

SPECIFICATION

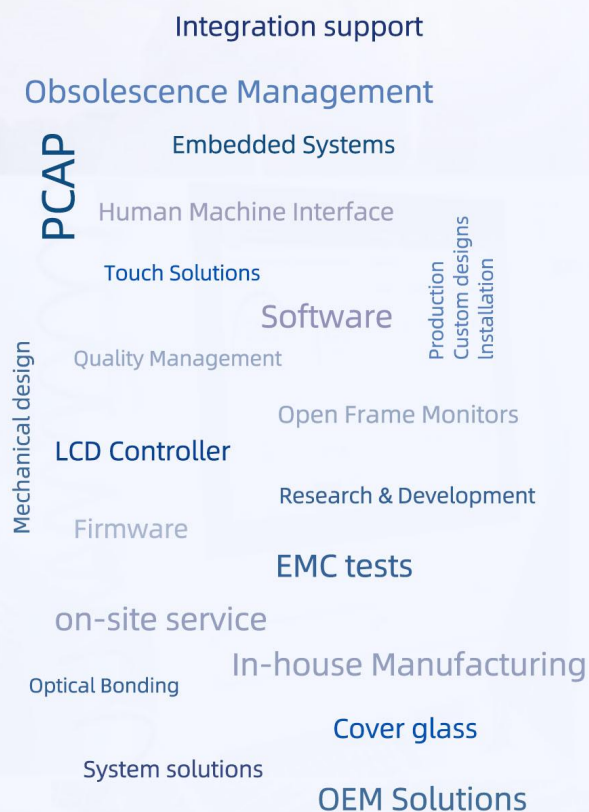
☐ Preliminary Specification
☒ Final Specification

Description **7" 1280xRGBx800 TFT-LCD Module**
Part Number **P0700WXF1ME00**

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

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REVISION HISTORY

[illegible]

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1. Summary

1.1 General Description

This is a 7 inch a-Si TFT-LCD module with Normal- Black technology. It is composed of a TFT-LCD panel, a driver circuit, FPC, and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle
- Interface: LVDS
- Surface treatment: HC

- Compliant with UL62368-1/CSA C22.2 No.62368-1-03
- Acquisition product for 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	7 inches	
	Resolution	1280(RGB)x800	
	Pixel Pitch	0.117x0.117	mm
	TFT Active Area	149.76x93.60	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	SFT, Normally Black	
	Surface Treatment	HC	
	Viewing Direction	ALL	
Mechanical Characteristics	LCM (W x H x D)	161.0x107.0x3.35	mm
	Weight	121	g
Optical Characteristics	Luminance	400	cd/m ²
	Contrast Ratio	1000: 1	
	NTSC	50	%
	Viewing Angle	88/88/88/88	degree
Electrical Characteristics	Interface	LVDS	
	Color Depth	16.7 Million	color
	Power Consumption	LCD:600 (white pattern) Backlight:1302	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin Assignment (LCD Interface)

Connector Information	
Matching connector	Molex 54132-4062

Table 3.1.1 Connector information

Pin No.	Symbol	I/O	function	Remarks
1	NC	--	No connection (ROM_RLB)	Note3
2	VDD	P	Power Voltage for digital circuit	
3	VDD	P	Power Voltage for digital circuit	
4	NC	--	No connection (CSB)	Note3
5	NC	--	No connection (SDA)	Note3
6	NC	--	No connection (SCL)	Note3
7	GND	P	Ground	
8	RXIN0-	I	- LVDS differential data input	
9	RXIN0+	I	+LVDS differential data input	
10	GND	P	Ground	
11	RXIN1-	I	-LVDS differential data input	
12	RXIN1+	I	+LVDS differential data input	
13	GND	P	Ground	
14	RXIN2-	I	-LVDS differential data input	
15	RXIN2+	I	+LVDS differential data input	
16	GND	P	Ground	
17	RXCLKIN-	I	-LVDS differential clock input	
18	RXCLKIN+	I	+LVDS differential clock input	
19	GND	P	Ground	
20	RXIN3-	I	-LVDS differential data input	
21	RXIN3+	I	+LVDS differential data input	
22	GND	P	Ground	
23	NC	--	No connection	
24	NC	--	No connection	
25	GND	P	Ground	
26	NC	--	No connection	
27	NC	--	No connection (VDD_MTP)	Note3
28	NC	--	No connection	
29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	NC	--	No connection	
34	NC	--	No connection	
35	VGL	P	Gate Off Voltage	
36	NC	--	No connection	
37	NC	--	No connection	
38	VGH	P	Gate On Voltage	

39	LED+	P	LED Anode	
40	LED+	P	LED Anode	

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: Let it open.TM used for MTP function.

4. Absolute Maximum Ratings

GND=0V, Ta=25℃

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VDD	-0.5	5.0	V	
	AVDD	-0.5	14.85	V	
	VGH	-0.3	36	V	
	VGL	VGH-36	0.3	V	
Backlight Forward Current	I _{LED}	-	25	mA	For each LED
Operating Temperature	T _{OPR}	-20	70	℃	
Storage Temperature	T _{STG}	-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/m ³	Ta>70℃

Table 4.1 Absolute Maximum Ratings

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 Voltage Characteristic

Ta=25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
Digital Supply Voltage	VDD	3.2	3.3	3.4	V	
Analog Supply Voltage	AVDD	10.8	11	11.2	V	
Gate On Voltage	VGH	17.5	18.0	18.5	V	
Gate Off Voltage	VGL	-7.1	-6.8	-6.5	V	

Table 5.1.1 LCD module electrical characteristics (voltage)

5.2 Current Characteristic

Item	Min	Typ	Max	Unit	Remark
Ivdd	-	53	98	mA	
Iavdd	-	38.5	84	mA	
Ivgh	-	0.38	0.8	mA	
Ivgl	-	0.40	0.8	mA	

Table 5.2.1 LCD module electrical characteristics (current)

Note: Current value is tested under white pattern condition.

