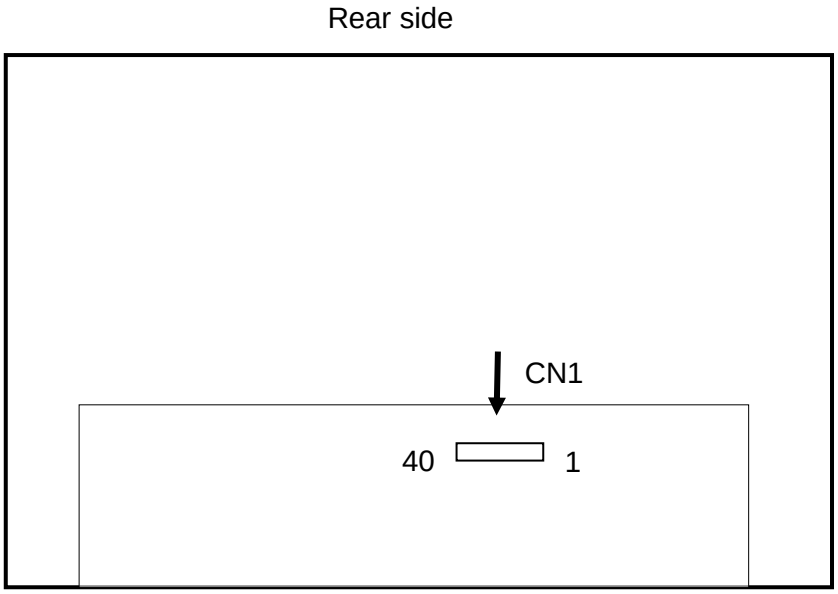
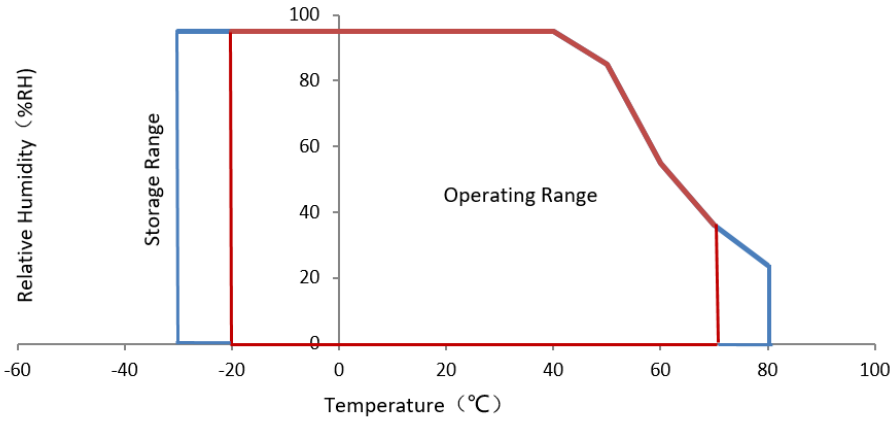


Table 3.2 Positions of Socket

4. Absolute Maximum Ratings

Item		Symbol	Rating	Unit	Remark
Power supply voltage	LCD panel	VCCS	(-0.3 to +4.0)	V	Ta= 25℃
	Backlight	LED_VCCS	(-0.3 to +27.0)	V	
Input voltage for signals	Display signals Note1	VD	T.B.D.	V	
	Function signal for Backlight	LED_EN	(-0.3 to +33.0)	V	
		LED_PWM	(-0.3 to +6.0)		
Storage temperature		Tst	-30 to +80	°C	-
Operating temperature	Front surface	TopF	-20 to +70	°C	Note2
	Rear surface	TopF	-20 to +70	°C	Note3
Relative humidity Note4		RH	≤ 95	%	Ta ≤ 40°C
			≤ 85	%	40°C < Ta ≤ 50°C
			≤ 55	%	50°C < Ta ≤ 60°C
			≤ 36	%	60°C < Ta ≤ 70°C
			≤ 24	%	70°C < Ta ≤ 80°C
Absolute humidity Note4		AH	≤ 70 Note5	g/m3	Ta= 70°C

Table 4.1 Absolute Maximum Ratings



Note1: ML1-, ML1+, ML0-, ML0+, AUX+, AUX-
Note2: Measured at LCD panel surface (including self-heat)
Note3: Measured at LCD module's rear shield surface (including self-heat)
Note4: No condensation
Note5: Water amount at Ta= 70°C and RH= 36%
Note6: 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

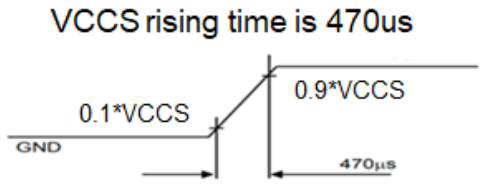
5.1 DC Characteristics for Panel Driving

(Ta= 25°C)

Item		Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage		VCCS	3.0	3.3	3.6	V	Note1
Supply current		I_{VCCS}	-	260	TBD	mA	At VCC= 3.3V Note2
Power Consumption		W_{VCCS}	-	858	TBD	W	
Inrush Current		Inrush_ VCCS	-	-	1.5	A	-
Permissible ripple voltage		VRPC	-	-	100	mVp-p	for VCC Note3
Output Signal Voltage	High Level	V_{OH}	0.8*2.5	-	-	V	HPD
	Low Level	V_{OL}	-	-	0.2*2.5	V	

