FORTEC GROUP

Datasheet

Tianma

P1330FHF1MB10

TI-01-035

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SPECIFICATION

[◉] Preliminary Specification
[ ] Final Specification

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

Part Number **P1330FHF1MB10**

Customer		Industrial Product Dept, PDBU Tianma Microelectronics Co., Ltd.	
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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	2024/03/21	All	Preliminary release.	Guangrui Fu

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, PCB, and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle
- High resolution
- Wide temperature range
- Interface: 2 port LVDS
- LED driver integrated
- Surface treatment ; AG
- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03 (File number: E170632)
- Compliant with the European RoHS Directive (2011/65/EU) and Delegated Directive (2015/863/EU, Amending Annex II of 2011/65/EU)

2. General Specifications

Feature		Spec	Unit
Display Spec	Size	13.3 inches	
	Resolution	1920(RGB)x1080	
	Pixel Pitch	0.153x0.153	mm
	TFT Active Area	293.76x165.24	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	SFT, Normally Black	
	Surface Treatment	Anti-Glare	
	Viewing Direction	All	
	Gray Scale Inversion Direction	NA	
Mechanical Characteristics	LCM (W x H x D)	308.00 x 186.00 x 9.20	mm
	Weight	TBD	g
Optical Characteristics	Luminance	600typ	cd/m^2
	Contrast Ratio	1000:1	
	NTSC	72	%
	Viewing Angle	88/88/88/88	degree
Electrical Characteristics	Interface	2 port LVDS	
	Color Depth	16.7 Million	color
	Power Consumption	LCD:2200（TBD） Backlight:8120（TBD）	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
LCD Module connector	MDF76KBW-30S-1H(56)

Table 3.1.1 Connector information

No	Symbol	I/O	Description	Comment
1	DA0-	I	Odd pixel data 0, negative	
2	DA0+	I	Odd pixel data 0, positive	
3	DA1-	I	Odd pixel data 1, negative	
4	DA1+	I	Odd pixel data 1, positive	
5	DA2-	I	Odd pixel data 2, negative	
6	DA2+	I	Odd pixel data 2, positive	
7	GND	P	Ground	
8	CLKA-	I	Odd pixel clock, negative	
9	CLKA+	I	Odd pixel clock, positive	
10	DA3-	I	Odd pixel data 3, negative	
11	DA3+	I	Odd pixel data 3, positive	
12	DB0-	I	Even pixel data 0, negative	
13	DB0+	I	Even pixel data 0, positive	
14	GND	P	Ground	
15	DB1-	I	Even pixel data 1, negative	
16	DB1+	I	Even pixel data 1, positive	
17	GND	P	Ground	
18	DB2-	I	Even pixel data 2, negative	
19	DB2+	I	Even pixel data 2, positive	
20	CLKB-	I	Even pixel clock, negative	
21	CLKB+	I	Even pixel clock, positive	
22	DB3-	I	Even pixel data 3, negative	
23	DB3+	I	Even pixel data 3, positive	
24	GND	P	Ground	
25	GND	P	Ground	
26	GND	P	Ground	
27	GND	P	Ground	
28	VCC	P	Power supply	
29	VCC	P	Power supply	
30	VCC	P	Power supply	

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.

3.2 CN2 Pin assignment (BL Interface)

Connector Information	
LCD BL connector	DF19L-14P-1H(52)

Table 3.2.1 Connector information

No	Symbol	I/O	Description	Comment
1	VDD	P	Power supply (12V)	
2	VDD	P	Power supply (12V)	
3	VDD	P	Power supply (12V)	
4	VDD	P	Power supply (12V)	
5	VDD	P	Power supply (12V)	
6	GND	P	Ground	
7	GND	P	Ground	
4	GND	P	Ground	
8	GND	P	Ground	
9	GND	P	Ground	
10	GND	P	Ground	
11	RSVD	N	Keep this pin open.	
12	BRTC	I	Backlight ON/OFF control	
13	PWM	I	Luminance control	
14	GND	P	Ground	

Table 3.2.2 Pin Assignment for BL Interface

4. Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.3	3.6	V	Note1
BL_POWER Input	VDD	-0.3	45	V	
BL_PWM signal input	PWM	-0.3	5.6	V	
BL ENABLE	BRTC	-0.3	5.6	V	
Operating Temperature	Top	-20	70	℃	
Storage Temperature	Tst	-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/m³	Ta＞70℃

Table 4.1.1 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 DC Characteristics for Panel Driving

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Power Supply for LCD	VCC	3.2	3.3	3.4	V	
Power supply current	ICC	-	TBD	-	mA	Test at White pattern at VCC= 3.3V
Permissible ripple voltage	VRPC	-	-	100	mVpp	for VCC Note2, Note3,
VCC inrush current	IVCC_inrush	-	TBD	-	A	for VCC Note4

Table 5.1.1 Operating Voltages

Note1: Indicated the subsequent version may be updated.
Note2: The permissible ripple voltage includes spike noise.
Note3: The load variation influence does not include.
Note4: VCC rising time must be longer than 0.5ms.

