SPECIFICATION

[ ] Preliminary Specification
[◉] Final Specification

Description **10.1” 1280xRGBx800 TFT-LCD Module**

Part Number **P1010WXF1ME20**

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

REVISION HISTORY

Rev	Date	Page	Revision Items	Editor
2.0	2024-07-11	-	First release	Tingting Hou
2.1	2024-10-18		Update Mechanical Drawing in page 17	Tingting Hou

CONTENTS

1. Summary

1.1 General Description

This is a 10.1 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
- Interface: LVDS 8-bit
- 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	10.1 inches	
	Resolution	1280xRGBx800	
	Pixel Pitch	0.1695x0.1695	mm
	TFT Active Area	216.96 x 135.60	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	SFT, Normally Black	
	Surface Treatment	HC	
	Viewing Direction	ALL	
	Gray Scale Inversion Direction	No Gray Scale Inversion Direction	
Mechanical Characteristics	LCM (W x H x D)	229.46 x 149.10 x 5.00(with PCB)	mm
	Weight	192	g
Optical Characteristics	Luminance	400	cd/m^2
	Contrast Ratio	800:1	
	NTSC	50	%
	Viewing Angle	85/85/85/85	degree
Electrical Characteristics	Interface	LVDS 8-bit	
	Color Depth	16.7 Million	color
	Power Consumption	LCD:614.4 typ; Backlight:1980 typ	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
LCD Module connector	196534-40041-3

Table 3.1.1 Connector information

Pin	Symbol	I/O	Description	Remark
1	NC	-	No Connect	
2	VDD	P	Power Supply	
3	VDD	P	Power Supply	
4	NC	-	No Connect	
5	NC	-	No Connect	
6	NC	-	No Connect	
7	GND	P	Ground	
8	Rxin0-	I	-LVDS differential data input	R0~R5,G0
9	Rxin0+	I	+LVDS differential data input	
10	GND	P	Ground	
11	Rxin1-	I	-LVDS differential data input	G1~G5,B0,B1
12	Rxin1+	I	+LVDS differential data input	
13	GND	P	Ground	
14	Rxin2-	I	-LVDS differential data input	B2~B5,DE
15	Rxin2+	I	+LVDS differential data input	
16	GND	P	Ground	
17	RxCLK-	I	-LVDS differential clock input	LVDS clock
18	RxCLK+	I	+LVDS differential clock input	
19	GND	P	Ground	
20	Rxin3-	I	-LVDS differential data input	R6,R7,G6,G7, B6,B7
21	Rxin3+	I	+LVDS differential data input	
22	GND	P	Ground	
23	NC	-	No Connect	
24	NC	-	No Connect	
25	GND	P	Ground	
26	NC	-	No Connect	
27	NC	-	No Connect	
28	NC	-	No Connect	

29	AVDD	P	Power for Analog Circuit	
30	GND	P	Ground	
31	LED-	P	LED Cathode	
32	LED-	P	LED Cathode	
33	NC	-	No Connect	
34	NC	-	No Connect	
35	VGL	P	Gate OFF Voltage	
36	NC	-	No Connect	
37	NC	-	No Connect	
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, NC---No connection
Note2: All of the GND pins should be connected to the system ground.

4. Absolute Maximum Ratings

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VDD	-0.3	3.9	V	
LVDS supply voltage	VDD_LVDS	-0.3	3.9	V	Note1
Power For Analog Circuit	AVDD	-0.3	14	V	
Gate On Voltage	VGH	-0.3	42	V	
Gate Off Voltage	VGL	VGH-42	0.3	V	
Operating Temperature	Top	-10	50	℃	
Storage Temperature	Tst	-20	60	℃	
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 Absolute Maximum Ratings

Note1: Input voltage include Rxin0-/ Rxin0+、Rxin1-/ Rxin1+、Rxin2-/ Rxin2+、Rxin3-/ Rxin3+、RxCLK-/ RxCLK+.

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 Voltage		VDD	3.0	3.3	3.6	V	
Power For Analog Circuit		AVDD	12.8	13	13.2	V	
Gate On Voltage		VGH	22	23	24	V	
Gate Off Voltage		VGL	-7.5	-7.0	-6.5	V	
Input Signal Voltage	Low Level	VIL	GND	-	0.2xVDD	V	
	High Level	VIH	0.8xVDD	-	VDD	V	

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
Power Supply Current	I_{VDD}	VDD=3.3V	-	62	93	mA	
	I_{AVDD}	AVDD=13V	-	30	45	mA	
	I_{VGH}	VGH=23V	-	660	990	uA	
	I_{VGL}	VGL=-7.0V	-	660	990	uA	

Note1: White picture, frame rate 60Hz.