5.3 TFT Driving Backlight

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Forward Voltage	VLED	$I_F=140\text{mA}$	8.4	9.3	10.2	V	-
Forward Current	I_F	-	-	140	210	mA	
Backlight Power Consumption	WBL	$I_F=140\text{mA}$	--	1302	1428	mW	
Life Time	-	$I_F=140\text{mA}$	--	30,000-	-	Hrs	Note 1

Table 5.3.1 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.

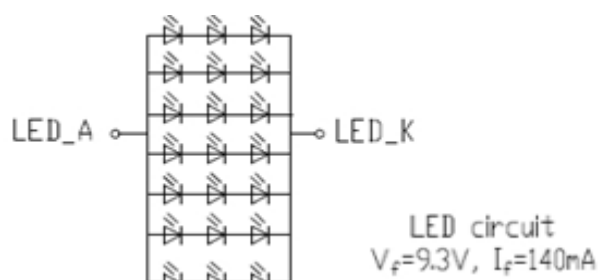


Figure 5.3.1 LED connection of backlight

5.4 LCD Module Block Diagram

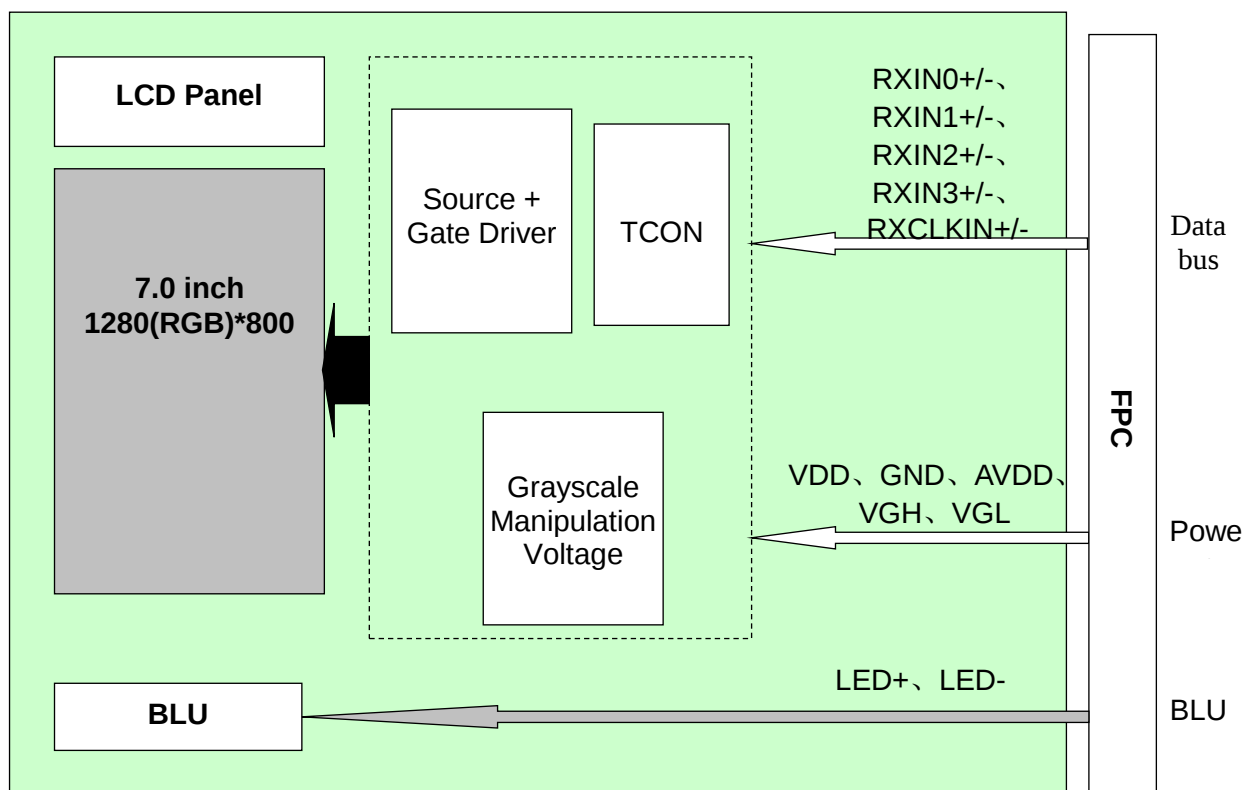


Figure 5.4.1 TFT Block Diagram

6. Interface Timing Characteristics

6.1 AC Characteristics

VDD=VDD_LVDS=3.0~3.6V; GND=0, T_A=-20~85° C

Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock Frequency	R _{xFCLK}	70.2	71.9	75	MHZ
Clock period	R _{xTCLK}	13.33	-	14.25	ns
1 data bit time	UI	-	1/7	-	R _{xTCLK}
Clock high time	T _{LVCH}	-	4	-	UI
Clock low time	T _{LVCL}	-	3	-	UI
Position 1	T _{POS1}	-0.25	0	0.25	UI
Position 2	T _{POS2}	0.75	-	1.25	UI
Position 3	T _{POS3}	0.75	1	1.25	UI
Position 4	T _{POS4}	1.75	-	2.25	UI
Position 5	T _{POS5}	1.75	2	2.25	UI
Position 6	T _{POS6}	2.75	-	3.25	UI
Position 7	T _{POS7}	2.75	3	3.25	UI
Position 8	T _{POS8}	3.75	-	4.25	UI
Position 9	T _{POS9}	3.75	4	4.25	UI
Position 10	T _{POS10}	4.75	-	5.25	UI
Position 11	T _{POS11}	4.75	5	5.25	UI
Position 12	T _{POS12}	5.75	-	6.25	UI
Position 13	T _{POS13}	5.75	6	6.25	UI
Position 14	T _{POS14}	6.75	-	7.25	UI
Input eye width	T _{EYEW}	0.5	-	-	UI
Input eye border	T _{EX}	-	-	0.25	UI
PLL wake-up time	T _{enPLL}			150	us

