SPECIFICATION

[ ] Preliminary Specification
[◉] Final Specification

Description **7” 800xRGBx480 TFT-LCD Module**

Part Number **P0700WVF1MA10**

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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	2021/05/13	-	Preliminary spec	Yang Yang
2.0	2022/04/08	5,6,12	Update Power Supply ripple, Supply Current on page 5. Power supply current on page 6; Chromaticity on page 12	Yang Yang
2.1	2022/06/24	16	Add Packing Drawing	Yang Yang
2.2	2023/06/01	2、17	Add LCM Weight & Packing Weight	Yang Yang

CONTENTS

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, PCB, and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle Super Fine TFT (SFT)
- Resolution 800xRGBx480
- Interface: LVDS

- Surface treatment AG

2. General Specifications

Feature		Spec
Display Spec.	Size	7inch
	Resolution	800*480
	Technology Type	a-Si TFT
	Pixel Configuration	RGB Vertical stripe
	Pixel pitch(mm)	0.1905 x 0.1905
	Display Mode	Normal black(SFT)
	Surface Treatment	AG
	Viewing Direction	all direction
Mechanical Characteristics	LCM (W x H x D) (mm)	169.80x109.70x8.90（Max）
	Active Area(mm)	152.40（W）×91.44（H）
	With /Without TSP	Without TSP
	Matching Connection Type	CN1: FI-SEB20P-HFE(JAE) CN2: FI-S6P-HFE(JAE)
	LED Numbers	14pcs(2P7S)
	Weight (g)	183g
Electrical Characteristics	Interface	1port LVDS DE mode ,6/8bit selectable
	Color Depth	262K/16.7M

Note 1: LCM weight tolerance: ± 5%

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
LCD Module connector	FI-SEB20P-HFE (JAE)
Matching connector	FI-S20S(JAE) or compatible

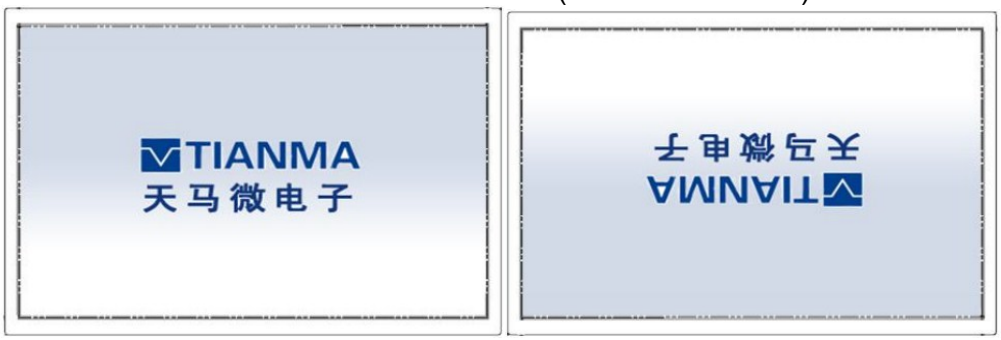
Table 3.1.1 Connector information

PIN	Symbol	I/O	Description	Remark
1	VCC	P	Power supply(+3.3V)	
2	VCC	P	Power supply(+3.3V)	
3	GND	P	Ground	
4	GND	P	Ground	
5	Link 0-	I	-LVDS differential data input 6 bit input: (R0~R5, G0) 8 bit JEIDA input: (R2~R7, G2)	
6	Link 0+	I	+LVDS differential data input 6 bit input: (R0~R5, G0) 8 bit JEIDA input: (R2~R7, G2)	
7	GND	P	Ground	
8	Link 1-	I	-LVDS differential data input 6 bit input: (G1~G5, B0~B1) 8 bit JEIDA input: (G3~G7, B2~B3)	
9	Link 1+	I	+LVDS differential data input 6 bit input: (G1~G5, B0~B1) 8 bit JEIDA input: (G3~G7, B2~B3)	
10	GND	P	Ground	
11	Link 2-	I	-LVDS differential data input 6 bit input: (B2~B5, -, -, DE) 8 bit JEIDA input: (B4~B7, -, -, DE)	
12	Link 2+	I	+LVDS differential data input 6 bit input: (B2~B5, -, -, DE) 8 bit JEIDA input: (B4~B7, -, -, DE)	
13	GND	P	Ground	
14	CLKIN-	I	-LVDS clock input	
15	CLKIN+	I	+LVDS clock input	
16	GND	P	Ground	
17	Link 3-	I	-LVDS differential data input 8 bit JEIDA input: (R0~R1, G0~G1, B0~B1, -)	Note 1
18	Link 3+	I	+LVDS differential data input 8 bit JEIDA input: (R0~R1, G0~G1, B0~B1, -)	
19	MODE	I	MODE=High or open, 8 bit JEIDA MODE=Low , 6 bit	
20	SC	I	Scan direction control SC=Low or open, Normal SC=High, Reverse	Note 2

Table 3.1 .1terminal pin assignments

I---Input, O---output, P---Power/Ground
Note 1: Connect Link 3+/- to GND in 6 bit mode.

Note 2: Scan direction is shown as below (PCB at down side):



SC=Low or open　　SC=High

Table 3.1.2 Pin Assignment for LCD Interface

Note3: All of the GND pins should be connected to the system ground.
Note4: This LCD module supports DE mode.

3.2 CN2 Pin assignment (Back Light)

Connector Information	
LCD Module connector	FI-S6P-HFE(JAE)
Matching connector	FI-S6S(JAE)

Table 3.2.1 Connector information

PIN	Symbol	I/O	Description	Remark
1	VL	P	Power Supply Input Voltage	
2	VL	P	Power Supply Input Voltage	
3	GNDL	P	GND	
4	GNDL	P	GND	
5	BLEN	I	Backlight On-Off (High: ON, Low or Open: Off)	BLEN is pull-down to GND with a 100kΩ resistor on PCB.
6	V_{PDIM}	I	Light Dimming Control (PWM) Input Voltage(High active)	

Table3.2.2 Backlight pin assignment

4. Absolute Maximum Ratings

Ta=25℃

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.3	5.0	V	
Input Voltage	V_{IN}	-0.3	VCC+0.3	V	Note1
Backlight Power Supply Input Voltage	VL	-0.3	24	V	
Backlight On-Off	BLEN	-0.3	24	V	
Light Dimming Control (PWM) Input Voltage	V_{PDIM}	-0.3	24	V	
Operating Temperature	Top	-30	80	℃	
Storage Temperature	Tst	-40	90	℃	
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 Absolute Maximum Ratings

Note1: V_{IN} represents Link 0-/+, Link 1-/+, Link 2-/+, Link 3-/+, CLKIN-/+, MODE, SC.
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.