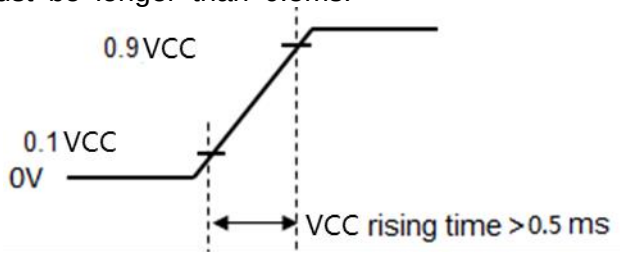


Figure 5.1.1 VCC rising time

5.2 DC Characteristics for Backlight Driving

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Backlight power supply voltage		VDD	11.5	12	12.5	V	56 LEDs (8 LED Parallel,7 LED Serial)
Backlight power supply current		I_{VDD}	-	TBD		mA	
Backlight power consumption		P_{VDD}	-	TBD		mW	
Input voltage for PWM signal	High level	-	1.2	-	-	V	
	Low level	-	-	-	0. 52	V	
Input voltage for BRTC	High level	-	1.5	-	-	V	
	Low level	-	-	-	0.8	V	
PWM frequency		F_{PWM}	100	-	10k	HZ	
VLED_PWM duty		D	3		100	%	
VDD inrush current		IVDD_inrush	-	TBD	-	A	
LED life time		-	-	50000		H	

Table 5.2.1 LED Backlight Characteristics

Note1: I_F is defined for each channel.
Note2: Optical performance should be evaluated at Ta=25℃ only.
Note3: If LED is driven by high current, high ambient temperature & humidity condition,The life time of LED will be reduced.
Note4: Operating life means brightness goes down to 50% of initial brightness. Typical operating life time is estimated data.
Note5: VDD rising time must be longer than 0.5ms.