Table 5.1.1 Operating Voltages and Currents

5.2 DC Characteristics for Backlight Driving

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Forward Current	IF	--	220	330	mA	33 LEDs (11 LED Parallel,3 LED Serial)
Forward Current Voltage	VF	8.4	9.0	9.6	V	
Backlight Power Consumption	WBL	--	1980	—	mW	
LED life time	--	20000	30000	-	Hrs	

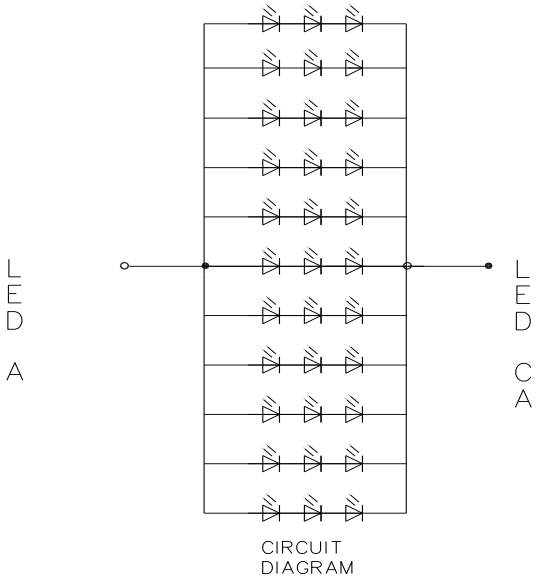
Table 5.2.1 LED Backlight Characteristics

Note1: I_F is defined for total channel current.

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.



5.3 Recommended Power ON/OFF Sequence

Power ON Sequence

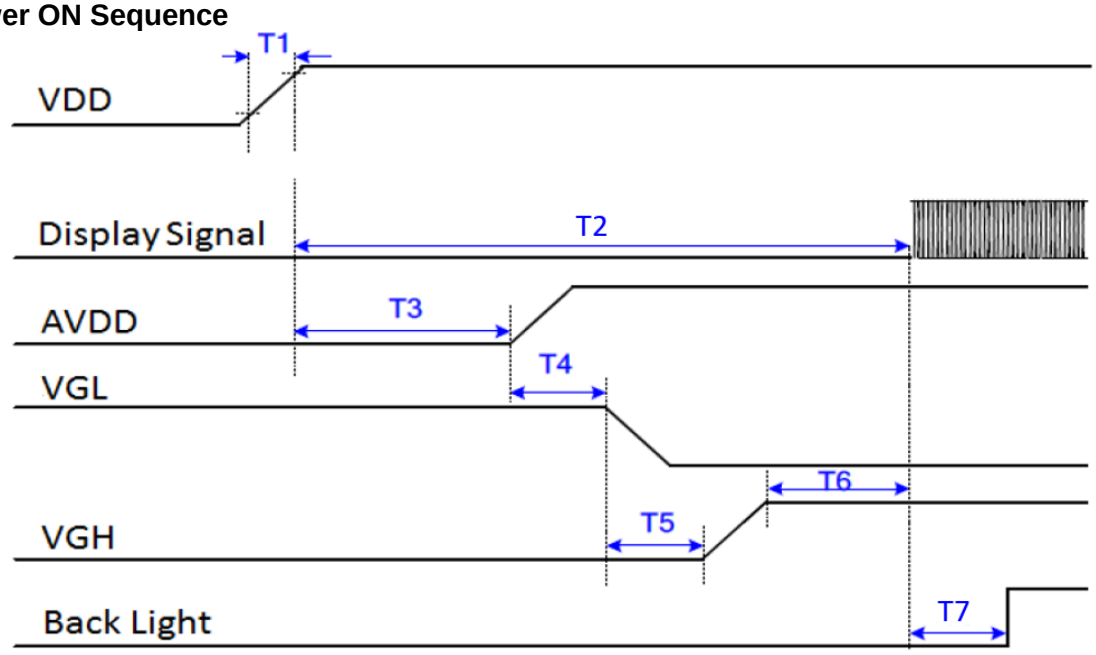


Figure 5.3.1 Power on sequence

T1	0.5ms≤T1≤3ms	VDD power on slew rate (0.1~0.9VDD)
T2	10ms≤T2≤50ms	VDD (0.9VDD)~Signal
T3	10ms≤T3≤35ms	VDD (0.9VDD)~AVDD
T4	T4＞0ms	AVDD~VGL
T5	T5＞0ms	VGL~VGH
T6	T6＞5ms	VGH (stable)~Signal
T7	T7＞200ms	Signal~ BL turn on

