DATA MODUL

SPECIFICATION

TIANMA

P0840XGF1MA00

8.4" – XGA –LVDS

Version: 2.1
Date: 01.11.2022

Note: This specification is subject to change without prior notice

SPECIFICATION

[ ] Preliminary Specification

[◉] Final Specification

Description **8.4” 1024x768 TFT-LCD Module**

Part Number **P0840XGF1MA00**

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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	2020/09/17		Preliminary Specification release.	Bin Wang
2.0	2021/09/13		Final Specification release.	Bin Wang
2.1	2022/11/01		Update CN2 Matching connector	Bin Wang

CONTENTS

1. Summary

1.1 General Description

This is a 8.4 inch a-Si TFT-LCD module with Normal- Black technology. It is composed of a TFT-LCD panel, a driver circuit, FPC, PCB, Bezel, and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle.
- High luminance.
- Long LED life time.
- Wide temperature range.
- Interface: LVDS 6/8 bits.

- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03.
- 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	8.4 inches	
	Resolution	1024x768	
	Pixel Pitch	0.1665 x 0.1665	mm
	TFT Active Area	170.496x127.872	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)	199.5×149×9.7	mm
	Weight	303	g
Optical Characteristics	Luminance	Typ:1000	cd/m2
	Contrast Ratio	Typ:1000:1	
	NTSC	Typ:70	%
	Viewing Angle	88/88/88/88(SFT)	degree
Electrical Characteristics	Interface	LVDS 6/8 bits	
	Color Depth	16.7 Million color/262 Kilo color	color
	Power Consumption	LCD:1023; Backlight:6720	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

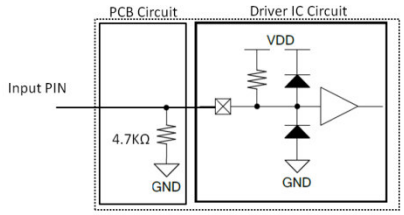
Connector Information	
Matching connector	FI-SEB20P-HFE

Table 3.1.1 Connector information

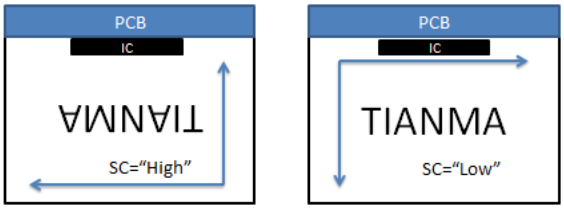
Pin No.	Symbol	I/O	Function	Remark
1	VCC	P	3.3V power supply	
2	VCC	P	3.3V power supply	
3	GND	P	Ground	Note2
4	GND	P	Ground	Note2
5	Link0-	I	Negative LVDS differential data input	
6	Link0+	I	Positive LVDS differential data input	
7	GND	P	Ground	Note2
8	Link1-	I	Negative LVDS differential data input	
9	Link1+	I	Positive LVDS differential data input	
10	GND	P	Ground	Note2
11	Link2-	I	Negative LVDS differential data input	
12	Link2+	I	Positive LVDS differential data input	
13	GND	P	Ground	Note2
14	CLKIN-	I	Negative LVDS differential data input	
15	CLKIN+	I	Positive LVDS differential data input	
16	GND	P	Ground	Note2
17	Link3-	I	Negative LVDS differential data input	Note3
18	Link3+	I	Positive LVDS differential data input	Note3
19	MODE	I	6-bit / 8-bit input select for LVDS interface. High：8bit Low or Open：6bit.	Note4
20	SC	I	Reverse Scan control Low or Open: Normal scan High: Reverse scan	Note4 Note5

Table 3.1.2 Pin Assignment for LCD Interface

Note1:I---Input, O---Output, P--- Power/Ground
Note2: All of the GND Pins should be connected to the system ground.
Note3: Please set to GND if pin is NOT in use.
Note4: The circuit of module is shown below. It is recommended that the pins give the level voltage directly, without other circuits, such as pull-up resistors.



Note5: The function of the SC. The figure below is a front view.



3.2 CN2 Pin assignment (Back Light)

Connector Information	
connector	SM06B-SHLS-TF (LF)(SN) (JST)
Matching connector	SHLP-06V-S-B

Table 3.2.1 Connector information

Pin	Symbol	I/O	Description	Remark
1	NC	-	This pin should be open.	-
2	NC	-	This pin should be open.	-
3	LED C1	P	LED cathode 1	Note1
4	LED A1	P	LED anode 1	Note2
5	LED A2	P	LED anode 2	Note2
6	LED C2	P	LED cathode 2	Note1

Table 3.2.2 Pin Assignment for Back Light Interface

Note1: LED C1，LED C2 connected together on the PCB and then connected with K of the backlight..
Note2: LED A1, LED A2 connected together on the PCB and then connected with A of the backlight.
Note3: P--- Power; NC--- Not connected.

4. Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Input voltage	V_{IN}	-0.3	5	V	Note1
	VLVDS	-0.3	2	V	Note2
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＞80℃

Table 4.1 Absolute Maximum Ratings

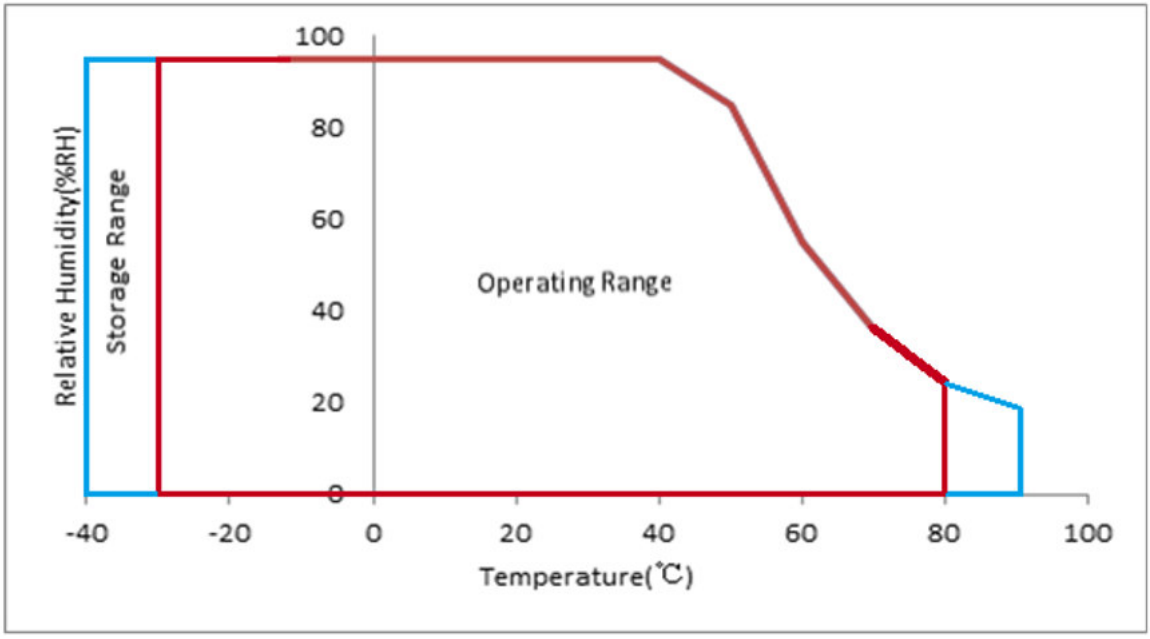


Table 4.2 Absolute Maximum Ratings chart

Note1: Input voltage include MODE,SC,VCC.
Note2: Including Link0+/-, Link1+/-, Link2+/-, Link3+/-,CLKIN+/-.
Note3: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.
Note4:The absolute maximum rating values of this product are not allowed to be exceeded at any times. A module should be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme condition, the module may be permanently destroyed

5. Electrical Characteristics

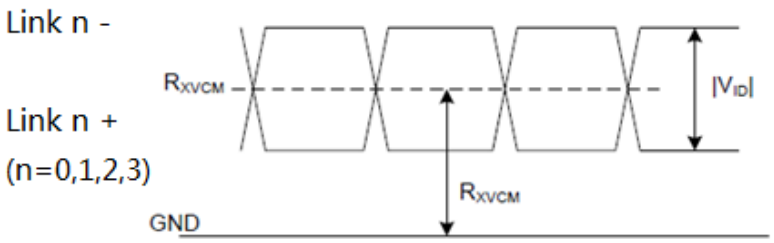
5.1 DC Characteristics for Panel Driving

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power supply voltage	VCC	3.0	3.3	3.6	V	Note1
Power Ground	GND	-	0	-	V	
Input High Voltage	V_{IH}	0.7xVCC		VCC	V	Note1
Input Low Voltage	V_{IL}	GND		0.3xVCC	V	
LVDS differential input high threshold voltage	RxVTH	-	-	+200	mV	Note2
LVDS differential input low threshold voltage	RxVTL	-200	-	-		
Differential input voltage	$\|V_{ID}\|$	200	-	600	mV	
Differential input common mode voltage	RxVCM	1.0	1.2	1.7-$\|V_{ID}\|/2$	V	
Current of VCC Power supply	IVCC	-	310	-	mA	Note3
Power consumption	P	-	1023	-	mW	
Inrush current of VCC	Irush	-	1.6		A	Note4

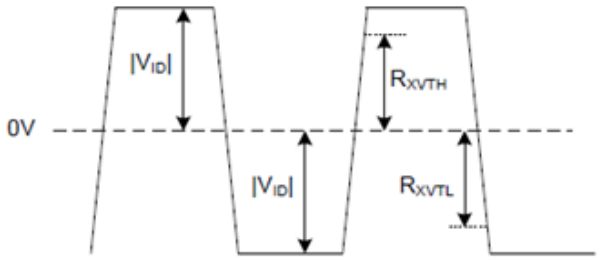
Table 5.1.1 Operating Voltages

Note1: Including MODE,SC.
Note2: Refers to the LVDS waveform as shown below:
Note3: Test in white pattern
Note4:VCC rising time >1ms.

Single-end Signal



Differential Signal



5.2 DC Characteristics for Backlight Driving

Parameter	Symbol	min.	typ.	max.	Unit	Remarks
Power supply voltage	VF	20.3	22.4	24.5	V	Ta=25℃，If=300mA
		18.27	-	-		Ta=80℃，If=300mA
		-	-	25.04		Ta=-30℃，If=300mA
		-	-	27.95		Ta=-30℃，If=330mA
Power supply current	IF	-	300	330	mA	
Power consumption of Backlight	P	-	6720	-	mW	
LED Life time	LT	70000	100000	-	Hrs	Ta = 25℃

Table 5.2.1 LED Backlight Characteristics

Note 1: The figure below shows the connection of backlight LED.
Note 2: K1，K2，K3 connected together on the PCB.
Note 3: Optical performance should be evaluated at Ta=25℃only.
Note 4: If LED is driven by high current, high ambient temperature & humidity condition, The life time of LED will be reduced.
Note 5:Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.