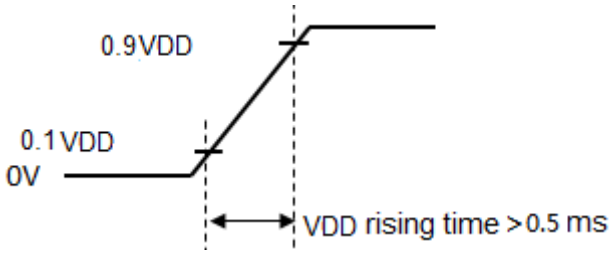


Figure 5.2.1 VDD rising time

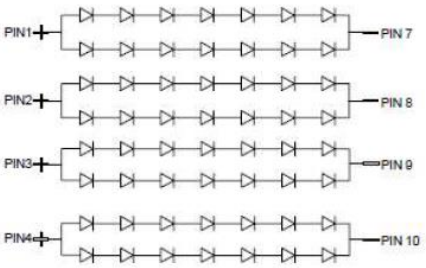


Figure 5.2.2 BL LED

5.3 Recommended Power ON/OFF Sequence

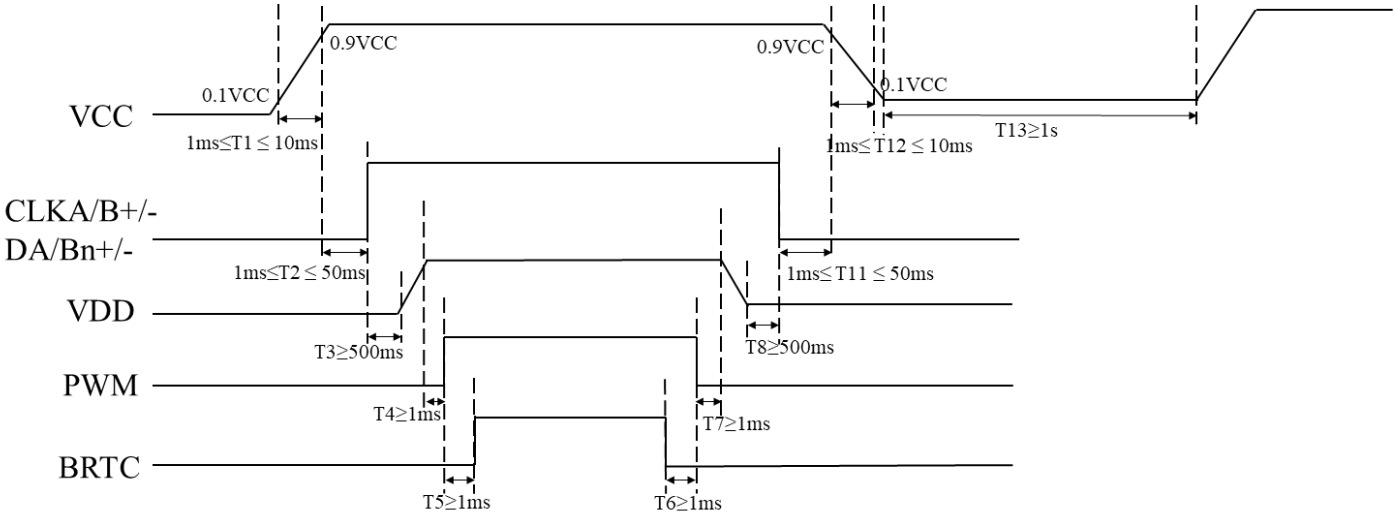


Figure 5.3.1 Power ON/OFF Sequence

Note1: The low level of these signals and analog powers are GND level.
Note2: All of the power and signals should be kept at GND level before power on. If there are residual voltages on them, the LCD might not work properly.
Note3: The power on/off sequence is the first version. It will be updated when the design is fixed.
Note4: VDD is the voltage applied to backlight. Keep it turned off until the display has stabilized.

5.4 LCD Module Block Diagram

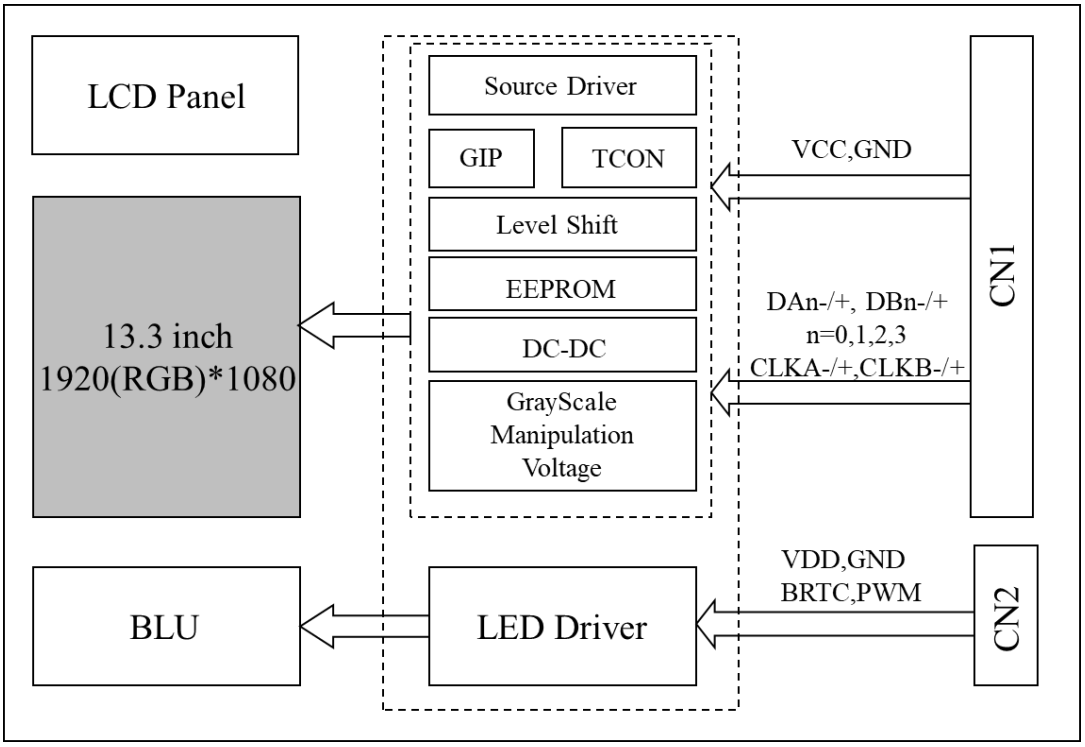


Figure 5.4.1 LCD Module Block Diagram

5.5 FUSE

Parameter	Fuse		Rating	Fusing Current/Fusing Time (at 25 ℃)	
	Type	Supplier			
VCC	F0603HI2000V032T	AEM	32V 2A	4 A	1 seconds(min) 60 seconds(max)
VDD	F0603HI2000V032T	AEM	32V 2A	4 A	1 seconds(min) 60 seconds(max)