5. Electrical Characteristics

5.1 TFT LCD Panel Driving

Ta = 25℃; VCC=3.3V

Item		Symbol	Min	Typ	Max	Unit	Remark
Digital Supply Voltage		VCC	3.2	3.3	3.4	V	
Power Supply ripple		Vp-p	-	-	100	mV	
Supply Current		IVCC	-	101	152	mA	Note1
Power consumption		P	-	330	495	mW	
Input Signal Voltage	Low Level	V_{IL}	0	-	0.3*VCC	V	Note2
	High Level	V_{IH}	0.7*VCC	-	VCC	V	
Inrush current of VCC		Inrush			1.5	A	

Table 5.1 LCD module electrical characteristics

Note1: To test the current dissipation, using the “white” testing pattern.
Note2: For setting “SC” and “MODE”.

5.2 LVDS mode DC electrical characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Input voltage range (signaled-end)	R_{xVIN}	0	-	VCC-1.2	V	
Differential Input common Mode voltage	R_{xVCM}	$\|V_{ID}\|/2$	-	VCC-1.2-$\|V_{ID}\|/2$	V	
Differential Input voltage	$\|V_{ID}\|$	0.2	-	0.6	V	
Differential Input high Threshold voltage	R_{xVTH}	-	-	+0.2	V	R_{xVCM}=1.2V

Differential Input Low Threshold voltage	R_{xVTL}	-0.2	-	-	V	
Differential Input leakage Current	R_{VXliz}	-10	-	10	μA	
LVDS Digital Stand-by Current	I_{STLVDS}	-	-	1	mA	Clock & all functions are stopped

Table 5.2 LVDS mode DC electrical characteristics

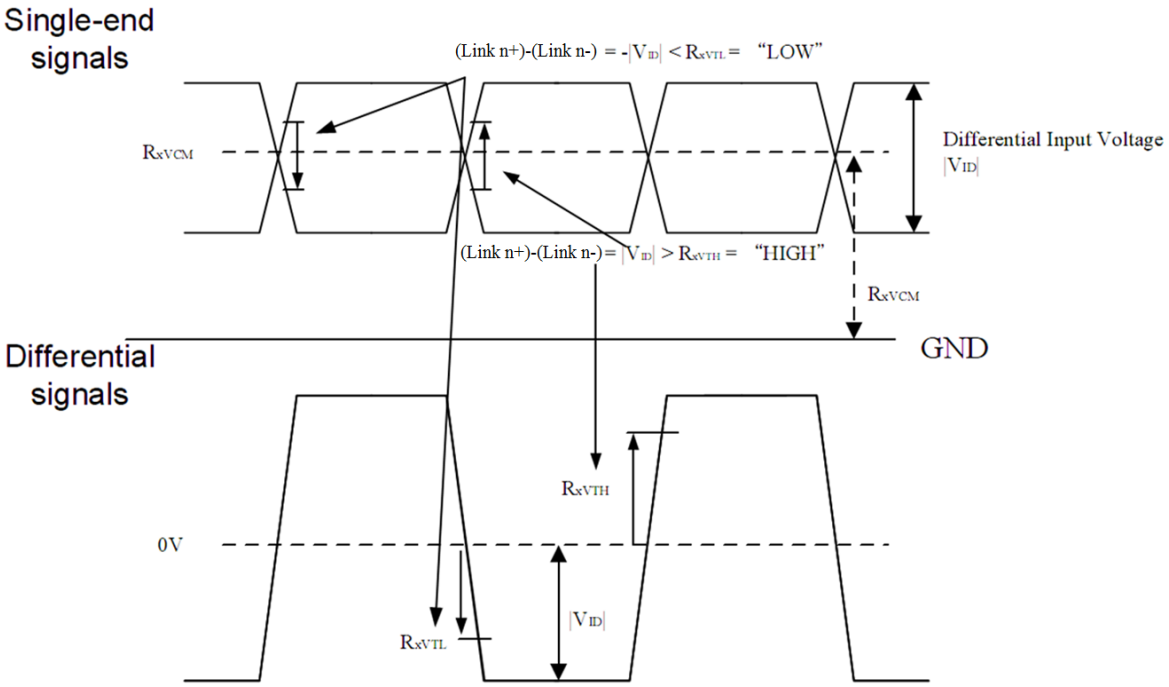


Figure 5.2 LVDS mode DC electrical characteristics

5.3 Driving Backlight

Parameter		Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage		VL	10.8	12.0	13.2	V	Note1
Power supply current		IL	-	308.	462 Note2	mA	At the maximum luminance control
Permissible ripple voltage		VRPD	-	-	100	mVp-p	for VL
Input signal voltage	High	V_{IH}	2.0	-	-	V	for BLEN and VPDIM
	Low	V_{IL}	-	-	0.8		
VPDIM(PWM) frequency		f_{PWM}	120	-	30K	Hz	Note3
LED life time		Hr	-	(70000)	-	Hour	

Table 5.3 Electrical Characteristics

Note1: When designing of the power supply, take the measures for prevention of surge voltage.
Note2: This value excludes peak current such as overshoot current.
Note3: The LED current cannot be 100% proportional to duty cycle especially for high frequency and low duty ratio because of physical limitation caused by inductor rising time.

Dimming Frequency (Hz)	Duty (Min.)	Duty (Max.)
$120<f_{PWM}\leq500$	0.2%	100%
$500<f_{PWM}\leq1k$	0.4%	100%
$1k<f_{PWM}\leq2k$	0.8%	100%
$2k<f_{PWM}\leq5k$	1.5%	100%
$5k<f_{PWM}\leq10k$	3%	100%
$10k<f_{PWM}\leq30k$	10%	100%

5.4 Fuse

Parameter	Fuse		Rating	Clear-time at 25℃	
	Type	Supplier			
VL for Backlight	F0603HI2000V032T	AEM	32V 2A	4 A	60 seconds(max)