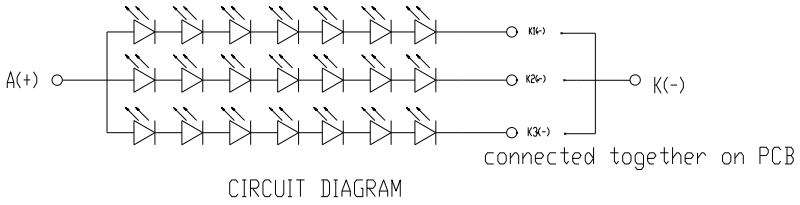


Table 5.2.2 LED connection of backlight

5.3 Recommended Power ON/OFF Sequence

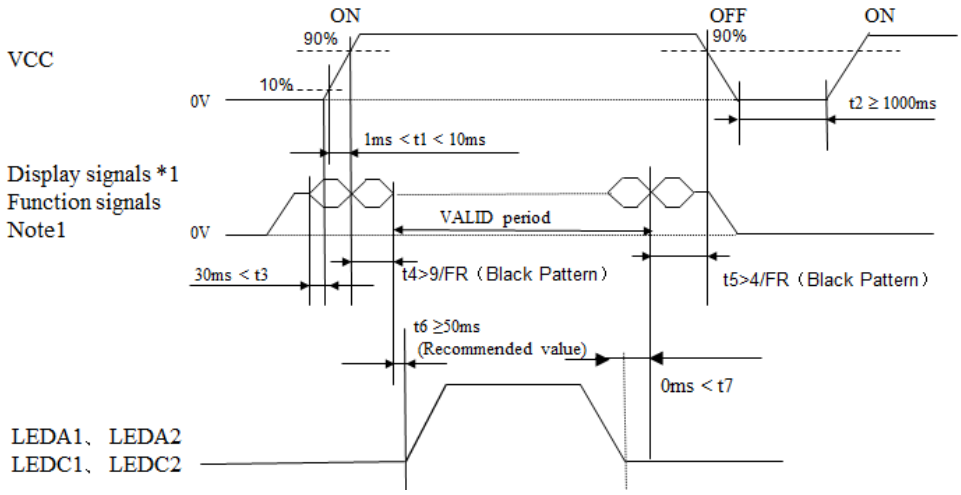


Table 5.3.1 Power On/off sequence

Note1: 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, VCC also must be shut down.
Note2: The backlight should be turned on within the valid period of display and function signals, in order to avoid unstable data display.
Note3: FR=Frame rate=60Hz.