6. Timing Characteristics

6.1 Timing Characteristics

	Item	Description	WUXGA (1920x1080)			Unit
			Min	Typ	Max	
Frame	TV-Total	V total line number	1088	1230	4096	Line
	TV-Active	Data duration		1080		Line
	TV-Blank	V-Blank	8			
Line	TH-Total	H total pixel number	1980	2080	2080	CLK
	TH-Active	Data duration		1920		CLK
	TH-Blank	H-Blank	60			

Note:

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

Table 6.1.1 SUPPORTED INPUT TIMING TABLE

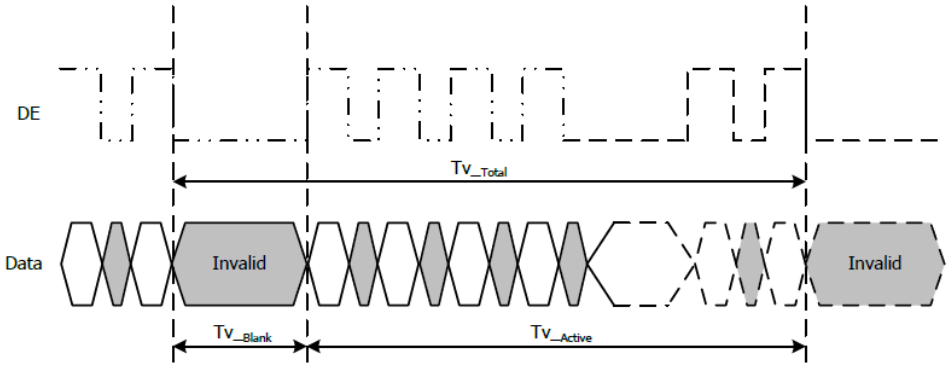


Figure 6.1.1 Vertical Input Timing

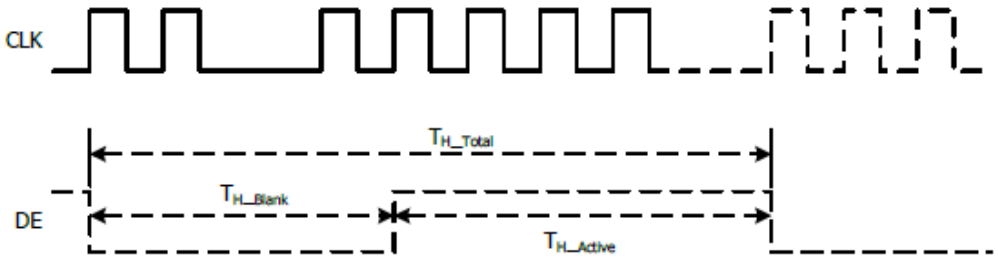


Figure 6.1.2 Horizontal Input Timing

6.2 Input Signal Timing Chart

6.2.1 LVDS DC SPECIFICATION

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
LVDS Input High Threshold	V_{TH}	V_{CMLVDS} = 1.2V			+100	mV
LVDS Input Low Threshold	V_{TL}	V_{CMLVDS} = 1.2V	-100			mV
Single-End Input Voltage Range	V_{IN}		0		VCC_LVDS	V
LVDS Input Common Mode Voltage	V_{CMLVDS}			1.2	VCC_LVDS-0.4-|VID|/2	V
Differential Input Voltage	$\|V_{ID}\|$		100		600	mV