Table 5.1.1 Operating Voltages

Note1: VCCS should be voltage on the LCD module connector，Including ripple.
Note2: Test at White pattern.
Note3：The permissible ripple voltage includes spike noise.
Note4：Inrush current should be tested under VCCS rising time 470us



5.2 DC Characteristics for Backlight Driving

(Ta= 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Power supply voltage	LED_VCCS	11.2	12.0	12.8	V	Note1, Note2
Power supply current	I_{LED_VCCS}	-	423	TBD	mA	at LED_VCCS = 12.0V Note4
Power Consumption	W_{LED_VCCS}	-	5076	-	W	
Inrush Current	Inrush_ LED_VCCS	-	-	1.5	A	-
Permissible ripple voltage	VRPD	-	-	100	mVp-p	for LED_VCCS Note2, Note5
Input voltage for BL_PWM, BL_ENABLE signal	VIH	2	-	3.3	V	
	VIL	0	-	0.8	V	
BL_PWM frequency	f_{PWM}	100	-	50K	Hz	Note6
BL_PWM duty ratio	DR_{PWM}	5	-	100	%	Note7, Note8
LED life time	Hr	-	50000	-	Hour	Note 9

Table 5.2.1 LED Backlight Characteristics

Note1: When designing of the power supply, take the measures for the prevention of surge voltage.
Note2: The power supply lines (LED_VCCS and BL_GND) may have ripple voltage during luminance control of LED. There is the possibility that the ripple voltage produces acoustic noise and signal wave noise in audio circuit and so on.
Note3: This value excludes peak current such as overshoot current.
Note4: At the maximum luminance control.
Note5: The permissible ripple voltage includes spike noise.
Note6: Depending on the frequency used, some noise may appear on the screen, please conduct a thorough evaluation.
Note7: While the LED_EN signal is high, do not set the tPWH (PWM pulse width) is less than minimum value. It may cause abnormal working of the backlight. In this case, turn the backlight off and then on again by LED_EN signal.
Note8: Regardless of the PWM frequency, both PWM duty ratio and PWM pulse width must be always more than the minimum values.
Note9: 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 an estimated data.