Table 6.1.1 AC Electrical Characteristics

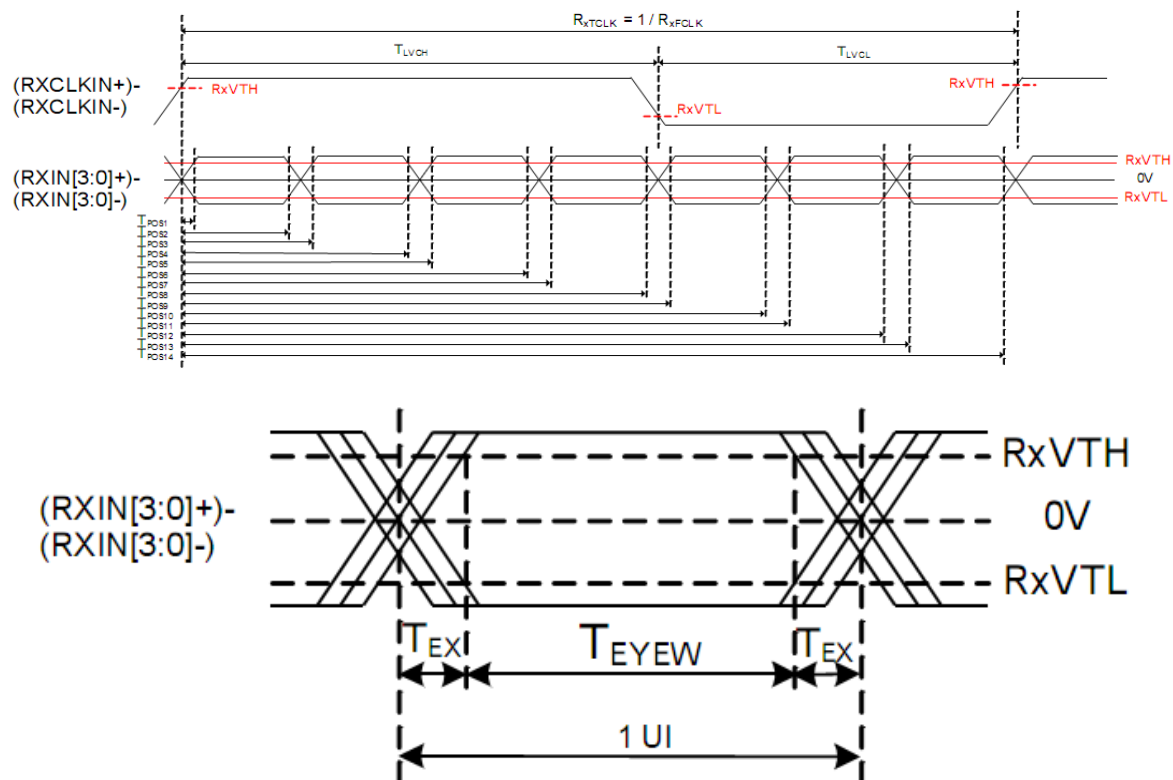


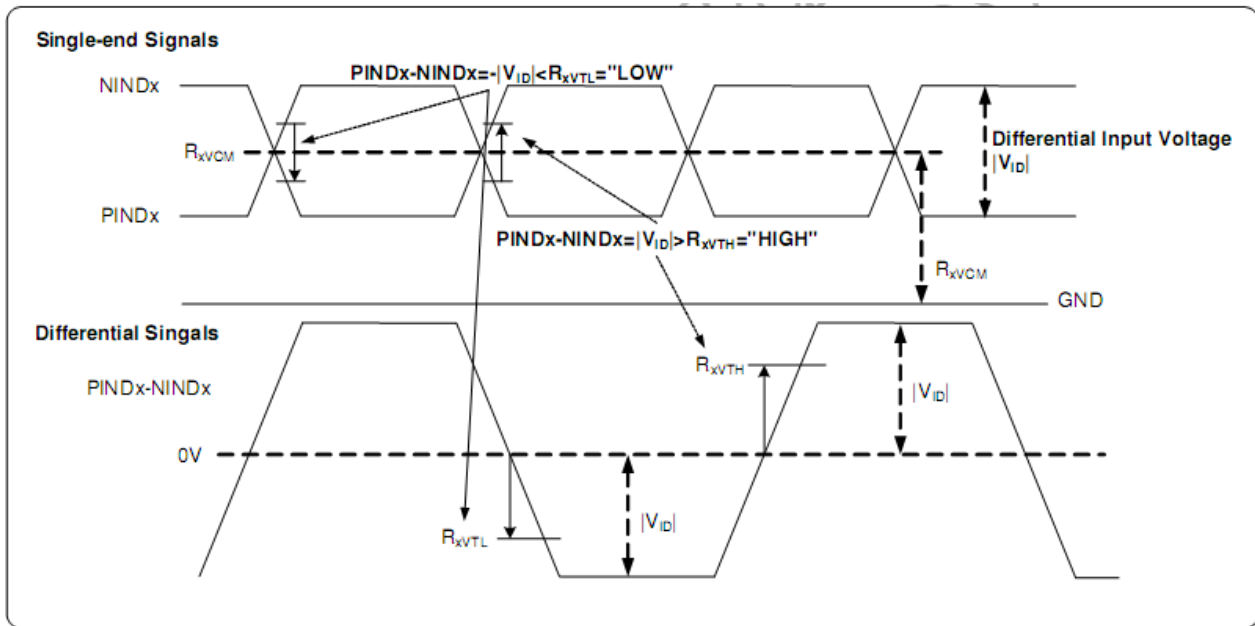
Figure 6.1.1 AC Electrical Characteristics