Power OFF Sequence

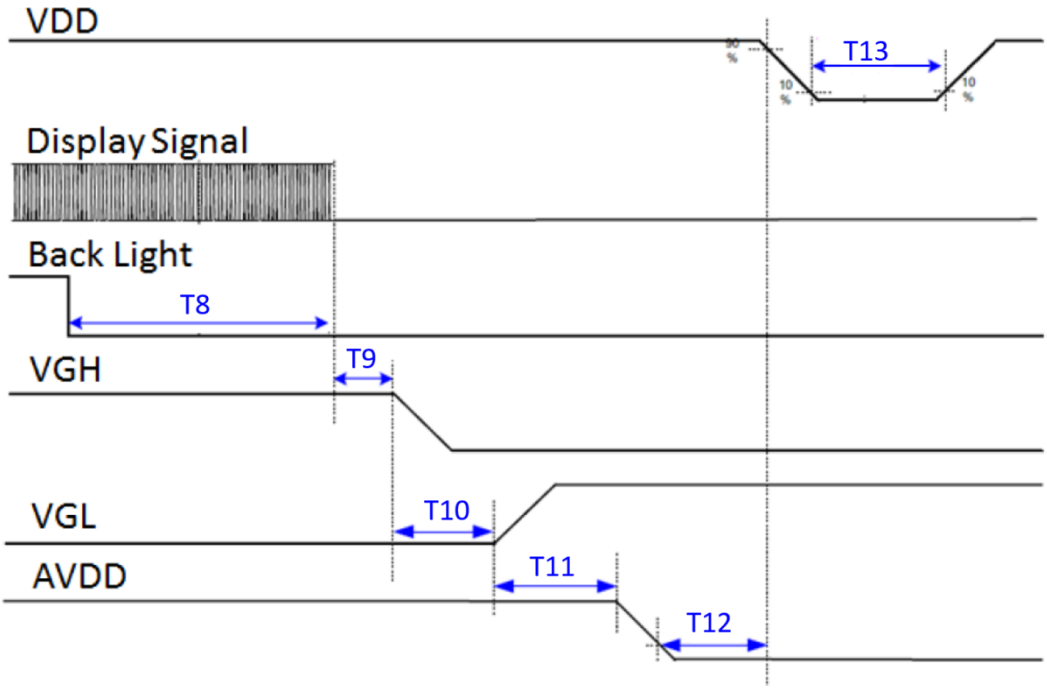


Figure 5.3.2 Power off sequence

T8	T8＞0ms	BL turn off ~ Signal
T9	T9＞0ms	Signal ~ VGH
T10	T10＞0ms	VGH ~ VGL
T11	T11＞0ms	VGL ~ AVDD
T12	T12＞1ms	AVDD(0.1AVDD) ~ VDD(0.9VDD)
T13	T13＞5000ms	All power off to next power on