Table 5.4 Fuse

5.5 Module Block diagram

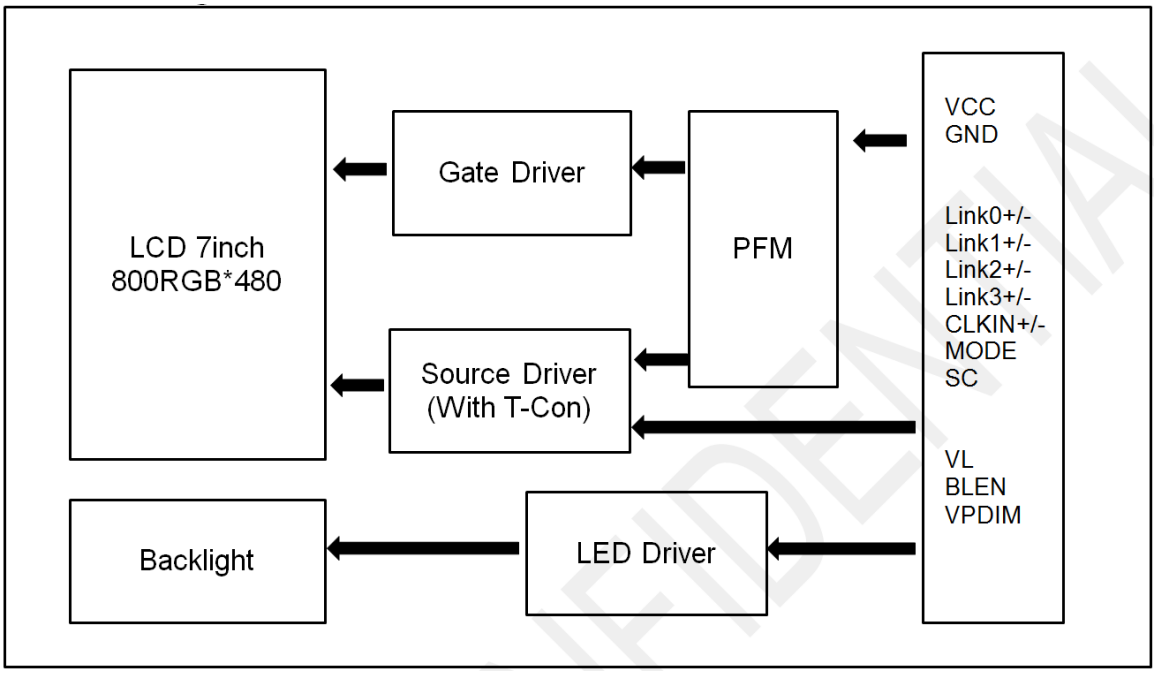


Figure 5.5 Block Diagram

6. Timing Chart

6.1 Data Input Format for LVDS

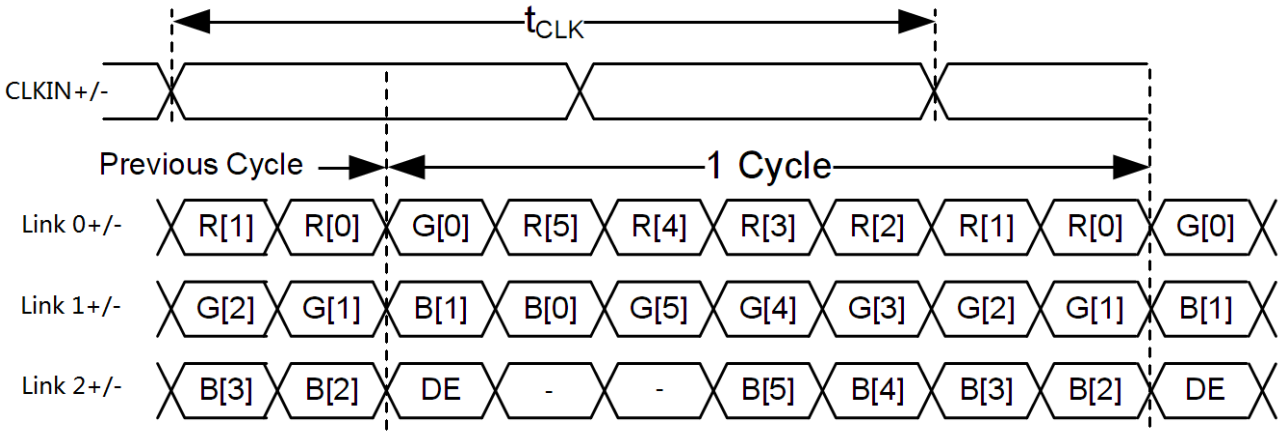
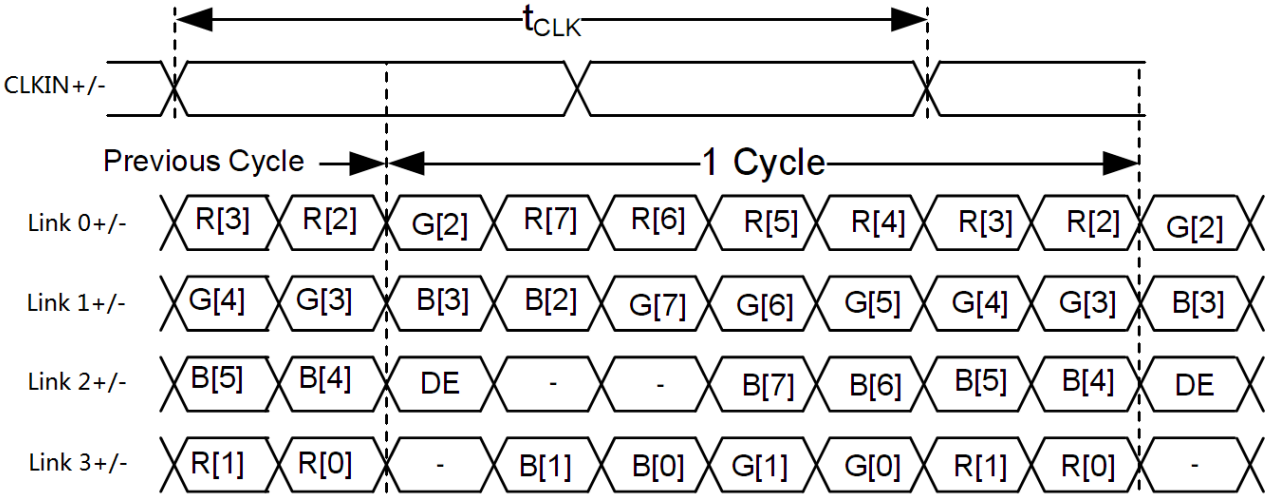


Figure6.1.1 Data Input Format for LVDS 6bit when MODE=L



6.1.2 Data Input Format for LVDS 8bit JEIDA when MODE=H

6.2 LVDS mode AC electrical characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Condition
Clock frequency	R_{xFCLK}	25.2	27.2	30.5	MHz	
Input data skew margin	T_{RSKM}	-	-	400	ps	|VID|=400mV RXVCM=1.2V RXFCLK=75MHz
Clock high time	T_{LVCH}	-	$4/(7*R_{xFCLK})$	-	ns	
Clock low time	T_{LVCL}	-	$3/(7*R_{xFCLK})$	-	ns	