5.4 LCD Module Block Diagram

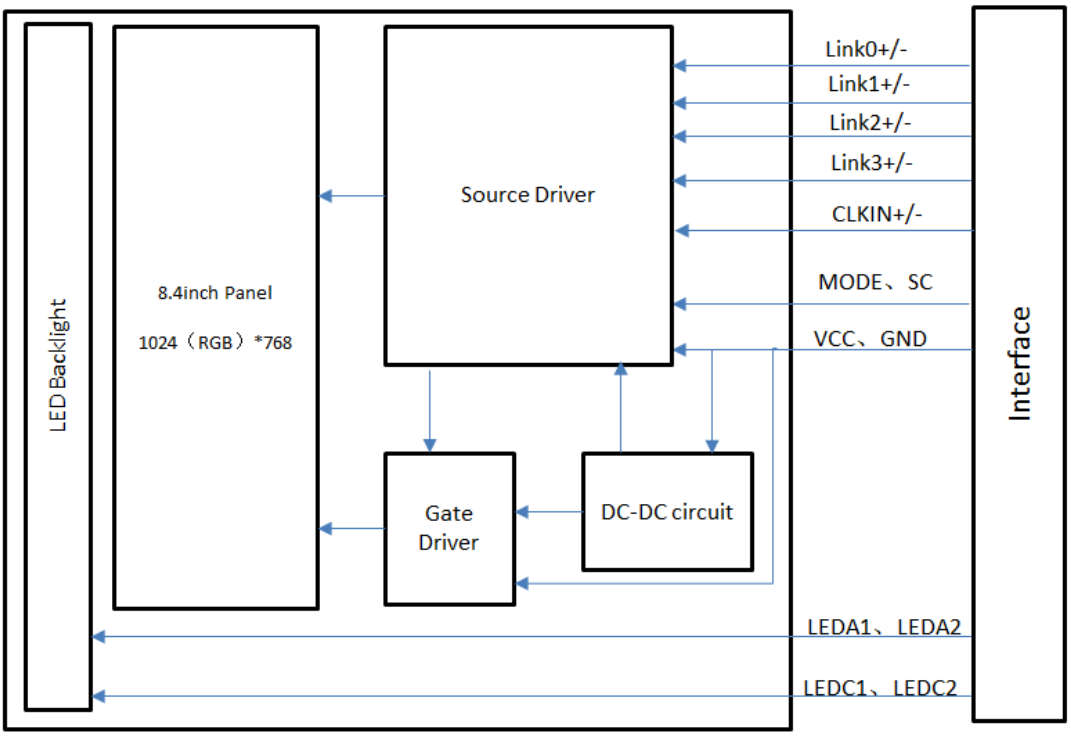


Table 5.4.1 LCD Module Block Diagram

6. Timing Characteristics

6.1 LVDS interface AC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	FLVCLK	25	-	85	MHz	Refer to input timing table for each display resolution.
Clock Period	TLVCLK	11.76	-	40	nsec	
Clock high time	TLVCH	-	4/(7* RXFCLK)	-	ns	
Clock low time	TLVCL	-	3/(7* RXFCLK)	-	ns	
Input data skew margin	TRSKM	-	-	0.25	UI	VCC_IF=1.8V w/o SSC
Strobe width	TSW	0.5	-	-	UI	
1 data bit time	UI	-	1/7	-	TLV CLK	
Position 1	TPOS1	-0.25	0	0.25	UI	
Position 0	TPOS0	0.75	1	1.25	UI	
Position 6	TPOS6	1.75	2	2.25	UI	
Position 5	TPOS5	2.75	3	3.25	UI	
Position 4	TPOS4	3.75	4	4.25	UI	
Position 3	TPOS3	4.75	5	5.25	UI	
Position 2	TPOS2	5.75	6	6.25	UI	

Table 6.1.1 LVDS interface AC characteristic

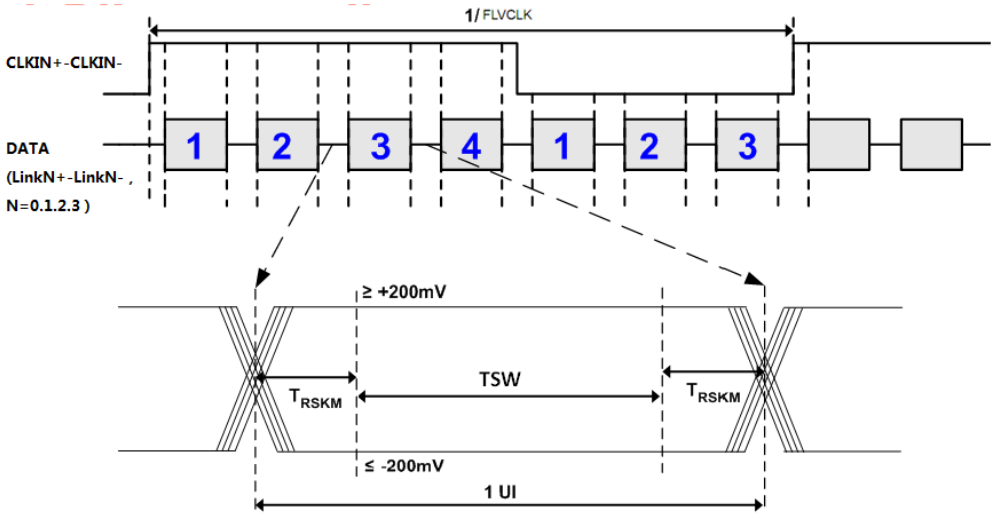


Table 6.1.2 LVDS Data Skew

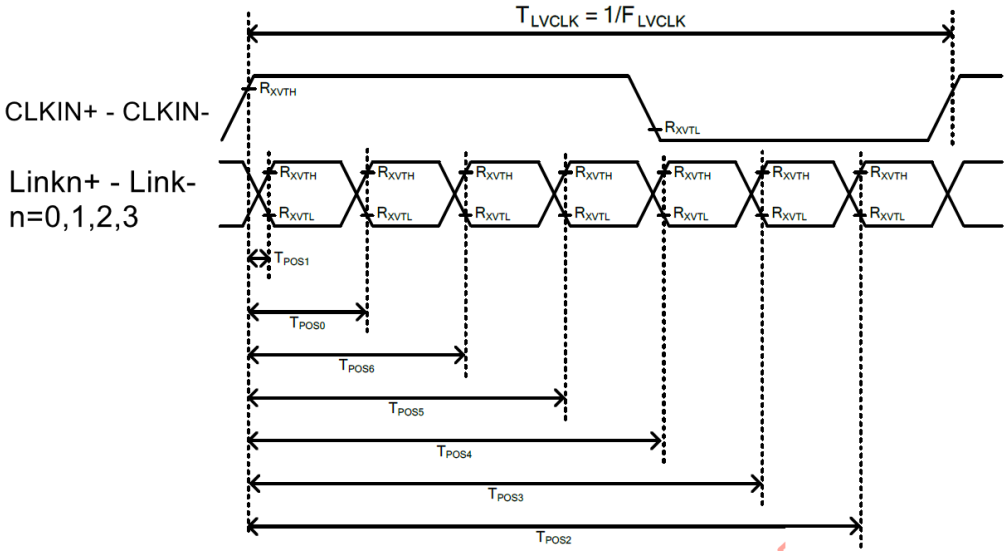


Table 6.1.3 Clock and Data Input Timing Diagram

6.2 Data Input Timing Parameter Setting

DE mode for 1024RGBx768

Parameter	Symbol	Min.	Typ.	Max.	Unit
CLKIN+/- frequency	FCLK	50.3	50.7	65.3	MHz
Horizontal display area	THD		1024		CLK
HS period time	TH	1084	1088	1214	CLK
HS blanking	THFP+THBP	60	64	190	CLK
Vertical display area	TVD		768		H
VS period time	TV	774	776	897	H
VS blanking	TVBP+TVFP	6	8	129	H