Table 6.2.1 LVDS DC SPECIFICATION

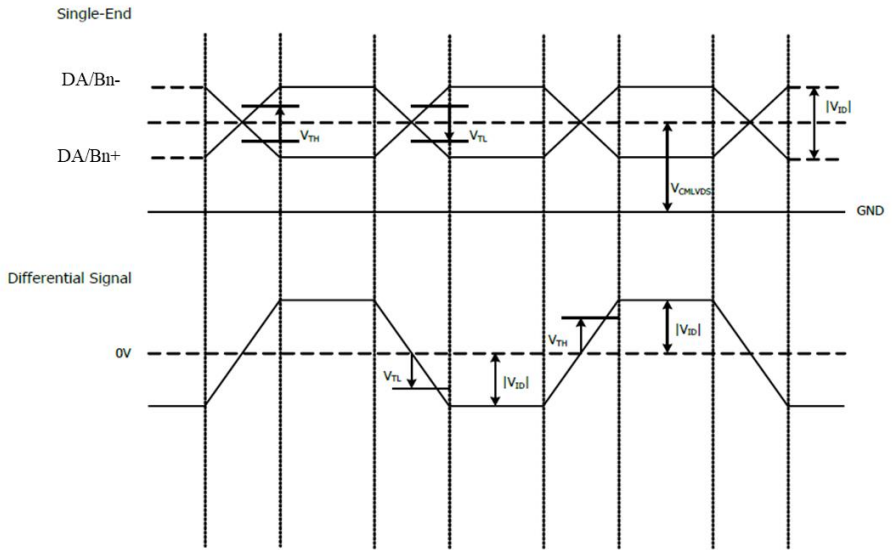


Figure 6.2.1 LVDS Waveform

6.2.2 LVDS AC SPECIFICATION

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Clock Period	tLVCP		9.5	T	25	ns
Clock Frequency	1/tLVCP		40		105	MHz
Clock High Time	tLVCH			4T/7		ns
Clock Low Time	tLVCL			3T/7		ns
Strobe Width	tSW	V_{CMLVDS} =1.2V |VID|=400mV @65MHz	200			ps
Receiver Strobe Margin	tRSM		400			ps

Table 6.2.1 LVDS AC SPECIFICATION

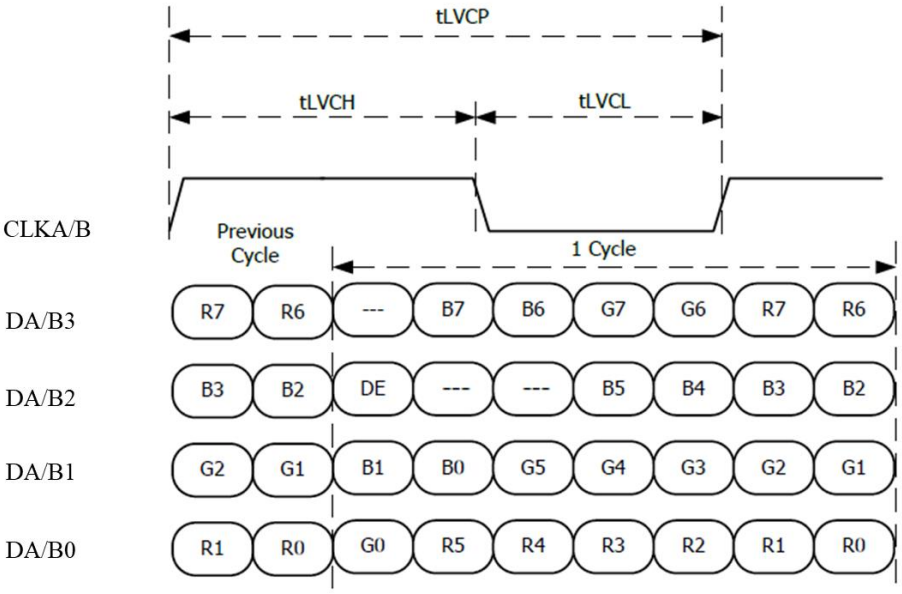


Figure 6.2.2 LVDS Clock Period with VESA(Non-JEDIA) Format

7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10		88	-	degree	Note2,3
		θB			88	-		
		θL			88	-		
		θR			88	-		
Contrast Ratio		CR	θ=0°	700	1000	-		Note 3
Response Time		T_{ON}	25℃	-	25	35	ms	Note 4
		T_{OFF}						
Chromaticity	**White**	x	Backlight is on	0.243	0.293	0.343		Note 1,5
		y		0.253	0.303	0.353		
	Red	x		0.586	0.636	0.686		Note 1,5
		y		0.291	0.341	0.391		
	Green	x		0.28	0.33	0.38		Note 1,5
		y		0.575	0.625	0.675		
	Blue	x		0.103	0.153	0.203		Note 1,5
		y		0.024	0.074	0.124		
Uniformity		U		75		-	%	Note 6
NTSC		-		67	72	-	%	Note 5
Luminance		L		480	600		cd/m^2	Note 7

Test Conditions:

1. I_F= **400** mA, and the ambient temperature is 25℃.
2. The test systems refer to Note1 and Note2.
3. Viewing Angle and Response Time test method follow the normal LCD test method.