6.2 DC Electrical Characteristics

V_{GH}=18V, V_{GL}=-6.8V, V_{DD}=3.3V, GND=0V, T_a=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Remark
Differential input high Threshold voltage	R _{XVTH}	–	–	+0.1	V	
Differential input Low Threshold voltage	R _{XVTL}	-0.1	–	–	V	
Input voltage range	R _{XVIN}	0	–	V _{DD} -1.0	V	
Differential input common Mode voltage	R _{XVCM}	0.6	1.2	2.4- V _{ID} /2	V	
Differential input voltage	V _{ID}	0.2	0.4	0.6	V	

Table 6.2.1 DC Electrical Characteristics

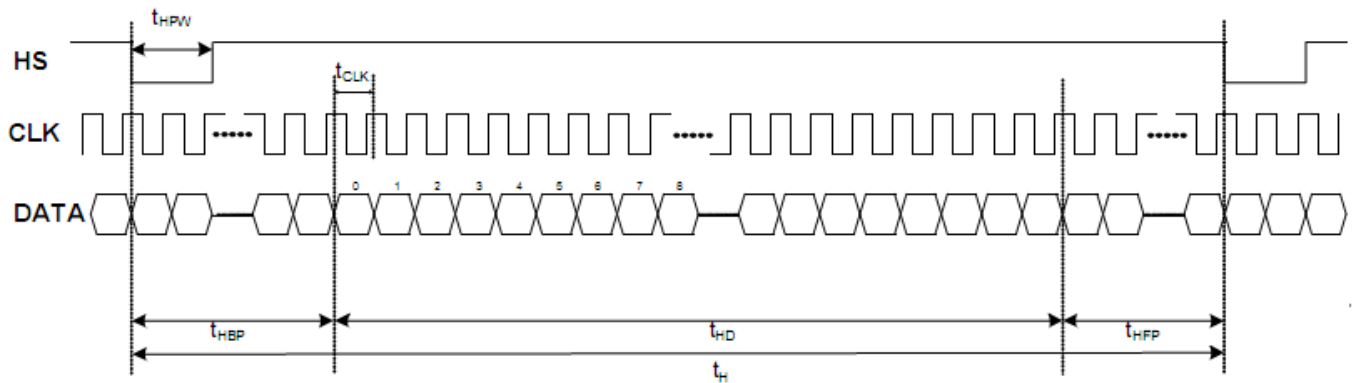


6.3 Input Timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
CLK Frequency	t_{CLK}	70.2	71.9	75	MHz	
Horizontal display area	t_{HD}	1280			t_{CLK}	
Horizontal back porch	t_{HBP}	5	5	154- t_{HFP}	t_{CLK}	
Horizontal front porch	t_{HFP}	135	139	149	t_{CLK}	
Horizontal blanking time	t_{HBT}	140	144	154	t_{CLK}	$t_{HBP} + t_{HFP}$
Horizontal period	t_H	1420	1424	1434	t_{CLK}	
Horizontal pulse width	t_{HPW}	1	1	2	t_{CLK}	
Vertical display area	t_{VD}	800			t_H	
Vertical back porch	t_{VBP}	2	2	72- t_{VFP}	t_H	
Vertical front porch	t_{VFP}	22	40	70	t_H	
Vertical blanking time	t_{VBT}	24	42	72	t_H	$t_{VBP} + t_{VFP}$
Vertical period	t_V	824	842	872	t_H	
Vertical pulse width	t_{VPW}	1	1	2	t_H	
Frame Rate	FR	60			Hz	