Table 6.2.1 Data Input Timing Parameters

6.3 LVDS Interface Timing Characteristics

6.3.1 LVDS Input Data Format 8-bit LVDS VESA

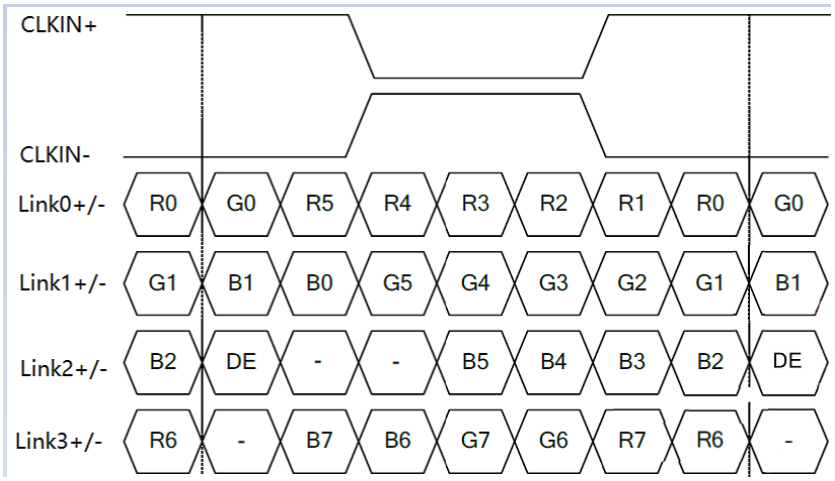


Table 6.3.1 8-bit LVDS data map

6.3.2 LVDS Input Data Format 6-bit LVDS VESA

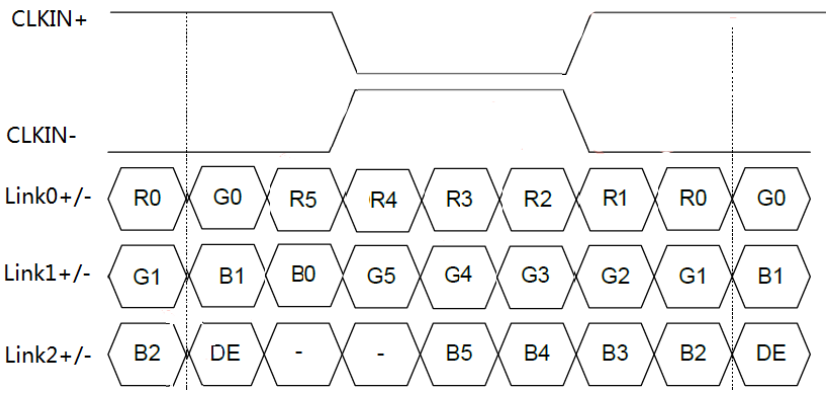


Table 6.3.2 LVDS data map

6.4 LVDS Input Timing Format

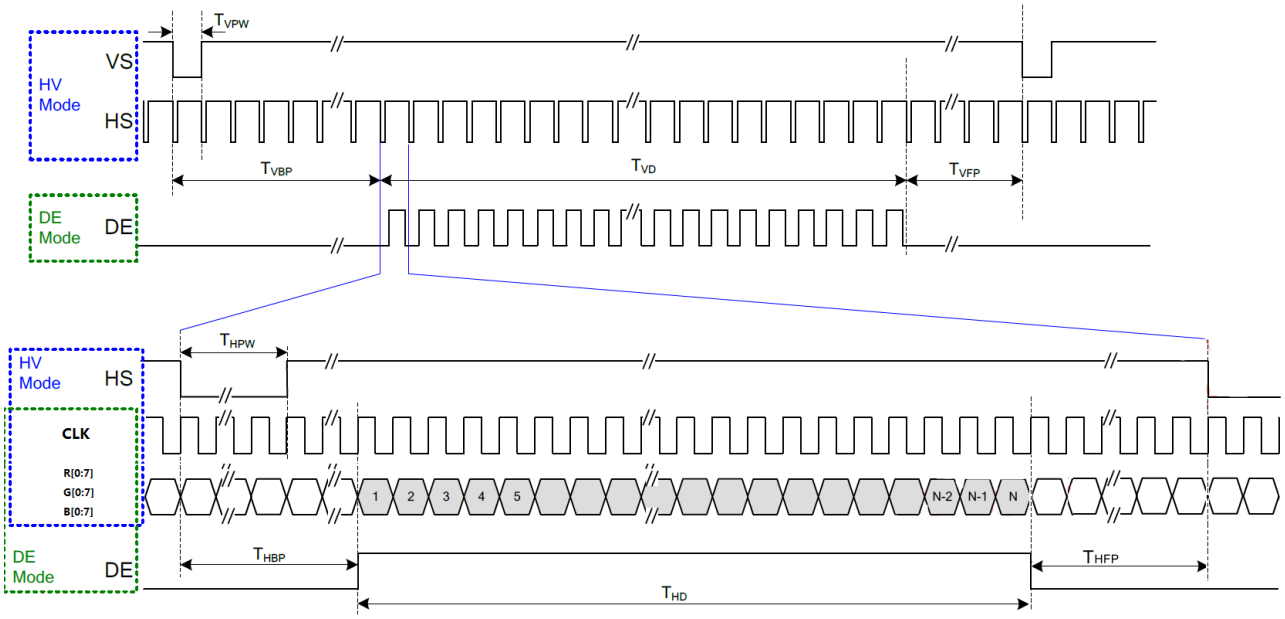


Table 6.4.1 Recommended input timing of LVDS transmitter

Note1: As shown in the figure above, the customer only needs to look at the DE mode section , instead of the SYNC section.