Table 6.2 LVDS mode AC electrical characteristics

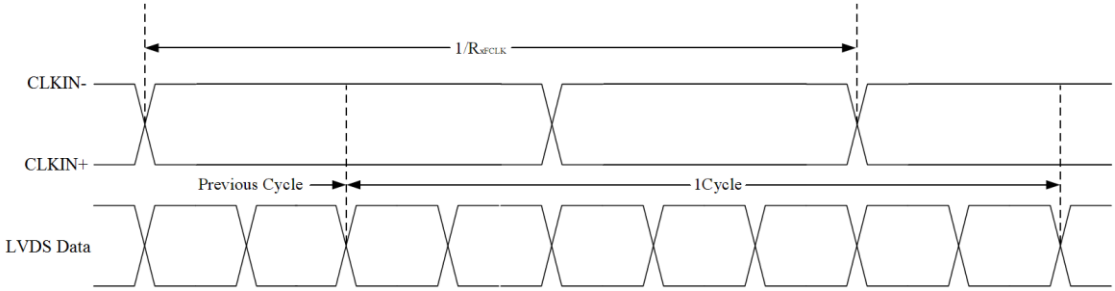


Figure 6.2.1 LVDS mode AC electrical characteristics 1

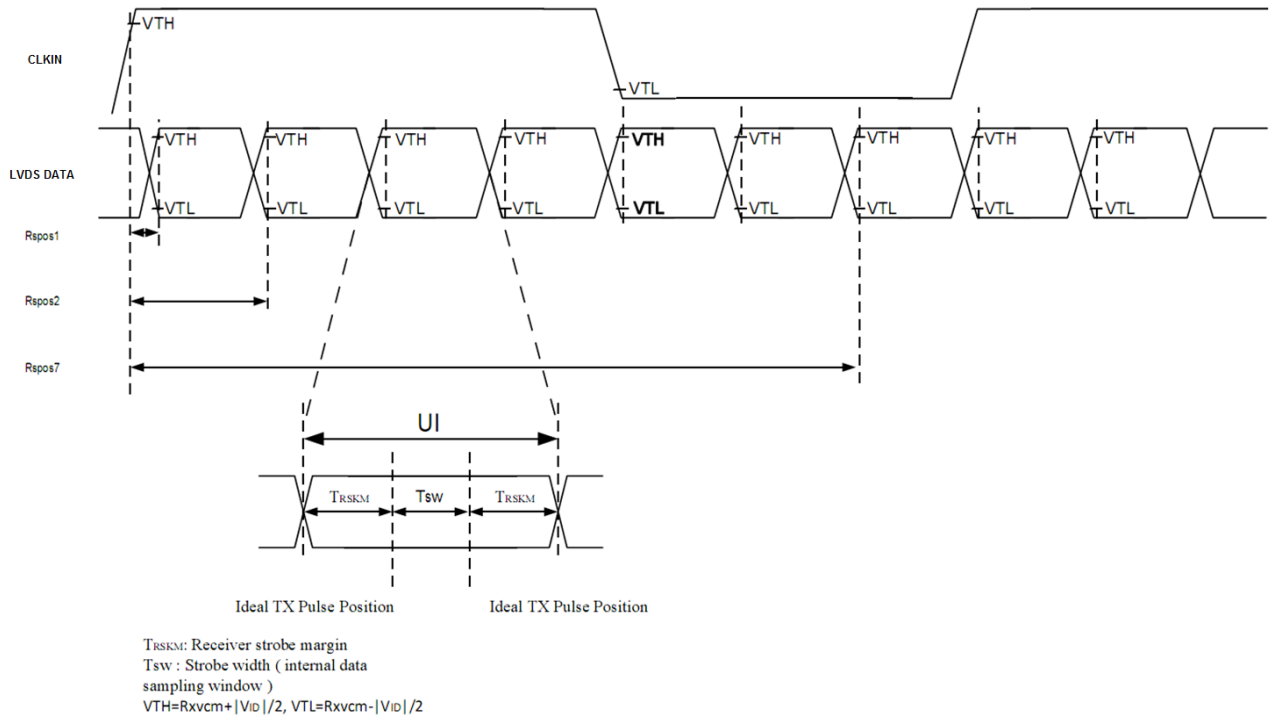


Figure 6.2.2 LVDS mode AC electrical characteristics 2

6.3 Power on/off sequence for LCD

Item	Symbol	Min	Typ	Max	Unit	Remark
VCC on to VCC stable	t1	1	-	20	ms	-
VCC stable to signal on	t2	1	-	-	ms	-
Signal off before VCC off	t3	1	-	-	ms	-
VCC off to next VCC on	t4	1500	-	-	ms	-
Signal on to Backlight on	t5	200	-	-	ms	-
Backlight off before signal off	t6	200	-	-	ms	-

Table 6.3 Power on/off sequence

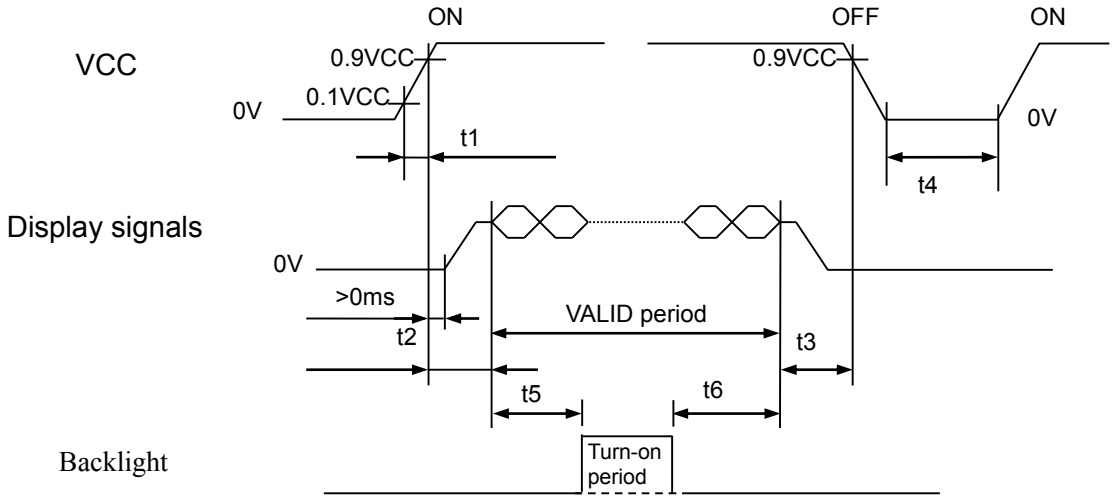


Figure 6.3 Power on/off sequence

6.4 Recommended Input Timing of LVDS transmitter (TTL DE mode)

Parameter	Symbol	Min	Typ	Max	Unit	Remark
DCLK frequency	1/tDCLK	25.2	27.2	30.5	MHz	

Horizontal valid data	t_{hd}	800			DCLK	
1 Horizontal Line	t_h	856	860	920	DCLK	
Vertical valid data	t_{vd}	480			t_h	
1 Vertical field	t_v	490	528	552	t_h	
Frame rate	FR	60			Hz	