5.3 Power ON/OFF Sequence

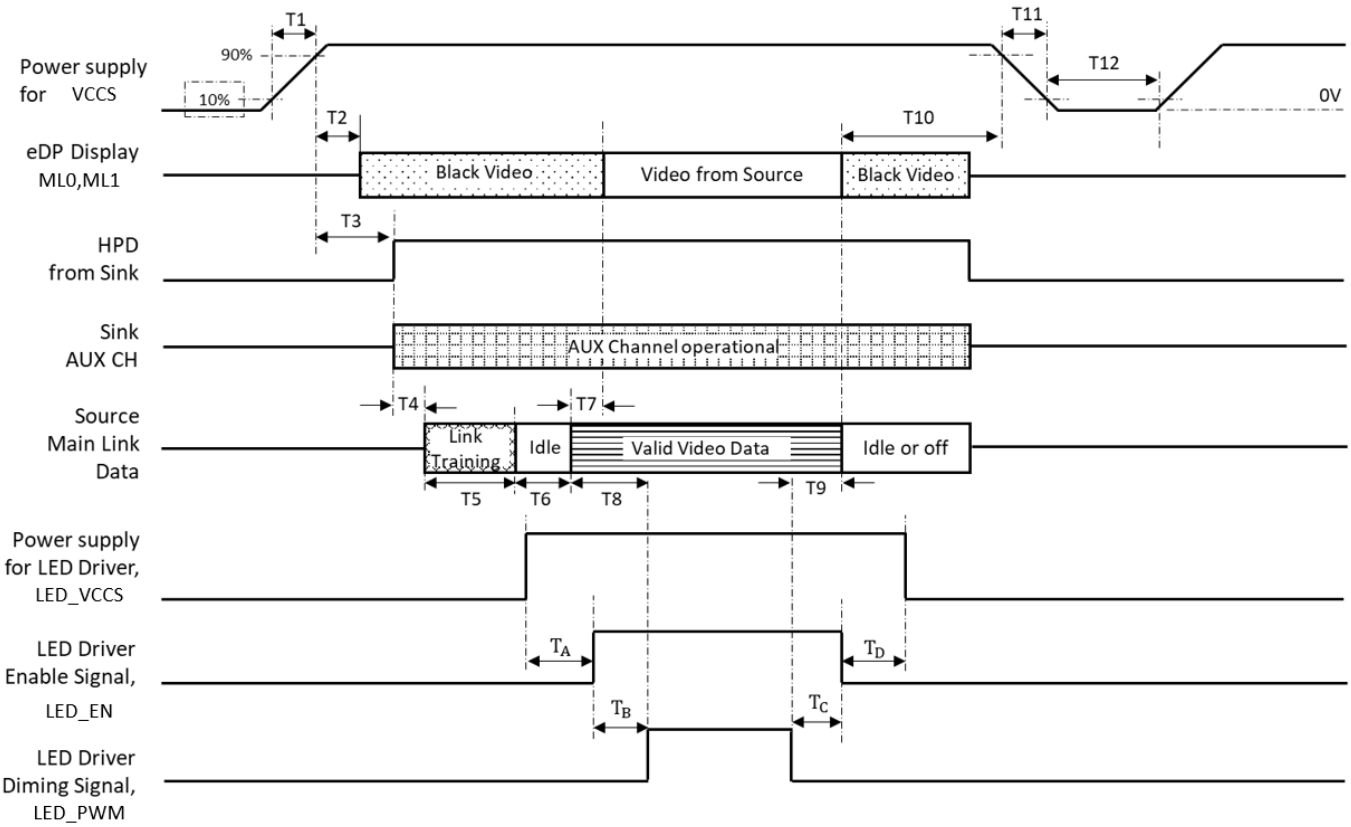


Figure 5.3.1 Power on/off sequence

Parameters	Description	Reqd. by	Value		Unit	Notes
			Min	Max		
T1	Power tail rise time, 10% to 90%	Source	0.5	10	ms	-
T2	Delay from VCCS to black video generation	Sink	0	200	ms	Automatic Black Video generation prevents display noise until valid video data is received from the Source
T3	Delay from VCCS to HPD high	Sink	0	200	ms	Sink AUX Channel must be operational upon HPD high
T4	Delay from HPD high to link training initialization	Source	-	-	ms	Allows for source to read Link capacity and initialize
T5	Link training duration	Source	-	-	ms	Dependent on Source link training Protocol
T6	Link Idle	Source	-	-	ms	Min Accounts for required BS-Idle pattern. Max allows for Source frame synchronization
T7	Delay from valid video Data from Source to video on display	Sink	0	50	ms	Max value allows for Sink to valid video Data and Timing. At the end of T7, Sink will indicate the detection of valid video data by setting SINK_STATUS bit to logic 1(DPCD 00205h, bit 0), and Sink will no longer generate automatic Black video
T8	Delay from valid video Data from Source to Backlight on	Source	0	-	ms	Source must assure display video is stable
T9	Delay from Backlight off to end of valid video Data	Source	0	-	ms	Source must assure backlight is no longer illuminated. At the end of T9, Sink will indicate the detection of no valid video data by setting the SINK_STATUS bit to logic 0 (DPCD 00205h, bit 0), and Sink will automatically display Black Video.
T10	Delay from end of valid video data from Source to Power off	Source	0	500	ms	Black video will be displayed after receiving idle or off signals from Source
T11	VCCS power rail fall time, 90% to 10%	Source	-	10	ms	-
T12	VCCS Power off time	Source	1000	-	ms	-
T_A	Delay from LED_VCCS on to enable signal LED_EN on	Source	2	5 typ	ms	-
T_B	Delay from enable signal LED_EN on to dimming signal LED_PWM on	Source	2	5 typ	ms	-
T_C	Delay from diming signal LED_PWM off to Enable signal LED_EN off	Source	2	5 typ	ms	-
T_D	Delay from Enable signal LED_EN off to diming signal LED_PWM off	Source	2	5 typ	ms	-

Table 5.3.2 Power On/Off Sequence Table

Note1: If there is a voltage variation (voltage drop) at the rising edge of VCCS below 3.0V, there is a possibility that a product does not work due to a protection circuit.

Note2: Display signals (ML0+/-, ML1+/-) 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, VCCS also must be shut down.