Table 6.3 Input timing

Horizontal input timing



Vertical input timing

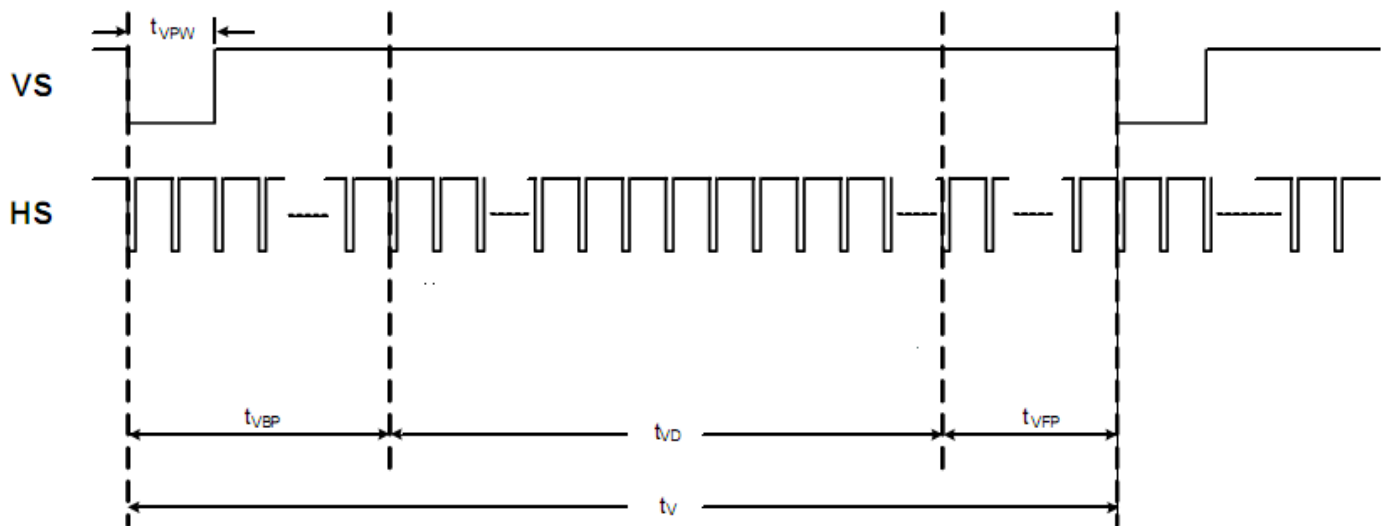
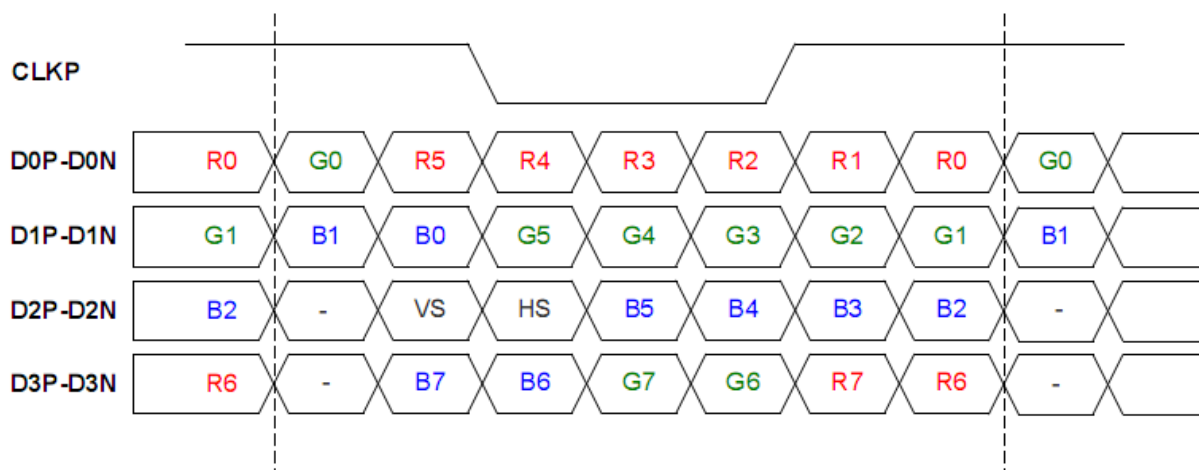


Figure 6.3 Input timing

6.4 Data Input Format

VESA data mapping



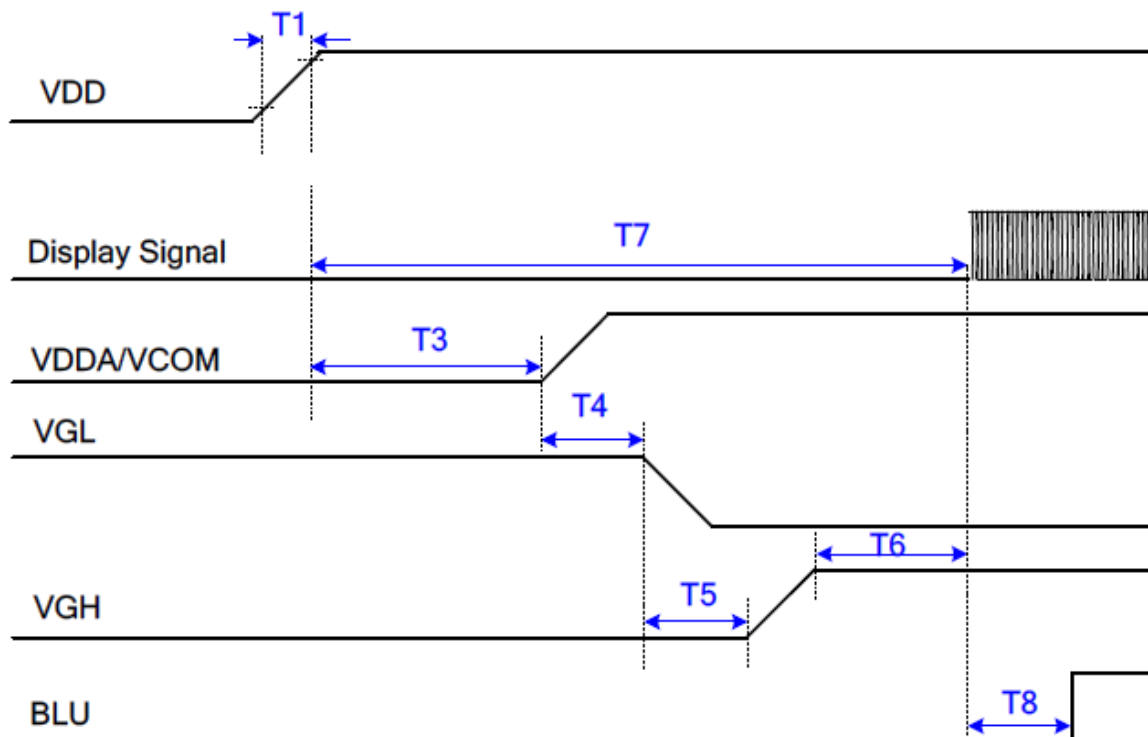
Note 1 : for 6 bit mode, MSB are R/G/B[5] and R/G/B[0] are LSB
Note 2 : for 8 bit mode, MSB are R/G/B[7] and R/G/B[0] are LSB

Figure 6.4.1 VESA Data input timing

6.5 Power On/Off Timing

To prevent the device damage from latch up, the power on/off sequence shown below must be followed.