Table 6.4 Recommended TTL Input Timing of LVDS transmitter

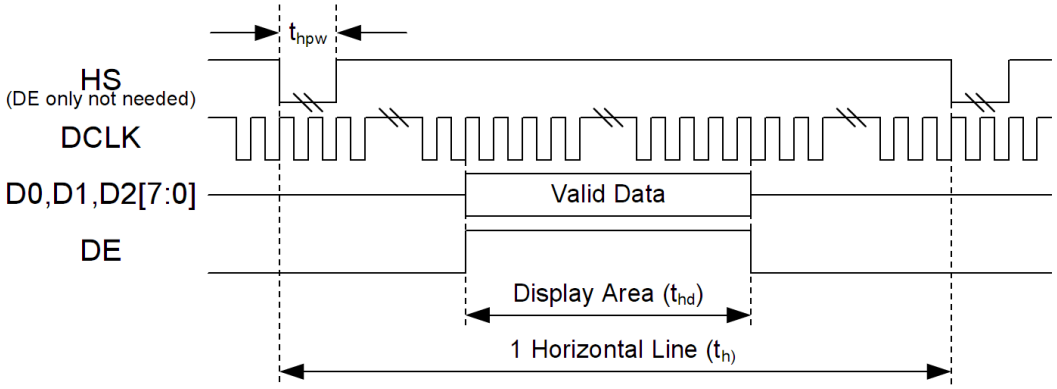


Figure 6.4.1 Horizontal input timing at DE only mode

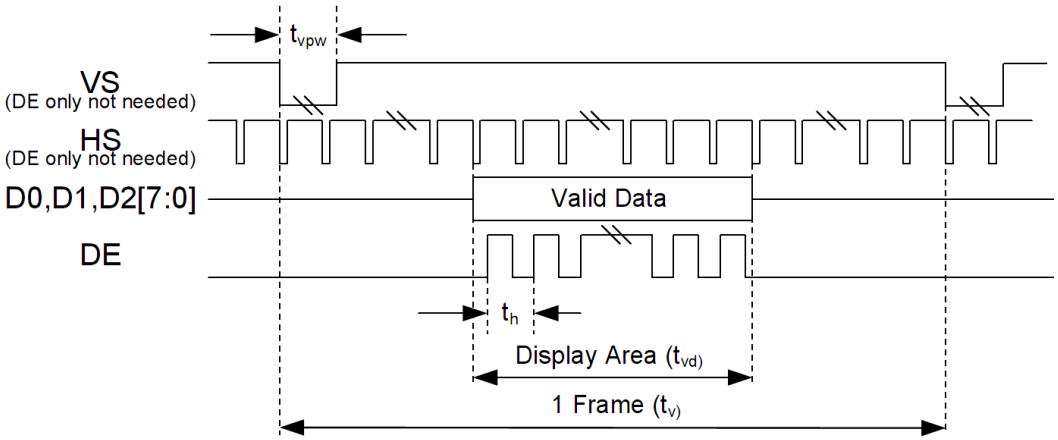


Figure 6.4.2 Vertical input timing at DE only mode

7. Optical Characteristics

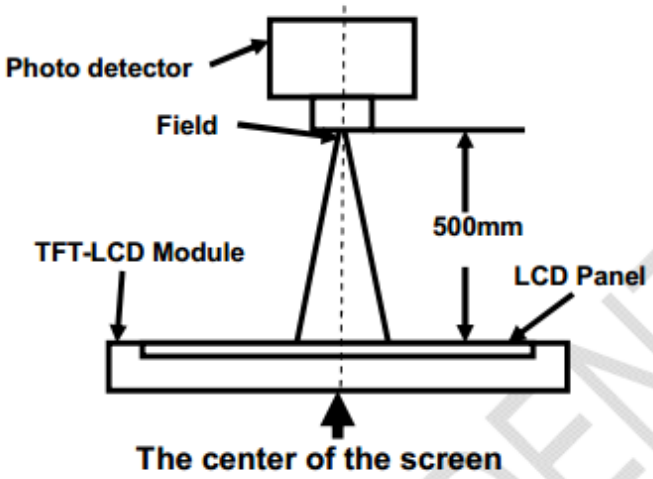
Item	Symbol		Condition	Min	Typ	Max	Unit	Remark
View Angles	θT		CR≧10	75	85	-	Degree	Note2,3
	θB			75	85	-		
	θL			75	85	-		
	θR			75	85	-		
Contrast Ratio	CR		θ=0°	800	1000			Note 3
Response Time	T_{ON}		25℃		25	35	ms	Note 4
	T_{OFF}							
Chromaticity	**White**	x	Backlight is on	0.259	0.309	0.359		Note 1,5
		y		0.265	0.315	0.365		
	Red	x		0.584	0.634	0.684		Note 1,5
		y		0.285	0.335	0.385		
	Green	x		0.263	0.313	0.363		Note 1,5
		y		0.574	0.624	0.674		
	Blue	x		0.100	0.150	0.200		Note 1,5
		y		0.013	0.063	0.113		
Uniformity	U			75	80		%	Note 6
NTSC				65	70		%	Note 5
Luminance	L			800	1000		cd/m_2	Note 7

Test Conditions:

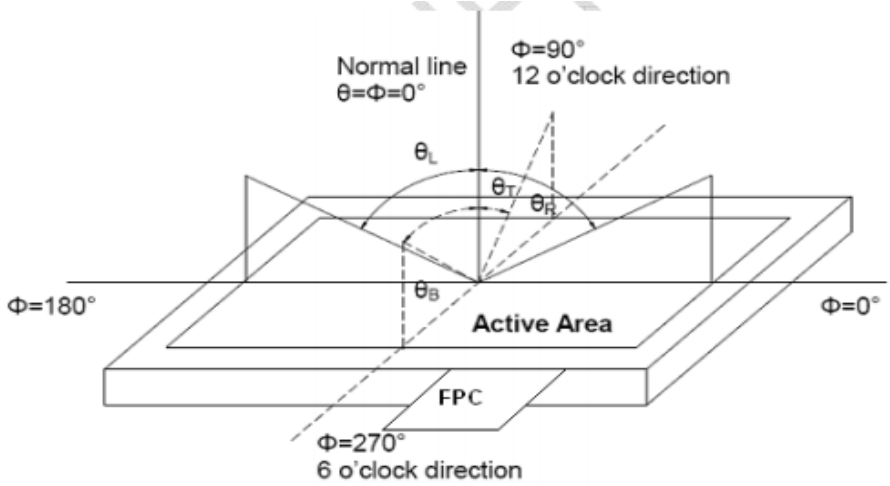
1. I_F= 156mA, and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

Note 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. All input terminals LCD panel must be ground when measuring the center area of the panel.



Note 2: Definition of viewing angle range and measurement system.
viewing angle is measured at the center point of the LCD 。



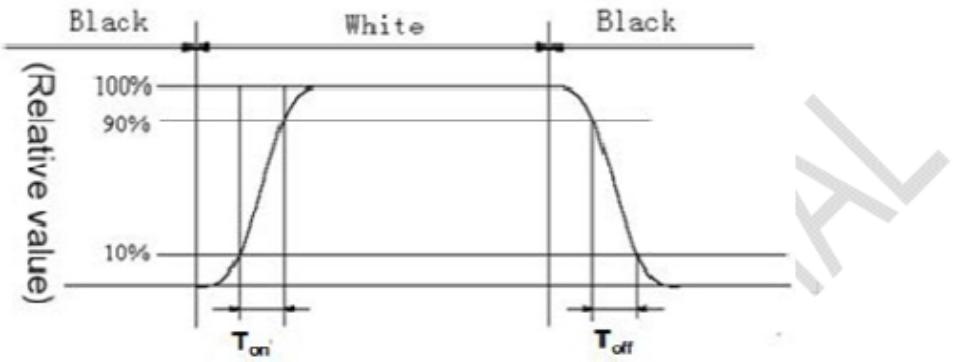
Note 3: Definition of contrast ratio

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

"White state ": The state is that the LCD should drive by Vwhite.
"Black state": The state is that the LCD should drive by Vblack.
Vwhite: To be determined Vblack: To be determined.