5.4 LCD Module Block Diagram

H GND

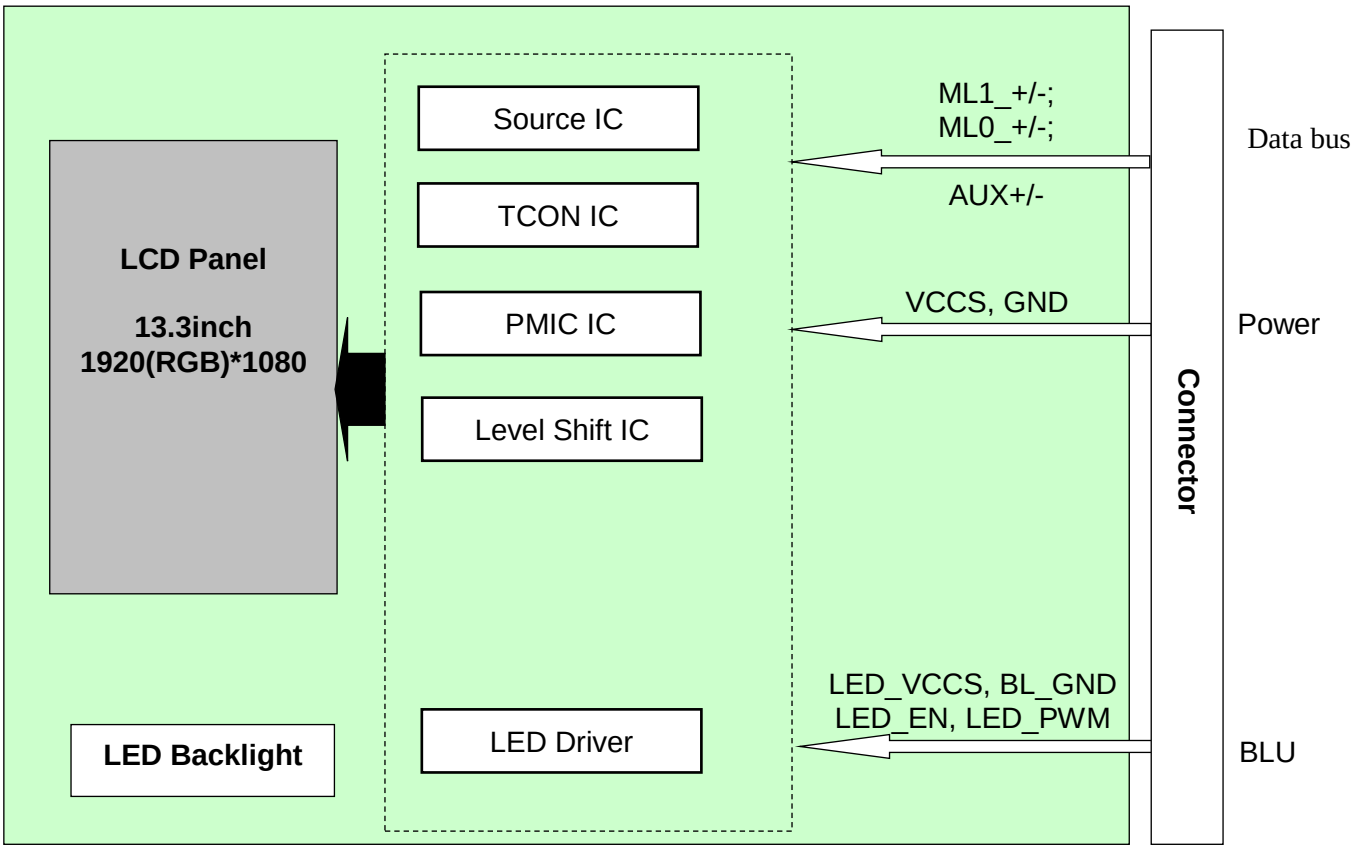
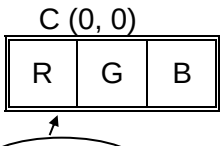


Figure 5.4.1 LCD Module Block Diagram

Note1: GND and BL_GND must be connected to customer equipment's ground, and it is recommended that these grounds to be connected together in customer equipment ground.

5.5 Display Positions

The following table is the coordinates per pixel (See following figures)



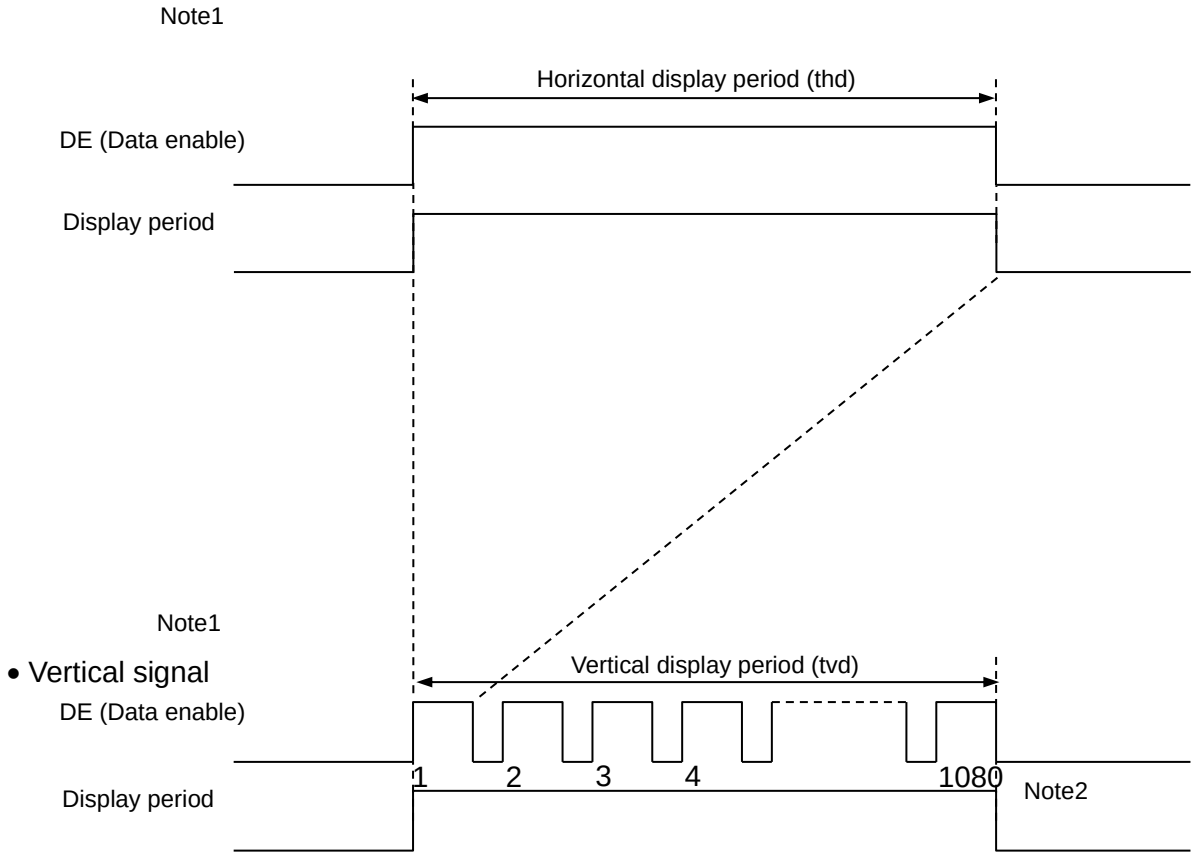
C(0, 0)	C(1, 0)	• • •	C(X, 0)	• • •	C(1918, 0)	C(1919, 0)
C(0, 1)	C(1, 1)	• • •	C(X, 1)	• • •	C(1918, 1)	C(1919, 1)
• • •	• • •	• • •	• • •	• • •	• • •	• • •
C(0, Y)	C(1, Y)	• • •	C(X, Y)	• • •	C(1918, Y)	C(1919, Y)
• • •	• • •	• • •	• • •	• • •	• • •	• • •
C(0, 1078)	C(1,1078)	• • •	C(X,1078)	• • •	C(1918,1078)	C(1919,1078)
C(0,1079)	C(1,1079)	• • •	C(X,1079)	• • •	C(1918,1079)	C(1919,1079)