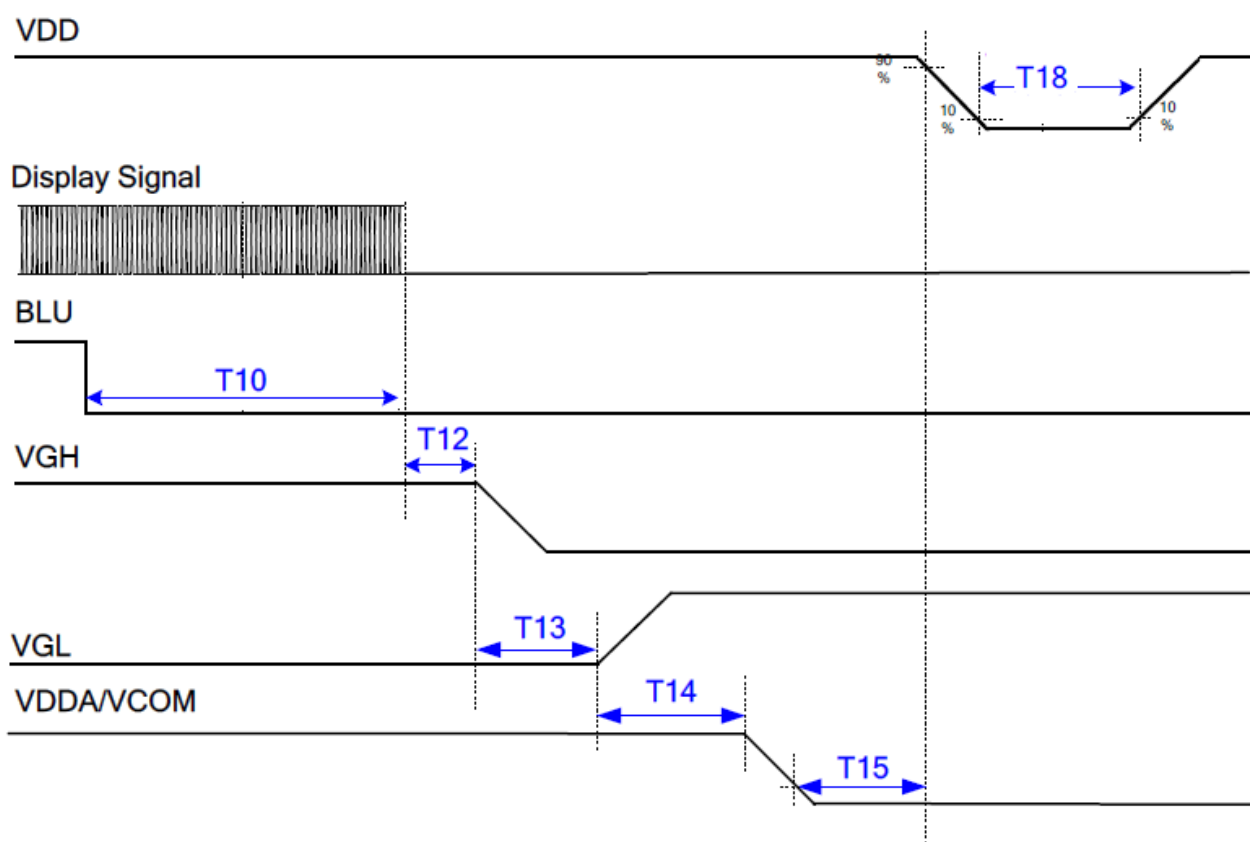
Power ON:



T1	$1.5\text{ms} \leq T1 \leq 3\text{ms}$	VDD power on slew rate (0.1 ~ 0.9*VDD)	
T3	$10\text{ ms} \leq T3 \leq 35\text{ms}$	VDD (0.9*VDD) ~ AVDD	
T4	$T4 > 0\text{ms}$	AVDD ~ VGL	
T5	$T5 > 0\text{ms}$	VGL ~ VGH	
T6	$T6 > 5\text{ms}$	VGH(stable) ~ Signal	
T7	$10\text{ ms} \leq T7 \leq 100\text{ms}$	VDD (0.9*VDD) ~ Signal	
T8	$T8 > 10\text{ frames}$	Signal ~ BLU turn on	

Figure 6.5.1 Power on timing

Power Off:



T10	$T10 > 0\text{ms}$	BLU turn off ~ Signal	
T12	$T12 > 0\text{ms}$	Signal ~ VGH	
T13	$T13 > 0\text{ms}$	VGH ~ VGL	
T14	$T14 > 0\text{ms}$	VGL ~ AVDD	
T15	$T15 \geq 1\text{ms}$	AVDD ($0.1 \cdot \text{AVDD}$) ~ VDD ($0.9 \cdot \text{VDD}$)	
T18	$T18 \geq 200\text{ms}$	All power off to next power on	All power should be turn off to under 10% before T18

Figure 6.5.2 Power off timing

Note: VDD must be powered off to 0V and then powered on.

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	1000	-		Note 3
Response Time		T _{ON}	25℃		25	35	ms	Note 4
		T _{OFF}						
Chromaticity	White	x	Backlight is on	0.264	0.314	0.364	±0.05	Note 1,5
		y		0.292	0.342	0.392		
	Red	x		0.520	0.570	0.620		Note 1,5
		y		0.280	0.330	0.380		
	Green	x		0.300	0.350	0.400		Note 1,5
		y		0.542	0.592	0.642		
	Blue	x		0.105	0.155	0.205		Note 1,5
		y		0.051	0.101	0.151		
Uniformity		U		70	75	-	%	Note 6
NTSC		-		45	50	-	%	Note 5
Luminance		L		320	400	-	cd/m ²	Note 7

Table 7.1 Optical Parameters

Test Conditions:

1. $I_F=140$ 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.