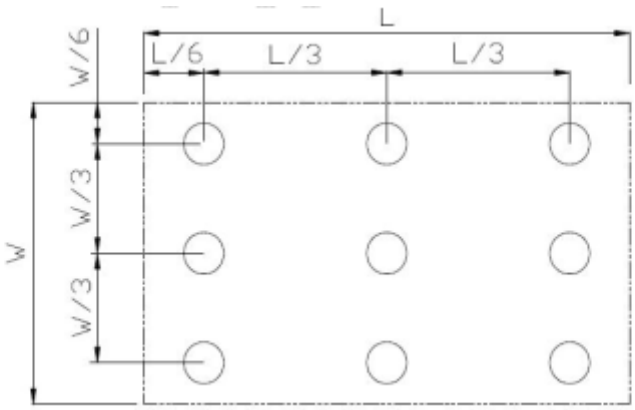
Note 4: Definition of Response time

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



Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.
Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas (Refer Fig. 2). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax
L-------Active area length W----- Active area width



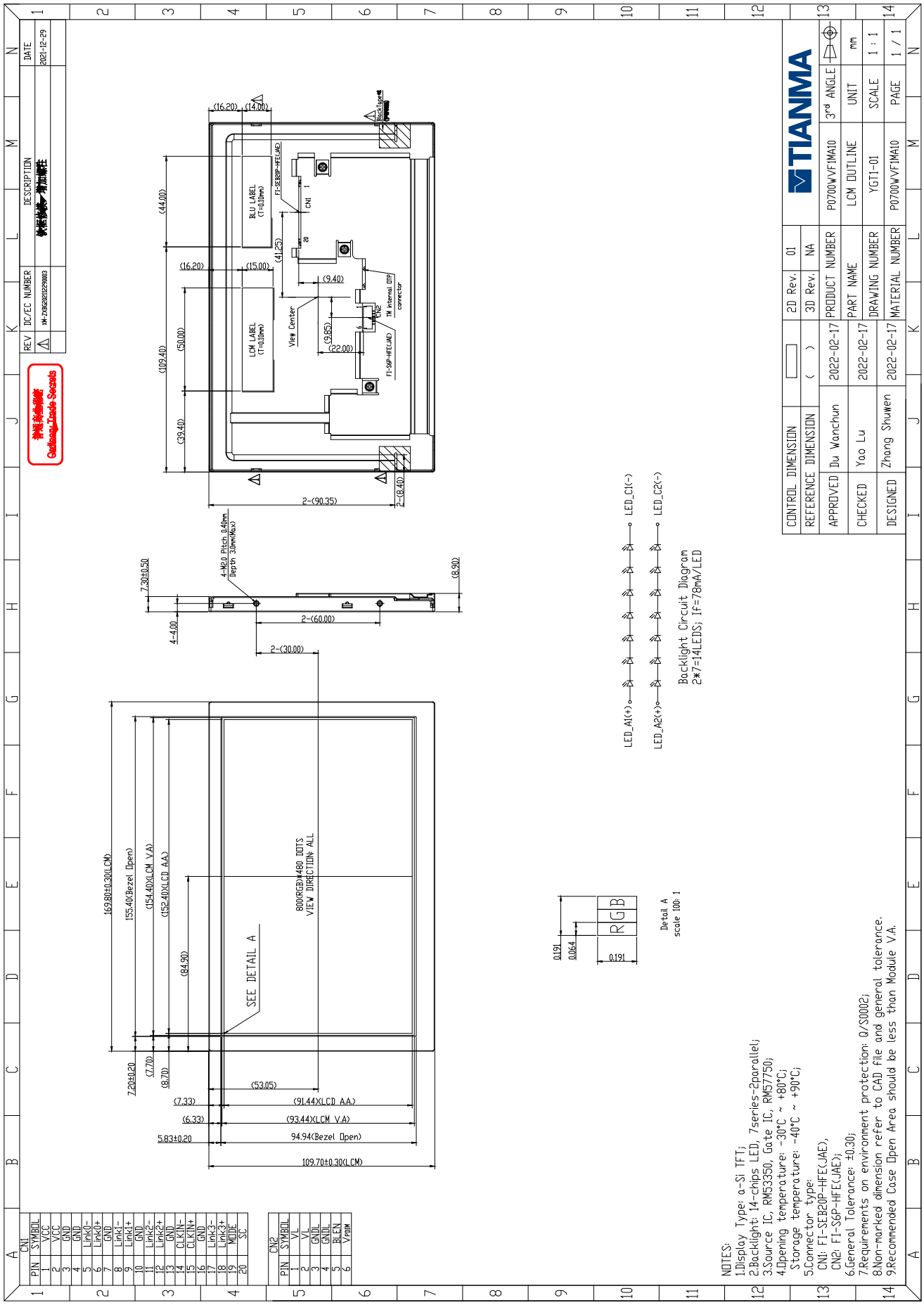
Lmax: The measured Maximum luminance of all measurement position.
Lmin: The measured Minimum luminance of all measurement position.
Note 7: Definition of Luminance:
Measure the luminance of white state at center point.

8. Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	+80℃, 500hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	-30℃, 500hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	+90℃, 500hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	-40℃,500hours	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	+60℃, RH= 90% max 240hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30min~85℃ 30min； Change time:5min, 100 Cycle 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	Vibration Test (Non-operation)	1G Waveform: sinusoidal Frequency range: 5~500Hz Frequency sweep rate: 0.5 octave/mim Duration: one sweep from 5 to 500Hz in each of three mutually perpendicular axis(each x,y,z axis:1hour,total 3hrs）	IEC60068-2-6:2007 GB/T 2423.10-2019
9	Shock Test (Non-operation)	Half Sine Wave 60G 2ms, ±X, ±Y, ±Z 2times for each direction	IEC60068-2-27:2008 GB/T 2423.5-2019
10	Package Drop Test	Weight≤10Kg，Height:80cm; Weight＞10Kg,，Height:60cm; 1corner,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