Table 5.5.1 Display Positions

5.6 Input Signal Timings

5.6.1 Outline of input signal timings

- Horizontal signal



- Vertical signal

Figure 5.6.1 Outline of Input Signal Timings

Note1: This diagram indicates virtual signal for set up to timing.
Note2: See "**5.6.3 Input signal timing chart**" for the pulse number.

5.6.2 Timing characteristics

(Note1)

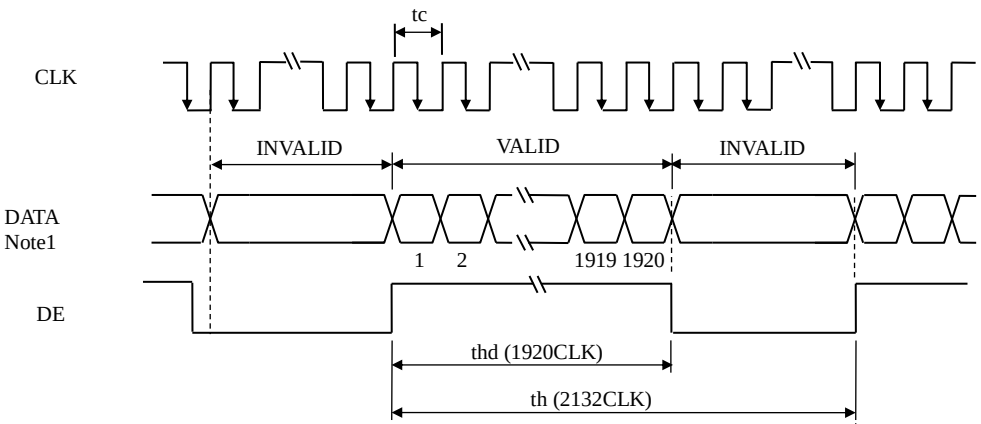
Parameter			Symbol	min.	typ.	max.	Unit	Remarks
CLK	Frequency		1/tc	-	144.8	-	MHz	
	Frame	TV-Total	V total line number	-	1132	-	Line	
		TV-Active	Data duration	-	1080	-	Line	
		TV-Blank	V-Blank	-	52	-	Line	
	Line	TH-Total	H total pixel number	-	2132	-	CLK	
		TH-Active	Data duration	-	1920	-	CLK	
		TH-Blank	H-Blank	-	212	-	CLK	
FR	Frame Rate		FR		60		Hz	