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	30	ms	Note 4
		T_{OFF}						
Chromaticity	**White**	x	Backlight is on	0.257	0.307	0.357		Note 1,5
		y		0.283	0.333	0.383		
	Red	x		0.580	0.630	0.680		Note 1,5
		y		0.284	0.334	0.384		
	Green	x		0.266	0.316	0.366		Note 1,5
		y		0.580	0.630	0.680		
	Blue	x		0.107	0.157	0.207		Note 1,5
		y		0.016	0.066	0.116		
Luminance Uniformity		U	-	75	85		%	Note 6
NTSC				65	70	--	%	Note 5
Luminance		L		800	1000		cd/m^2	Note 7

Table 7.1 Optical Parameters

Test Conditions:

1. I_F= 100 mA/LED, and the ambient temperature is 25℃.
2. The test systems refer to Note1 and Note2.

Note1: Definition of optical measurement system.

The optical characteristics should be measured in dark room. After 5 Minutes operation, the optical characteristics are measured at the center point of the LCD screen.

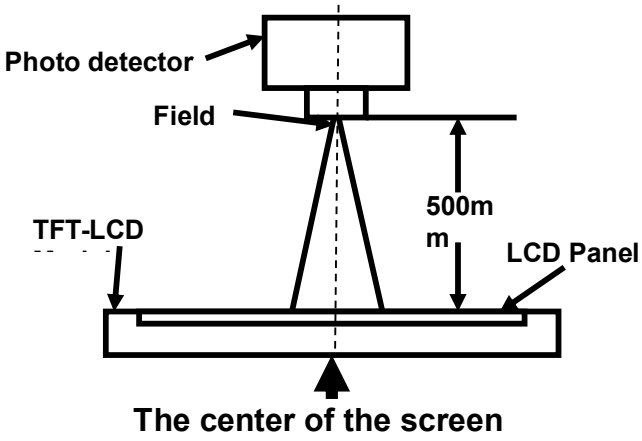


Fig1. Measurement Set Up

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

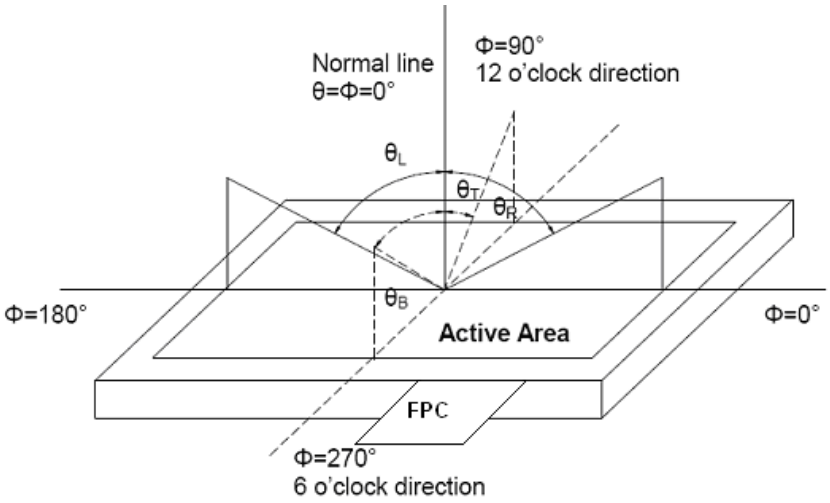


Fig2. Measurement viewing angle

Note3: Definition of contrast ratio

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

Note4: Definition of Response time

For TN LCM,the response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_r) is the time between photo detector output intensity changed from 90% to 10%. And fall time (T_f) is the time between photo detector output intensity changed from 10% to 90%.

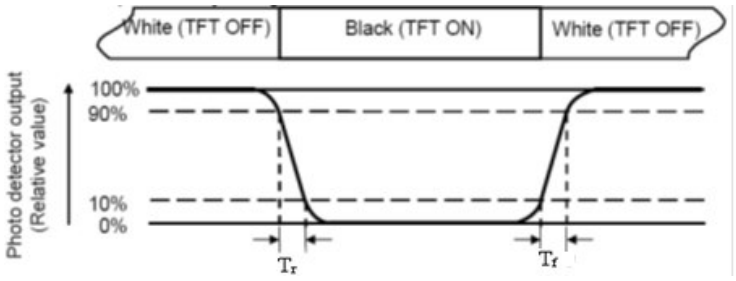


Fig3. Response Time Testing(TN)

For SFT LCM, the response time is defined as the LCD optical switching time interval between “White” state and “Black” state. Rise time (T_r) is the time between photo detector output intensity changed from 10% to 90%. And fall time (T_f) is the time between photo detector output intensity changed from 90% to 10%.