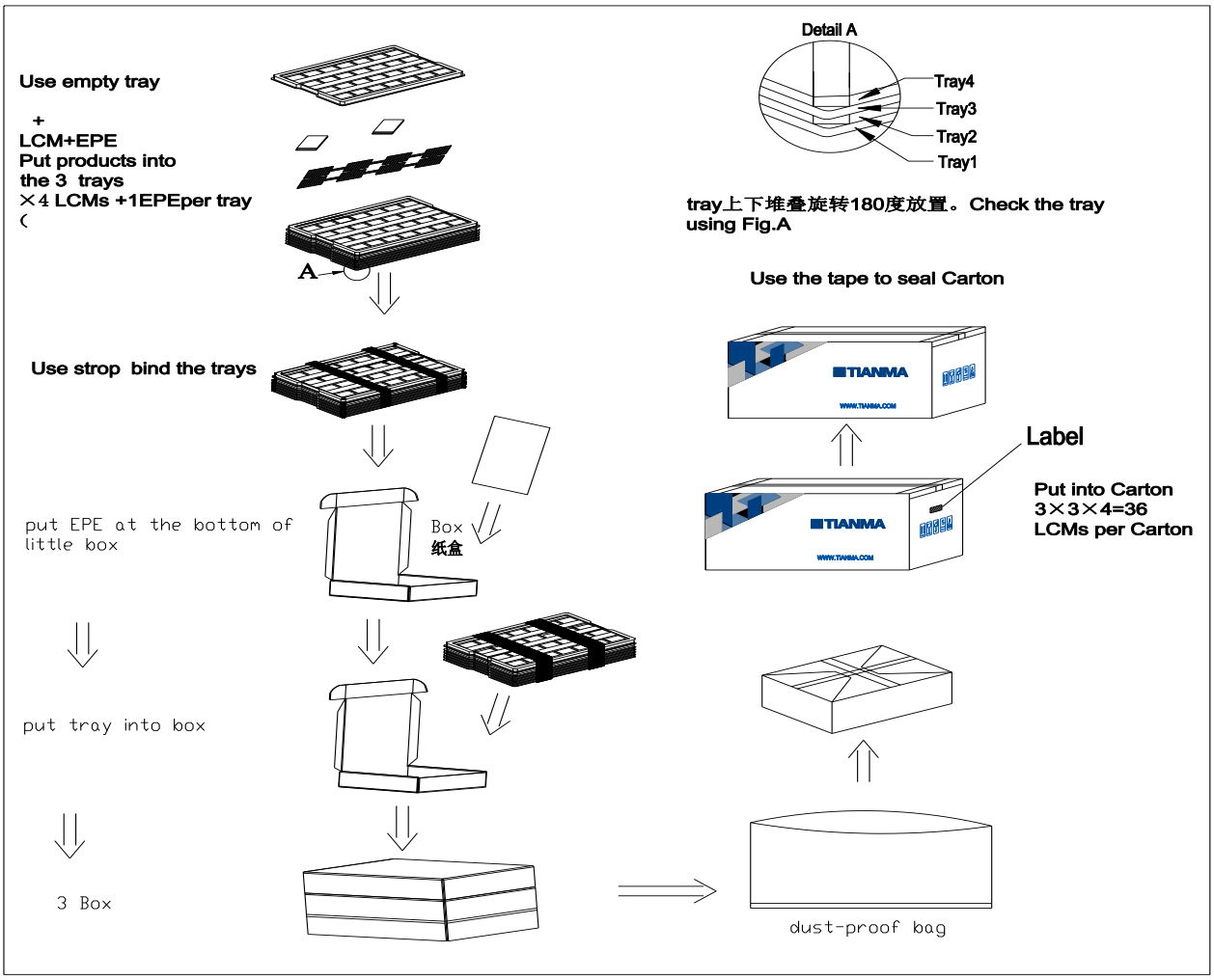
Note1: Ta is the ambient temperature of sample.
Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.
Note3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product 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	P0700WVF1MA10	169.8×109.7×7.3	0.183	36	
2	Tray	PET	485×330×20	0.257	12	
3	EPE	EPE	324.72×218.98×1	0.002	9	
4	Dust-proof Bag	PE	600×500×0.08	0.021	1	
5	Carton	Corrugated Paper	544×365×250	1.01	1	
6	BOX	Corrugated Paper	520×345×74	0.38	3	
7	EPE	EPE	485×330×5	0.016	3	
8	Label		100×52	0.001	1	
9	Total weight	11.88Kg±10%				



11 Precautions for Use of LCD Modules

11.1 Handling Precautions

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

11.1.2 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.

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

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

11.1.5 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

11.1.6 Do not attempt to disassemble the LCD Module.

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

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

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

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

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

11.1.8.4 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 precautions

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

11.2.2 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%

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

11.3 Transportation Precautions

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

12. Module Incoming Inspection Standard

12.1Scope

The incoming inspection standards shall be applied to TFT-LCD Modules (hereinafter called "Modules") that supplied by Tianma Micro-Electronics Corporation.

12.2Incoming Inspection

The customer shall inspect the modules within twenty calendar days of the delivery date (the “inspection period) at its own cost. The result of the inspection (acceptance or rejection) shall be recorded in writing, and a copy of this writing will be promptly sent to the seller, If the results of the inspecting from buyer does not send to the seller within twenty calendar days of the delivery date. The modules shall be regards as acceptance.
Should the customer fail to notify the seller within the inspection period, the buyers right to reject the modules. Shall be lapsed and the modules shall be deemed to have been accepted by the buyer.

12.3 Inspection Sampling Method

3.1 Lot size: Quantity per shipment lot per model
3.2 Sampling type: Normal inspection, Single sampling
3.3 Inspection level: II
3.4 Sampling table: GB/T 2828.1, test level II
3.5 Acceptable quality level (AQL)
Major defect: AQL=0.65
Minor defect: AQL=1.00

12.4 Inspection Conditions

4.1 Ambient conditions:

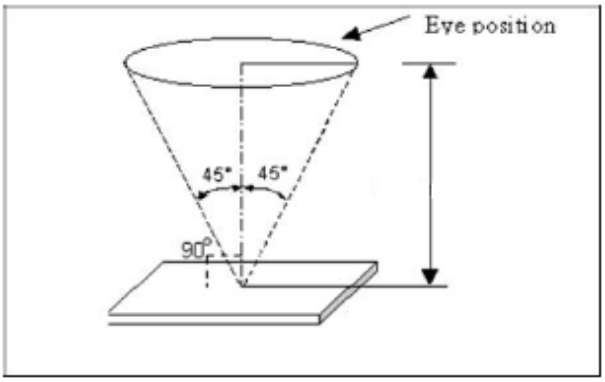
a. Temperature: Room temperature 25±5℃

b. Humidity: (60±10)%RH

c. Illumination: Appearance 600 Lux minimum, Display 100±50 Lux (The luminance at an inspection desk surface with single non-directive fluorescent lamp).

4.2 Viewing distance: The distance between the LCD and the inspector’s eyes shall be at least 30±5cm.

4.3 Viewing Angle: U/D: 45º/45º, L/R: 45º/45º



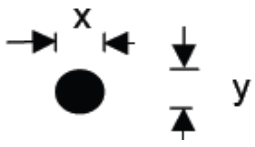
12.5 Inspection Criteria

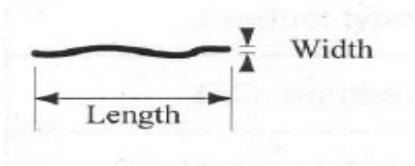
Defects are classified as major defects and minor defects according to the degree of defectiveness defined herein.