Table 5.6.2 Timing Characteristics

Note1: Definition of parameters is as follows.
tc= 1CLK, th= 1H

5.6.3 Input signal timing chart

Horizontal timing



Vertical timing

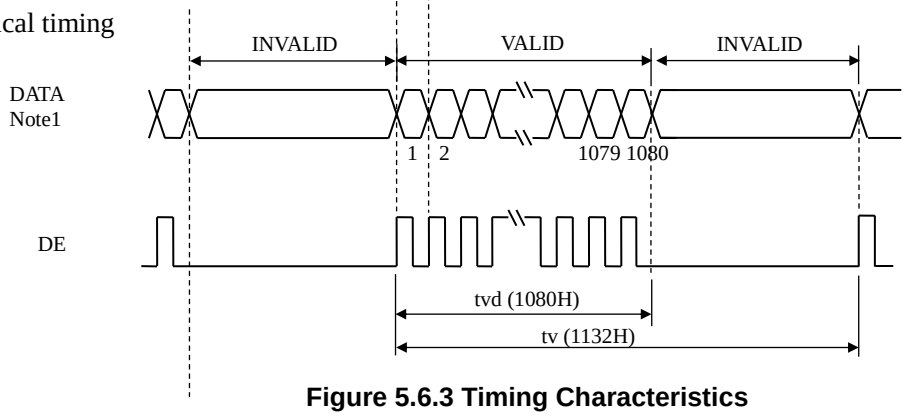


Figure 5.6.3 Timing Characteristics

Note1: DATA = R0-R7, G0-G7, B0-B7

6. eDP Signal Timing Specification

6.1 Display Port Main Link Signal

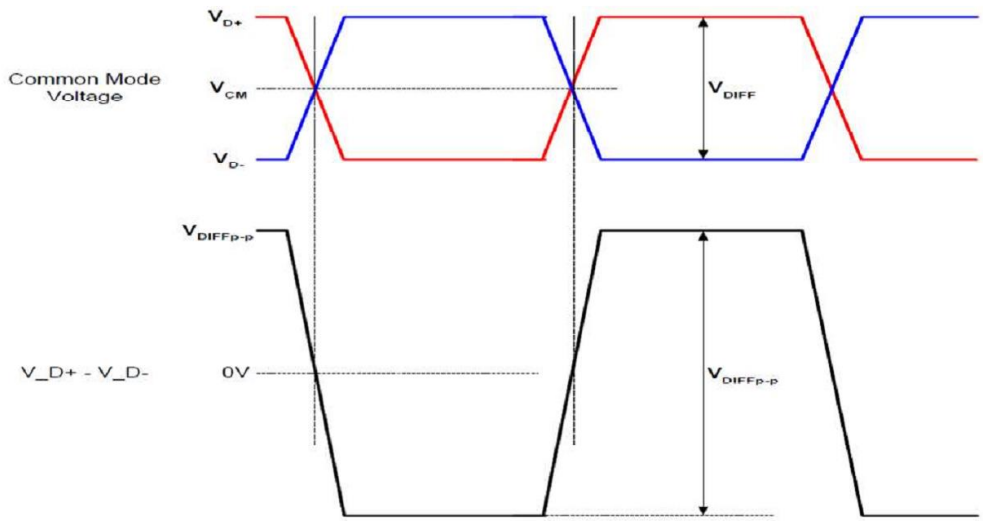


Figure 6.1.1 Timing Specification for Display Port Main Link Signal

DC Specification	Min	Typ	Max	Unit
DC common mode voltage	0		2	V
AC Specification	**Min**	**Typ**	**Max**	**Unit**
Frequency for high bit rate	2.68569	2.7	2.70081	Gbps
Frequency for reduced bit rate	1.611414	1.62	1.620486	Gbps
Spread spectrum clock (down spreading)	0		0.5	%
SSC modulation frequency	30		33	KHz
Differential peak-to-peak input voltage at package pins	100			mV
Differential termination resistance	80		120	ohm
Rx short circuit current limit			50	mA
Rx intra-pair skew tolerance at HBR			60	ps

Figure 6.1.2 Timing Specification for Display Port Main Link Signa

6.2 Display Port AUX Signal

AC Specification	Min.	Typ.	Max.	Unit
Unit interval	0.4	-	0.6	Us
AUX differential peak to peak voltage at TX	0.18	-	0.8	V
AUX differential peak to peak voltage at RX	0.14	-	1.36	V
Rx sensitivity	0.1	-	-	V

Figure 6.2.1 Timing Specification for Display Port AUX signal

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°	1000	1500	-		Note 3
Response Time		T_r	25℃	-	30	40	ms	Note 4
		T_f						
Chromaticity	**White**	x		0.266	0.316	0.366		Note 1,5
		y		0.286	0.336	0.386		
	Red	x		0.607	0.657	0.707		Note 1,5
		y		0.287	0.337	0.387		
	Green	x		0.261	0.311	0.361		Note 1,5
		y		0.572	0.622	0.672		
	Blue	x		0.100	0.150	0.200		Note 1,5
		y		0	0.068	0.118		
Uniformity		U		70	80		%	Note 6
NTSC		-		68	72		%	Note 5
Luminance		L		400	500		cd/m^2	Note 7

Table 7.1 Optical Parameters

Test Conditions:

1. PWM duty ratio: 100%, 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.

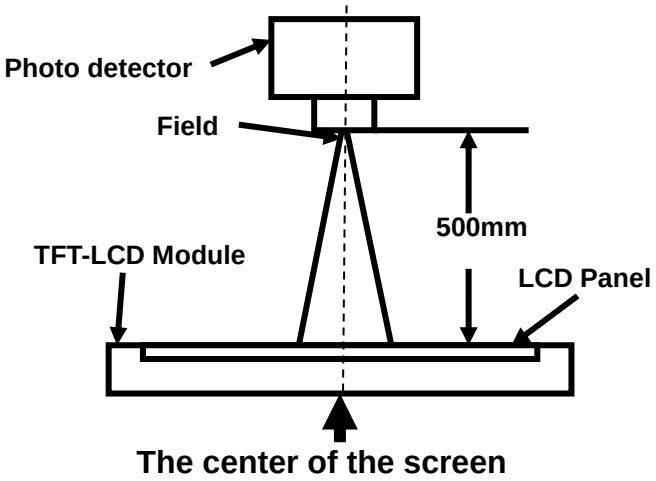


Fig1. Measurement Set Up

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

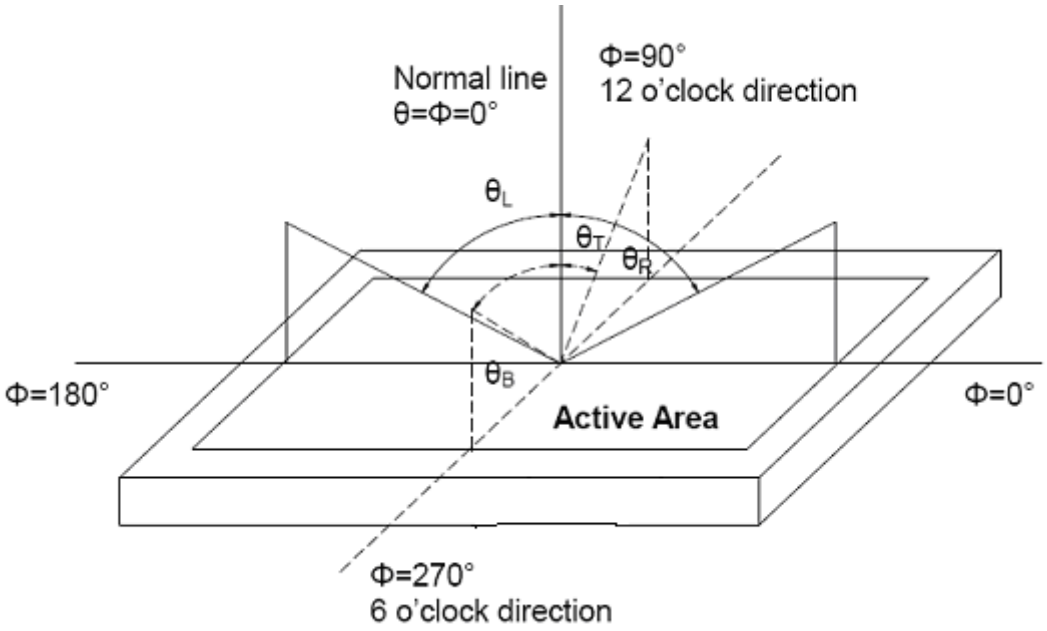


Fig2. Measurement viewing angle

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 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%.

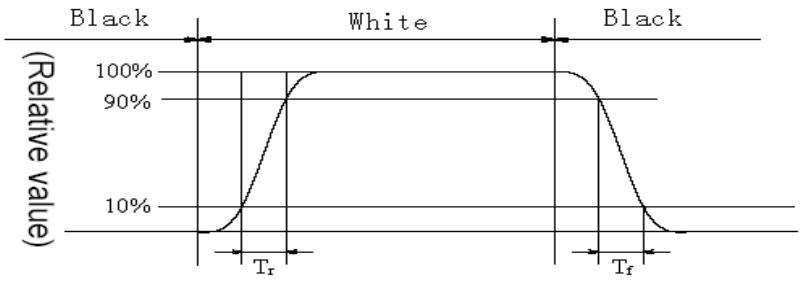


Fig3. Response Time Testing(SFT)

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

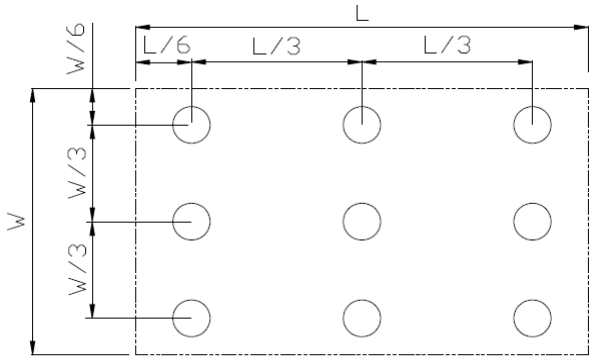


Fig4. Luminance Uniformity Measurement Locations(9 points)

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℃~80℃ 30min，50cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=150pF，R=330Ω，9point/panel Air：±15kv，10times； Contact：±8kv，10times； （Environment：15℃~35℃， 30%~60%，86Kpa~106Kpa）	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration (Non-operation)	1.5G, 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z	-
9	Shock (Non-operation)	Half Sine Wave 50G ,11ms,±X,±Y,±Z 5times for each direction	-
10	Package Vibration	Frequency（Hz）5~20-200Hz, PSD:0.01-0.01-0.001 Total:0.781g2/Hz， Time: X/Y/Z 30min	-
11	Package Drop Test	Height: 60cm,1 corner, 3edges, 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 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.
Note4: See the following figure for discharge points.