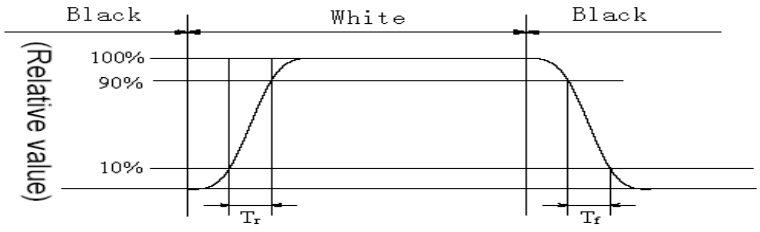


Fig4. Response Time Testing(SFT)

Note5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

Note6: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (Refer Fig.5). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = Lmin/ Lmax

Lmax: The measured Maximum luminance of all measurement position.

Lmin: The measured Minimum luminance of all measurement position.

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

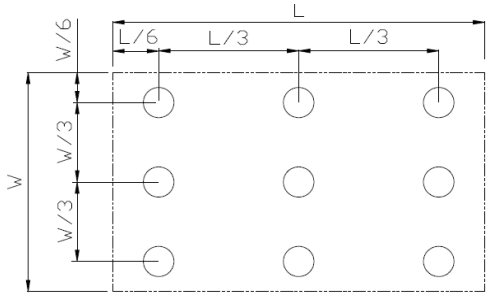


Fig5. Luminance Uniformity Measurement Locations(9 points)

Note7: Definition of Luminance:

Measure the luminance of white state at center point.

8. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +80℃,500 hours	IEC60068-2-1 GB2423.2
2	Low Temperature Operation	Ta = -30℃, 500 hours	IEC60068-2-1 GB2423.1
3	High Temperature Storage	Ta = +90℃, 500 hours	IEC60068-2-1 GB2423.2
4	Low Temperature Storage	Ta = -40℃, 500 hours	IEC60068-2-1 GB2423.1
5	Storage at High Temperature and Humidity	Ta = +60℃, 90% RH max,500hours	IEC60068-2-78 GB/T2423.3
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 100 Cycle	Start with cold temperature, End with high temperature, IEC60068-2-14,GB2423.22
7	ESD	C=150pF,R=330Ω,5point/panel Air:±15KV,5times; Contact:±8KV,5times (Environment:15℃~35℃, 30%RH~60%RH.86Kpa~106Kpa)	IEC61000-4-2 GB/T17626.2
8	Vibration Test (Non Op)	5~100HZ，19.60m/s2 1min/cycle 120times Per X/Y/Z	IEC60068-2-6 GB/T17626.6
9	Mechanical Shock (Non Op)	539m/s2, 11ms 5times ±X、±Y、±Z	IEC60068-2-27 GB/T2423.5

Table 8.1 RA test condition

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.

Note 4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, only guarantee the operation of the product, but don't guarantee all of the cosmetic specification.