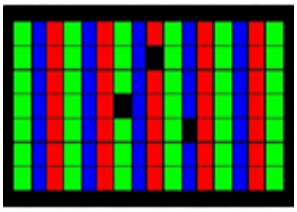
5.1 Major defect – Features

Item No	Items to be inspected	Inspection Standard
5.1.1	All functional defects	1) No display 2) Display abnormally 3) line defect
5.1.2	Missing	Missing function component
5.1.3	Crack	Glass Crack

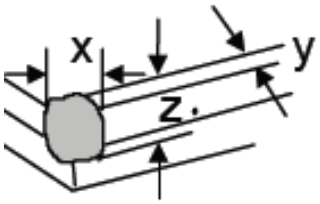
5.2 Minor defect – Display

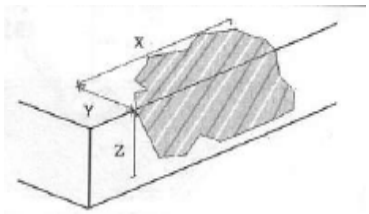
<table>
<tr><th>Item No</th><th>Items to be inspected</th><th colspan="2">Inspection standard</th></tr>
<tr><td rowspan="5">5.2.1</td><td rowspan="5">Spot Defect
Including:
Black spot
White spot
Foreign particle
Polarizer dirt
Cell particle</td><td colspan="2">For dark/white spot is defined
$\varphi=(x+y)/2$
 
dots distance=DS</td></tr>
<tr><td>φ(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>φ≤0.2</td><td>Ignore</td></tr>
<tr><td>0.2＜φ≤0.5</td><td>3 (DS≥5mm)</td></tr>
<tr><td>0.5＜φ</td><td>Not allowed</td></tr>
</table>

<table>
<tr><td rowspan="4">5.2.2</td><td rowspan="4">Line Defect
Including:
Black line
White line
Scratch</td><td colspan="2">Define:
 

Line defect distance≥5mm</td></tr>
<tr><td>Width(mm) Length(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>W≤0.05</td><td>Ignore</td></tr>
<tr><td>0.05＜W≤0.1,
L≤5.0</td><td>4 (DS≥5mm)</td></tr>
<tr><td>0.1＜W or L＞5.0</td><td>Not allowed</td></tr>
<tr><td rowspan="8">5.2.3</td><td rowspan="7">Electrical
Dot Defect</td><td colspan="2">Bright and Black dot define:
 
and
 </td></tr>
<tr><td>Item</td><td>Acceptable Quantity</td></tr>
<tr><td>Dark dot defect</td><td>3</td></tr>
<tr><td>Bright dot defect</td><td>0</td></tr>
<tr><td>Total Dot</td><td>3</td></tr>
<tr><td>DDP (double dark point)</td><td>0</td></tr>
<tr><td>Distance between dark dot</td><td>＞15mm</td></tr>
<tr><td>Tiny bright dot
Dense tiny highlights</td><td>Φ＜0.2mm</td><td>ND 5% judgment, clustered is not allowed (clustered mean N＞5, D≤5)</td></tr>
<tr><td>5.2.4</td><td>Mura</td><td colspan="2">Invisible under 2% ND filter in black pattern.Other pattern don’t control, If necessary, building limited sample.</td></tr>
</table>

5.3 Minor defect – Exterior

<table>
<tr><td rowspan="4">5.3.1</td><td rowspan="4">Polarizer Dent/Bubble</td><td>φ(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>φ≤0.2</td><td>Ignore</td></tr>
<tr><td>0.2＜φ≤0.5</td><td>3 (DS≥5mm)</td></tr>
<tr><td>0.5＜φ</td><td>Not allowed</td></tr>
<tr><td rowspan="4">5.3.2</td><td rowspan="4">FPC</td><td>Broken</td><td>Not allowed</td></tr>
<tr><td>FPC kink, indentation, Top wound, scratch</td><td>naked wire, hole is not allowed, Invisible copper line</td></tr>
<tr><td>Connect broken (no crack, no short circuit, no dead fold, not inflict function)</td><td>Don't control</td></tr>
<tr><td>The surface of the dirt</td><td>Don't control</td></tr>
<tr><td>5.3.3</td><td>Bonding IC</td><td colspan="2">Bareness is not allowed</td></tr>
<tr><td rowspan="3">5.3.4</td><td rowspan="3">B/L Frame Broken, Oil pollution</td><td>Broken, Oil pollution</td><td>Not allowed</td></tr>
<tr><td>Scratch, indelible</td><td>Ignore</td></tr>
<tr><td>Bump point</td><td>Does not affect the use of allowed</td></tr>
<tr><td rowspan="2">5.3.5</td><td rowspan="2">Protective Film</td><td>Top injury, scratch, Wear scar</td><td>Undamaged polarizer, ignore</td></tr>
<tr><td>Can wipe dirt, particle</td><td>ignore</td></tr>
<tr><td rowspan="3">5.3.6</td><td rowspan="3">Glass Defect</td><td colspan="2">1.Corner Fragment:
 
</td></tr>
<tr><td>Size(mm)</td><td>Acceptable Quantity</td></tr>
<tr><td>X≤3mm,
Y≤3mm,
Z≤T</td><td>Ignore
T: Glass thickness
X: Length, Y: Width,
Z: thickness</td></tr>
</table>

		2. Side Fragment: 	
		Size(mm)	Acceptable Quantity
		X≤6.0mm, Y≤1.0mm, Z≤T	Ignore T: Glass thickness X: Length, Y: Width, Z: Thickness

Note:
1. Dot defect is defined as the defective area of the dot area is larger than 50% of the dot area.
2. Polarizer bubble is defined as the bubble appears on active display area. The defect of polarizer bubble shall be ignored if the polarizer bubble appears on the outside of active display area.
3. ND application method: the parallel vertical distance between ND and panel is 3~5cm, the distance of eyes look squarely to the panel is 30±5cm
4. Foreign particle on the surface of the LCM should be ignored.
5. Displaying foreign body points using single eye determination
6. AA (Active Area) area, the display area, ie, the effective product display area, is a poor type of control area for the electrical measurement display. VA (View Area) area, viewable area, that is, the area that can be visually seen after the product is installed on the customer's entire machine.

12.6 Mechanics specification

As for the outside dimension, weight of the modules, please refer to product specification for more details.

12.7 Precaution

Please pay attention to the following items when you use the LCD Modules:

7.1 Do not twist or bend the module and prevent the unsuitable external force for display module during assembly.

7.2 Adopt measures for good heat radiation. Be sure to use the module with in the specified temperature.

7.3 Avoid dust or oil mist during assembly.

7.4 Following the correct power sequence while operating. Do not apply the invalid signal, otherwise, it will cause improper shut down and damage the module.

7.5 Less EMI: it will be more safety and less noise.

7.6 Please operate module in suitable temperature. The response time & brightness will drift by different temperature.

7.7 Avoid to display the fixed pattern (exclude the white pattern) in a long period, otherwise, it

will cause image stains.

7.8 Be sure to turn off the power when connection of disconnecting the circuit.

7.9 Polarizer scratches easily, please handle it carefully.

7.10 Display surface never likes dirt of stains.

7.11 A dewdrop may lead to destruction. Please wipe off and moisture before using module.

7.12 Sudden temperature changes cause condensation, and it will cause polarizer damaged.

7.13 High temperature and humidity may degrade performance. Please do not expose the module to the direct sunlight and so on.

7.14 Acetic acid or chlorine compounds are not friends with TFT display module.

7.15 Static electricity will damage the module, please do not touch the module without any grounded device.

7.16 Do not disassemble and reassemble the module by self.

7.17 Be careful do not touch the rear side directly.

7.18 Not strong vibration or shock. It will cause module broken.

7.19 Storage the modules in suitable environment with regular packing.

7.20 Be careful or injury from a broken display module.

7.21 Please avoid the pressure adding to the surface (front or rear side) of modules, because it will cause the display non-uniformity of other function issue.