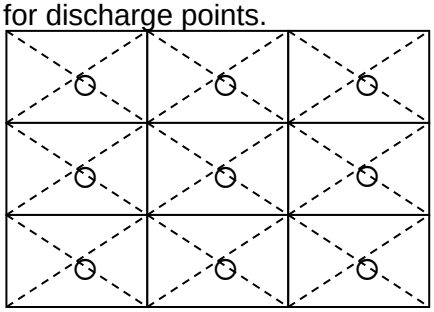
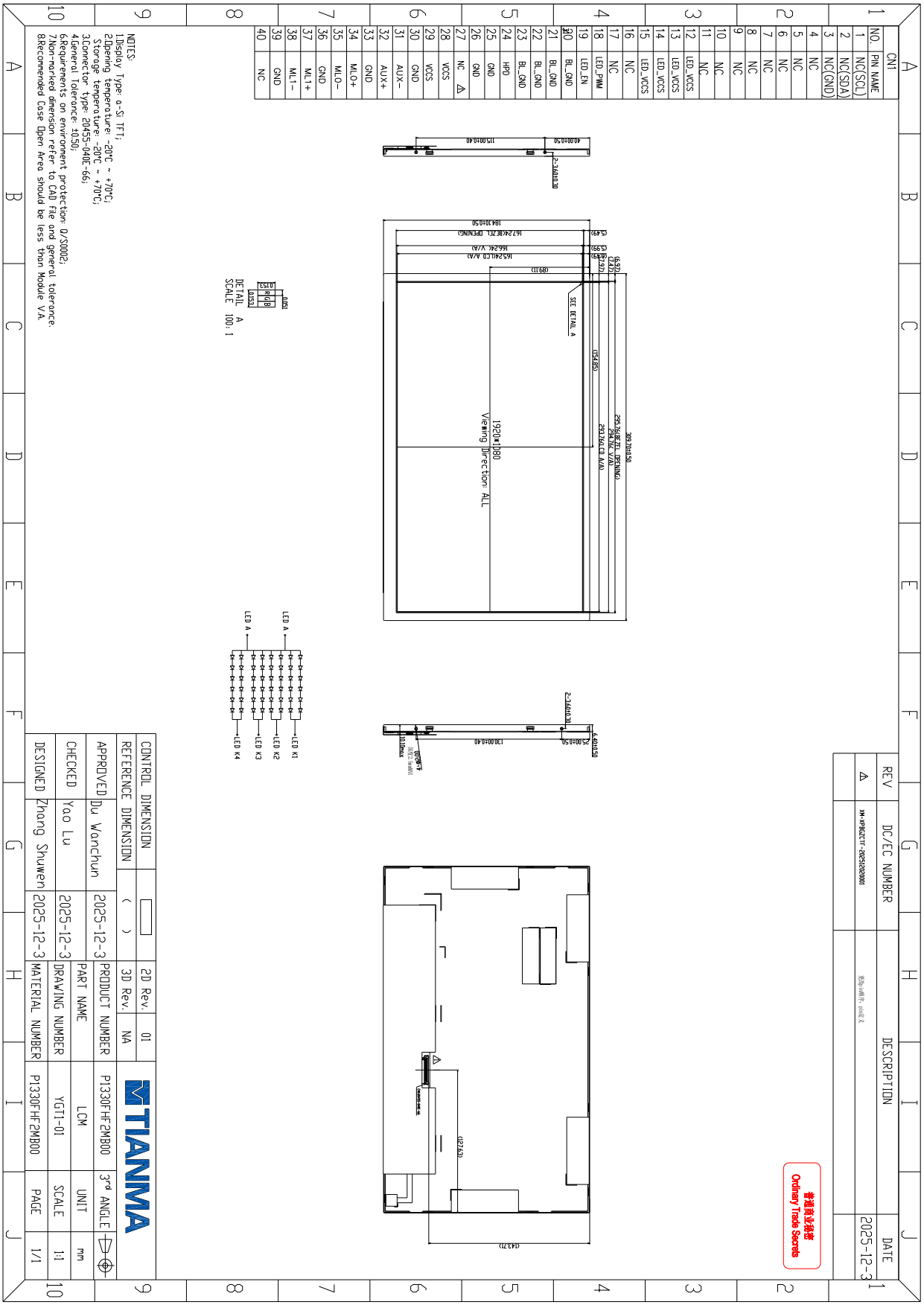


Figure 8.1 ESD position

9. Mechanical Drawing

9.1 Mechanical Drawing Of LCM



9.2 Markings

The marking is attached to this product.

9.2.1 Nameplate label

Nameplate label

10. Packing Instruction

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	P1330FHF2MB01	309.7×184.1×10.1	TBD	8	
2	Paper card	Corrugated Paper	380×272×208	TBD	1	
3	Dust-proof Bag	PE	680×520×0.08	0.021	1	
4	Carton	Corrugated Paper	398×290×235	TBD	1	
5	Paper board	Corrugated Paper	380×272×6	0.068	1	
6	Label	Label	100×52	0.001	1	
7	Tape	Tape	30×10×5	0.001	16	
8	ESD bubble bag	PE	333×325×6	0.015	8	
9	Total weight	TBD Kg				

8 products are packed as the maximum in an packing box. The type name and quantity are shown on outside of the packing box, either labeling or printing. In case the packing box with products is dropped from a height of 40cm or more, there is a risk of damage to products.

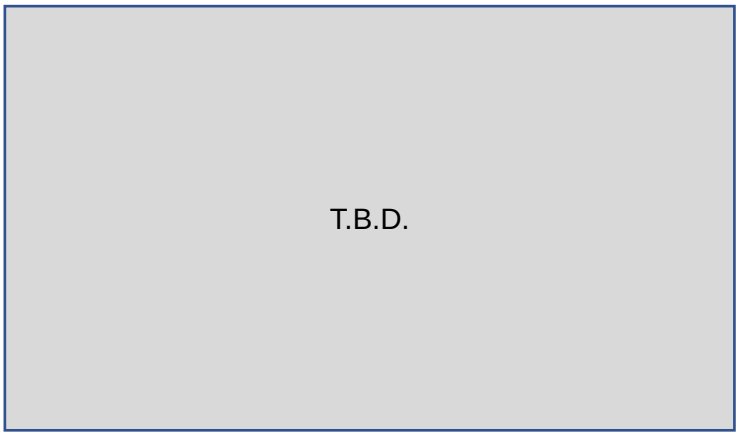


Figure 10.1 Outline Figure for Packing

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.