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

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

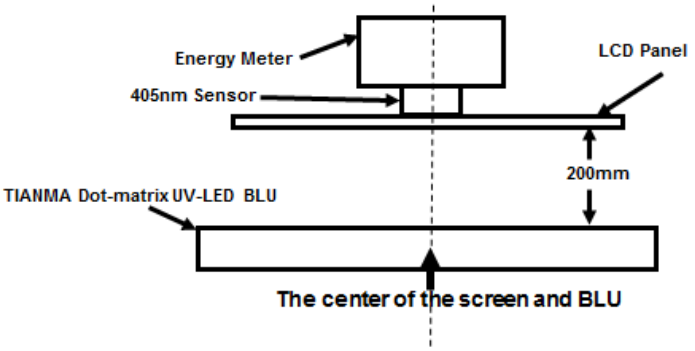


Fig.1

(2)Test instrument and recipe.

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

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

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

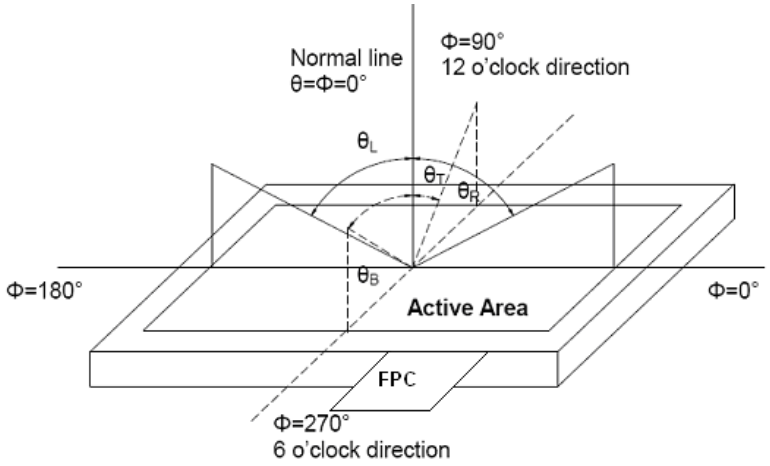


Fig.2

Note 3: Definition of contrast ratio

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

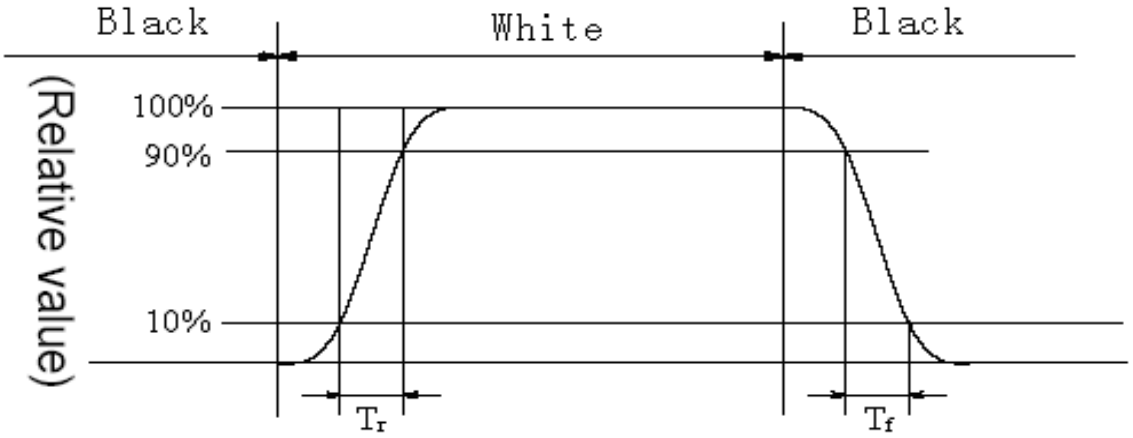
"White state ": The state is that the LCD should be driven by Vwhite.

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

Vwhite: To be determined Vblack: To be determined.

Note 4: Definition of Response time

The response time is defined as the LCD optical switching time interval between "White" state and "Black" state. Rise time (T_{ON}) is the time between photo detector output intensity changed from 10% to 90%. And fall time (T_{OFF}) is the time between photo detector output intensity changed from 90% to 10%.