9. Mechanical Drawing

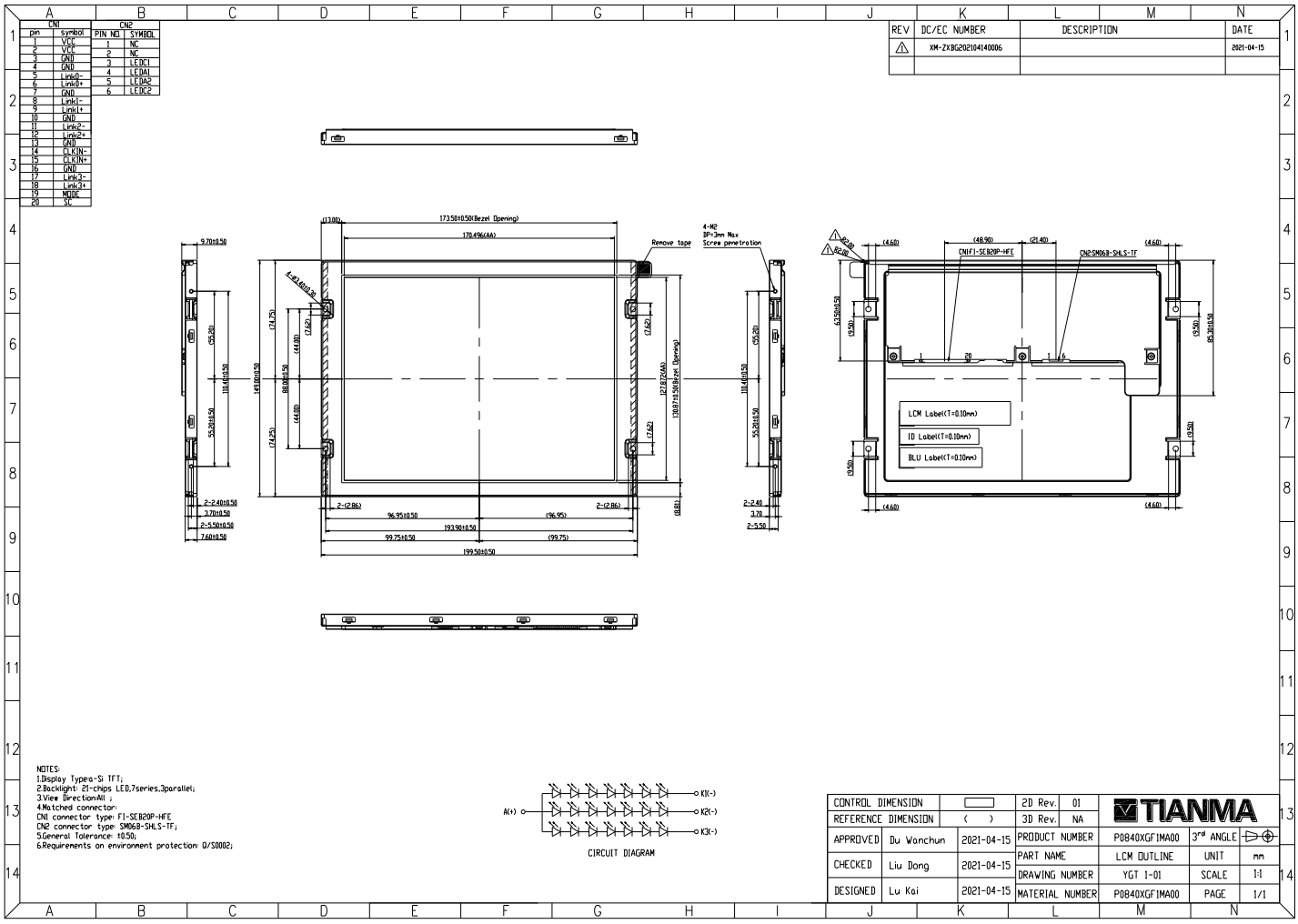
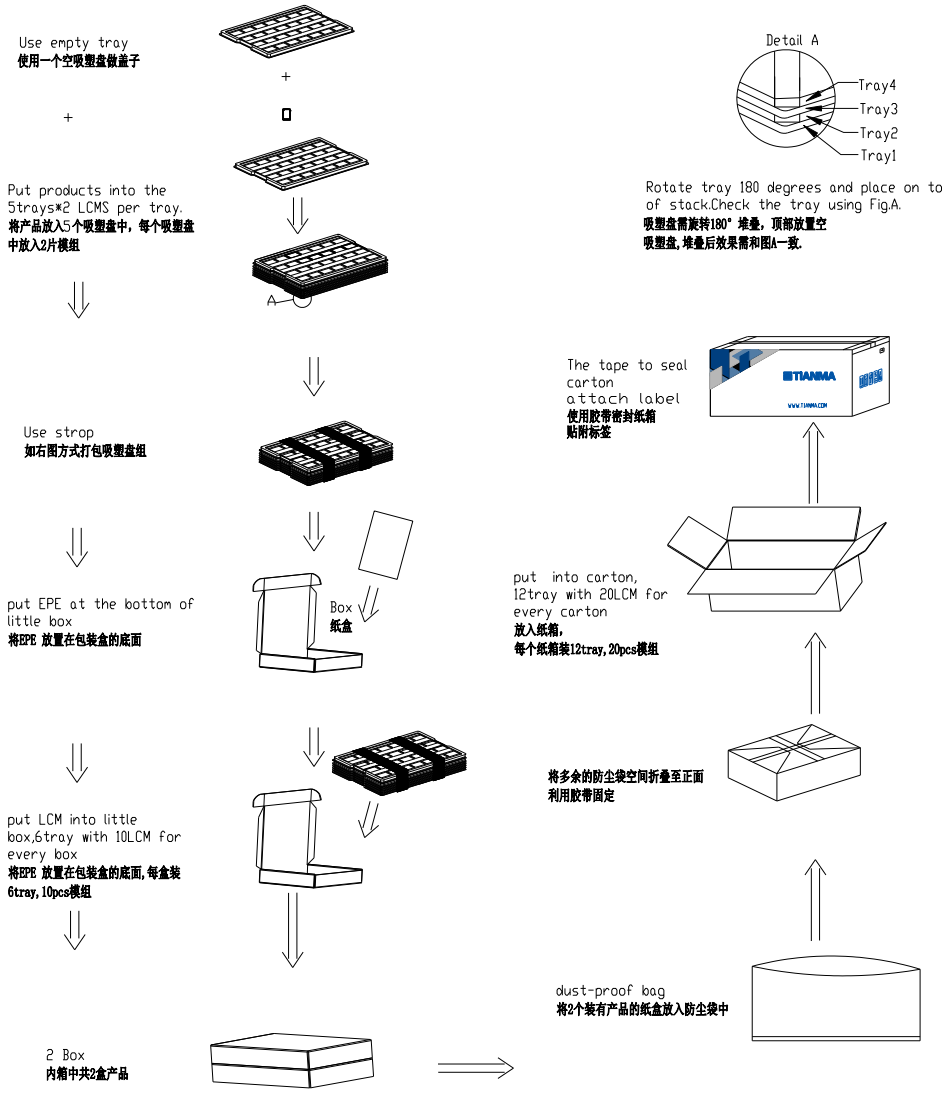


Table 9.1 Mechanical Drawing

10. Packing Instruction

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	P0840XGF1MA00	199.5×149×9.7	0.303	20	
2	Tray	PET	485×330×25	0.257	12	
3	Dust-proof Bag	PE	700×545×0.05	0.021	1	
4	Carton	Corrugated Paper	544×365×250	1.01	1	
5	BOX	Corrugated Paper	520×345×111	0.38	2	
6	Label		100×52	0.001	1	
7	EPE	EPE	485×330×5	0.016	2	
8	Total weight	10.95Kg±5%				



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.

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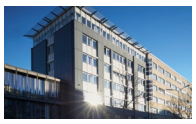

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