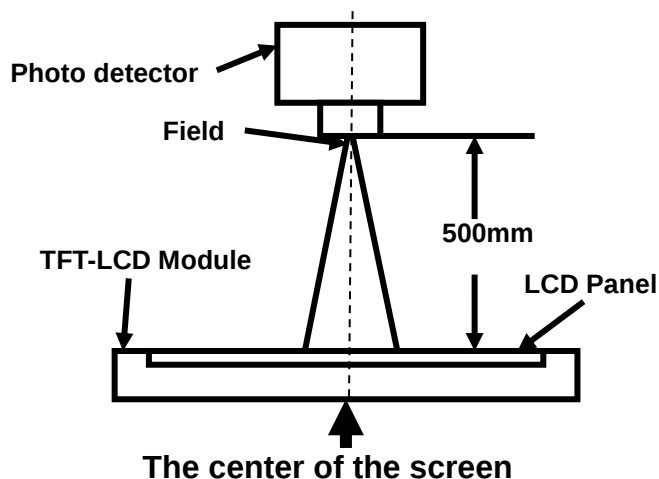


Fig1.Measurement Set Up

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

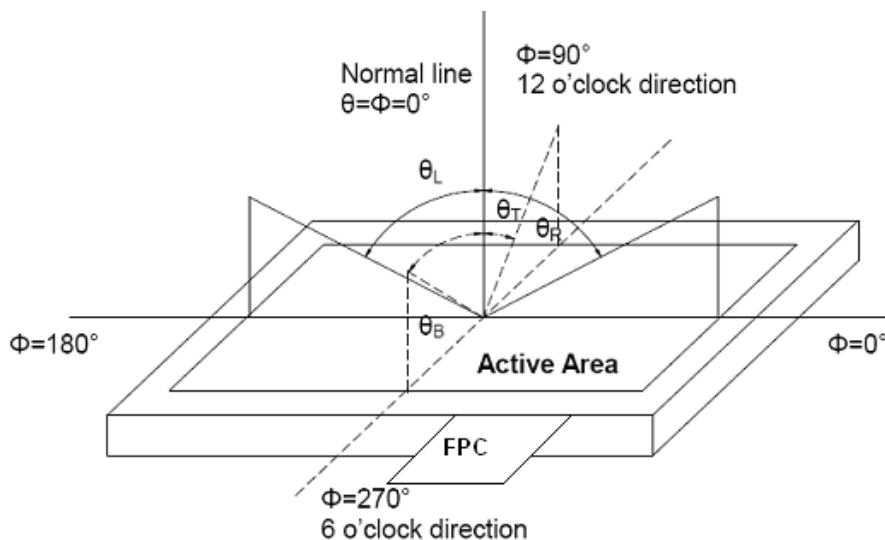


Fig2. Measurement viewing angle

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 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%.

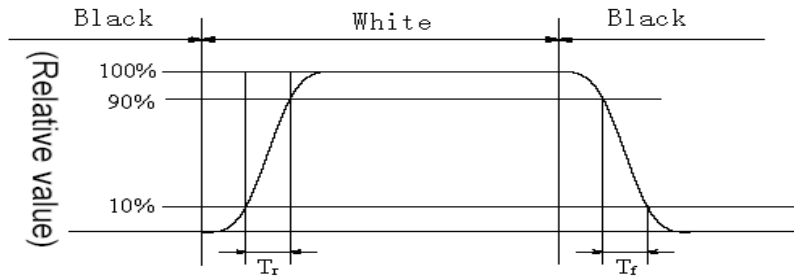


Fig4. Response Time Testing(SFT)

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) = L_{min} / L_{max}

L_{max} : The measured Maximum luminance of all measurement position.

L_{min} : The measured Minimum luminance of all measurement position.

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

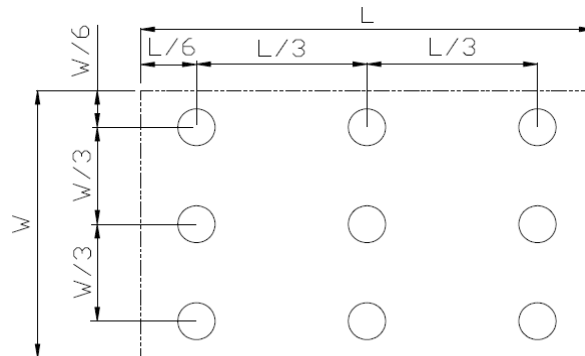


Fig5. Luminance Uniformity Measurement Locations(9 points)

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	Ta = +70℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Operate at High Temperature and Humidity	Ta=+60℃、RH=90%, 240 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ (30min) ⇔ 80℃ (30min) ,Change Time:5min,20cycle	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,G B2423.22-2002
7	ESD (operation)	C=150pF、R=330Ω Air: ±8KV Contact:±4KV 5point/panel, 5times (Environment:15℃~35℃, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration Test (non-operation)	Frequency range:10~55Hz Stroke: 1.5mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total)	IEC60068-2-6:1982 GB/T2423.10—1995
9	Mechanical Shock (non-operation)	Half Sine Wave 60G ,6ms,±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5—1995
10	Package Drop Test	Height:60cm, 1corner,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