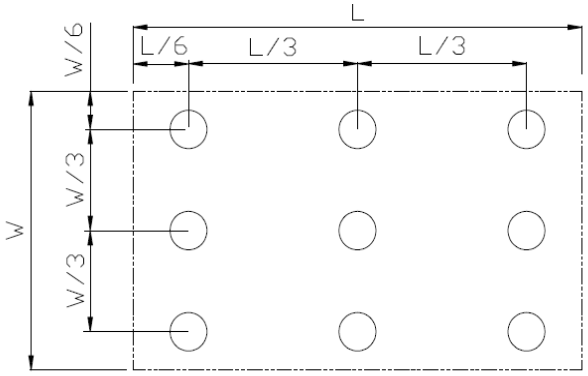


Note 5: Definition of Energy Uniformity

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

Energy Uniformity (U) = Emin / Emax

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



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

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

Note 6: Definition of transmittance:

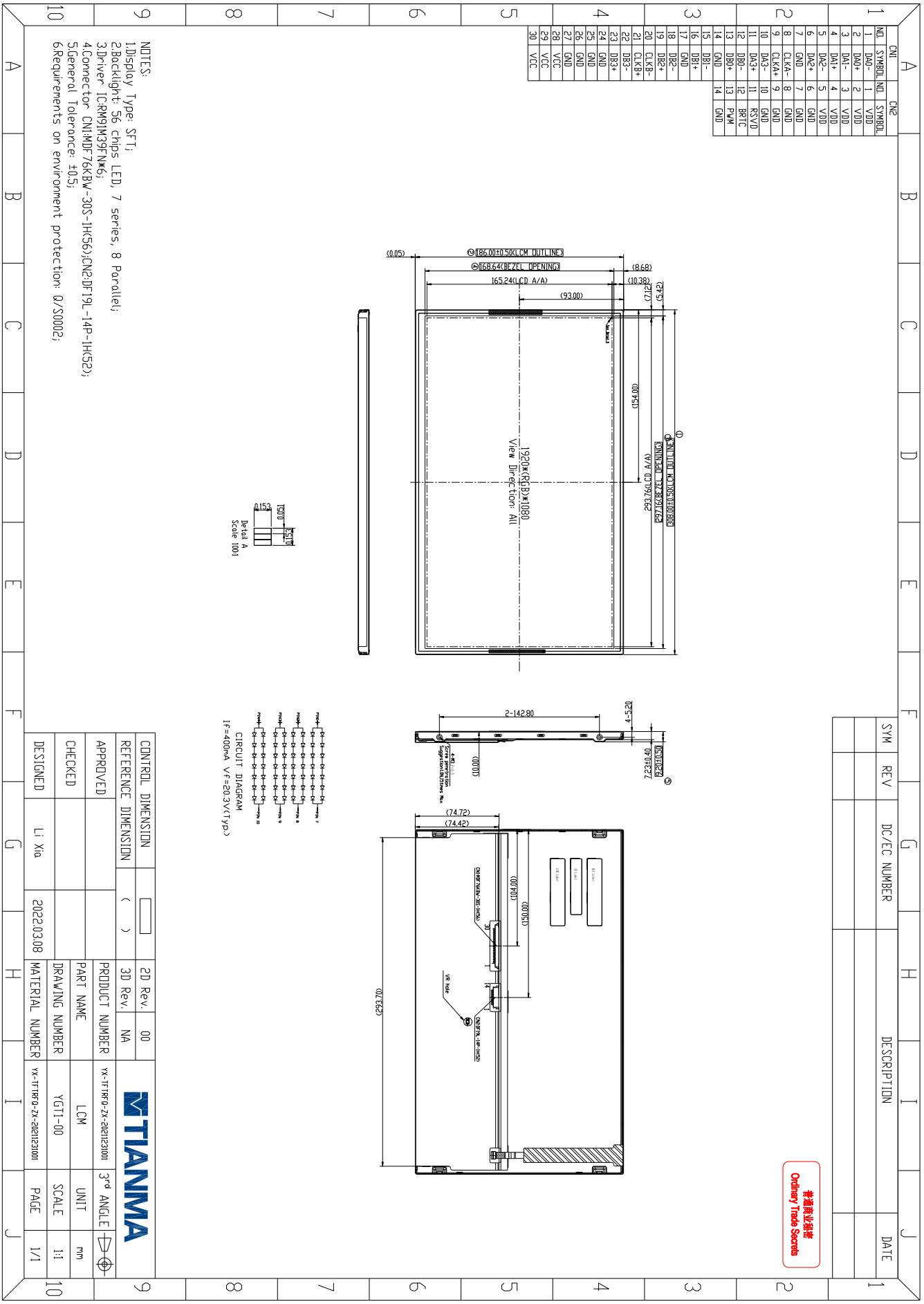
$$\text{Transmittance} = \frac{\text{Energy value measured when LCD is on the “White” state}}{\text{Energy value measured from BLU}}$$

Reliability Test

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

Note1: Ts is the ambient temperature of sample
Note2: Ta is the ambient temperature of sample.
Note3: Before cosmetic and function test, the product must have enough recovery time, at least 24 hours at room temperature.
Note4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