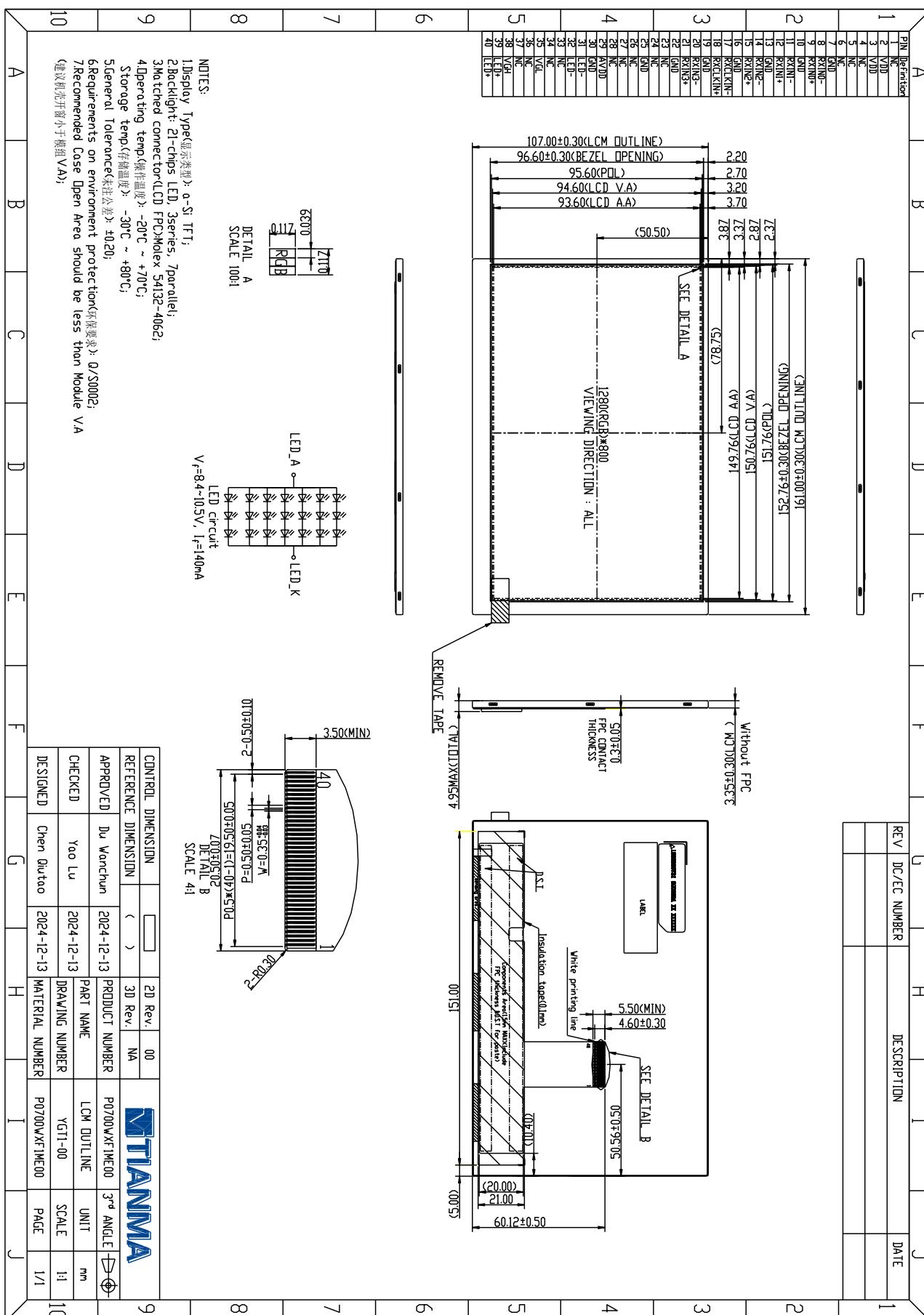
Table 8.1 RA test condition

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.

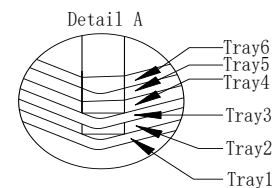
Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product's function only be guaranteed, but not for all of the cosmetic specification.

9. Mechanical Drawing



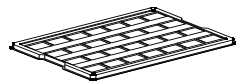
10. Packing Instruction

No	Item	Model (Materiel)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM	P0700WXF1ME00	161.0*107.0*3.35mm	0.121	72	
2	Tray	PET	485×330×15.3	0.167	21	
3	BOX	CORRUGATED PAPER	520×345×74	0.38	3	
4	Dust_proof bag	LD-PE	700x545x0.05	0.046	1	
5	Lable	tagboard	100×52	0.002	1	
6	Carton	CORRUGATED PAPER	544×365×250	1.01	1	
7	Total Weight	14.417 ± 10% kg				



Rotate tray 180 degrees and place empty tray on top of stack. Check the tray using Fig. A.

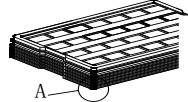
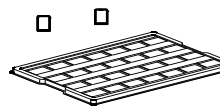
Use empty tray



+

+

Put products into the 6trays*4 LCMs per tray.



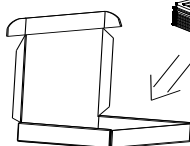
Use strop



24LCMs per Box

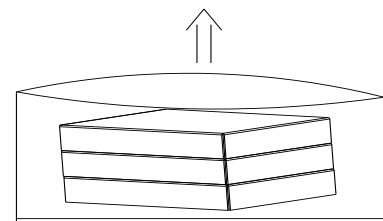
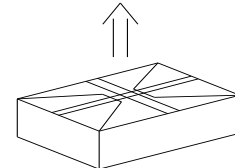
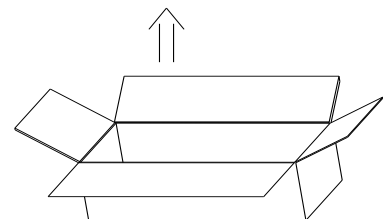


3Box



The opening folds back on packaging

Beauty grain



dust-proof bag

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. If the LCD modules will be stored for a long time, the recommend condition is: Temperature: 0 ~ 35 °C 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 carefully to limit or stop its function when over current is detected on the LED.