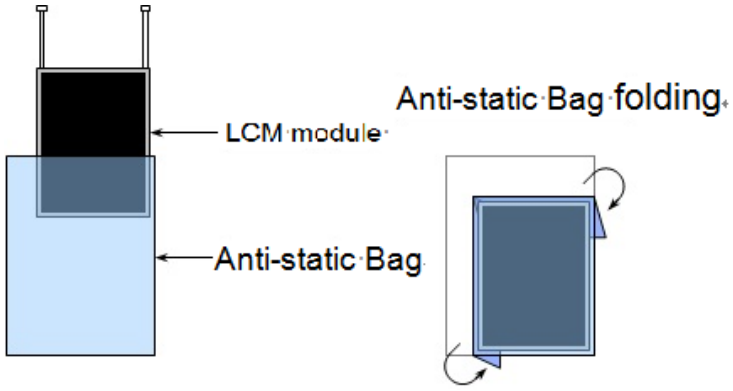
8. Mechanical Drawing



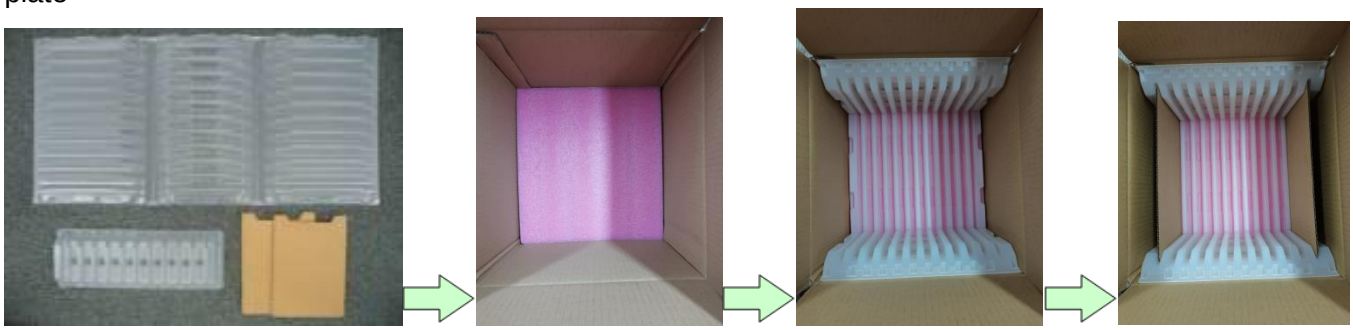
9. Packing Instruction

No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM module	P1330FHF1MB10	308x186x9.77	0.5605	10	
2	Partition board	Corrugated paper	308x186	0.033	2	
3	Anti-static Bag	LD-PE	360x255	0.021	10	
4	Base tray	PP	330×811×42	0.305	1	
5	Top tray	PP	355×330×42	0.135	1	
6	Carton	Corrugated paper	360×335×253	1.01	1	
7	EPE	EPE	356×331×20	0.047	1	
8	Barcode Label	Paper	52x100	0.001	1	
9	Total weight	7.38kg±10%				

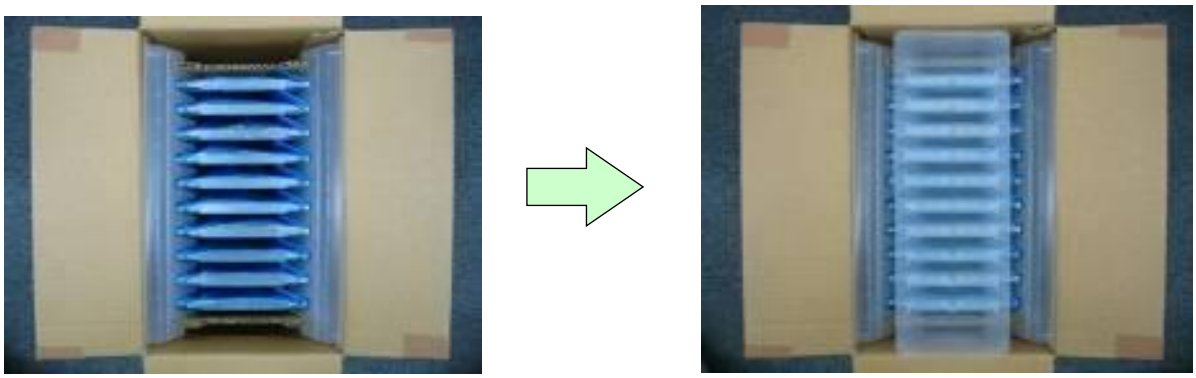
1、Put the LCM module into the packaging bag



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



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



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

10. 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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