5.4 LCD Module Block Diagram

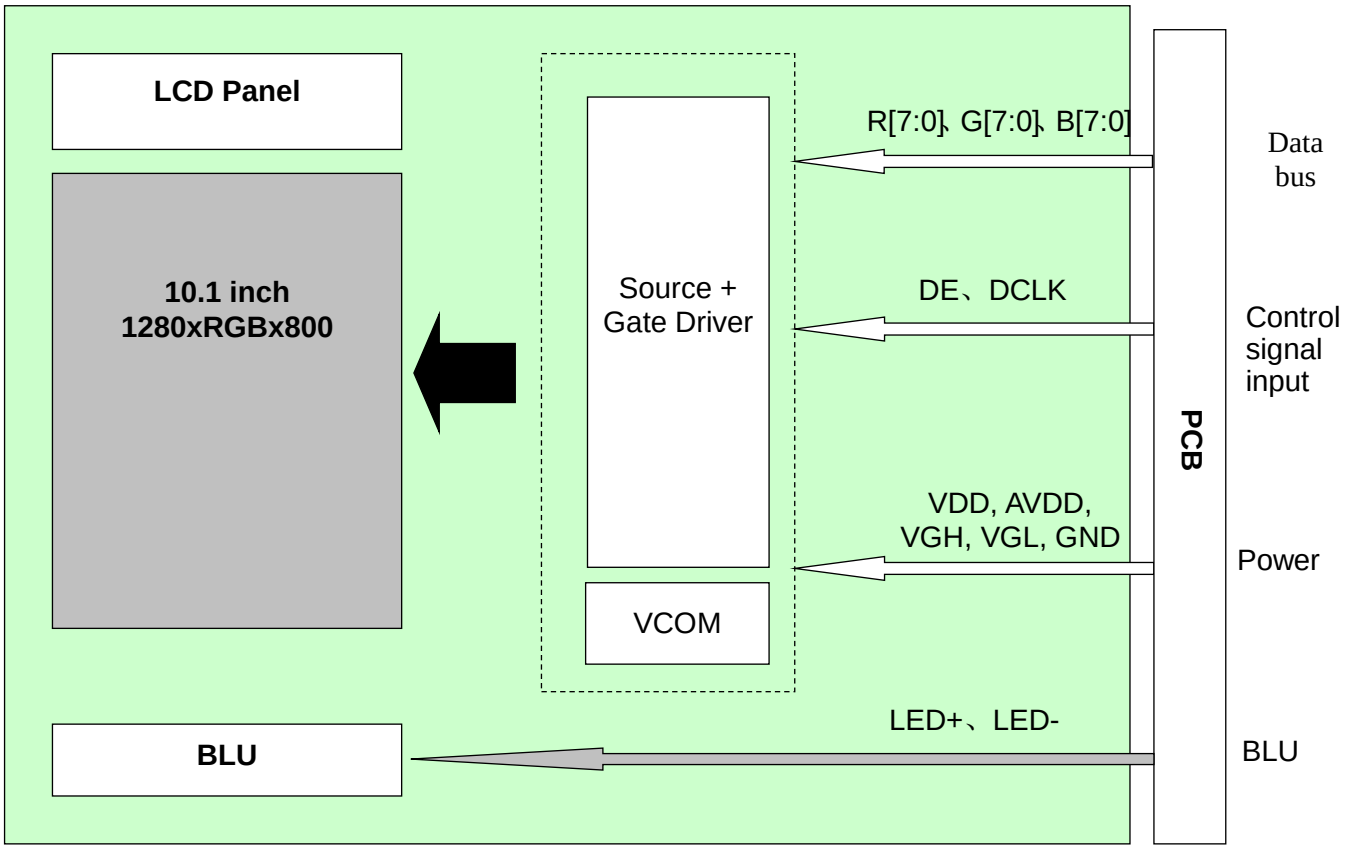


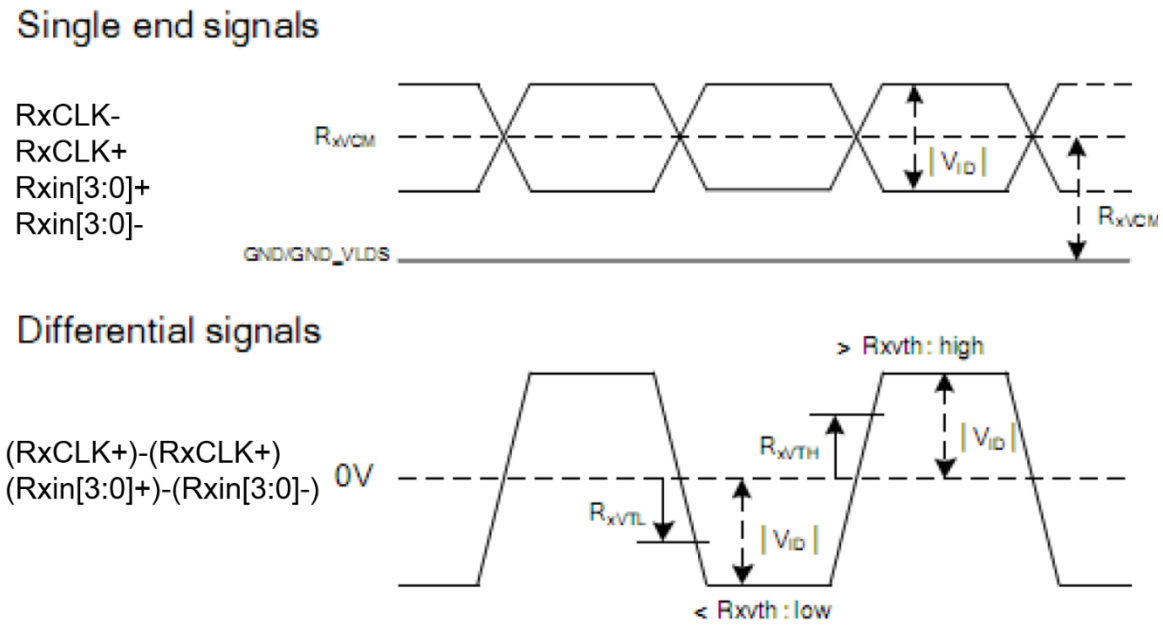
Figure 5.4.1 LCD Module Block Diagram

6. Timing Characteristics

6.1 LVDS signal timing characteristic

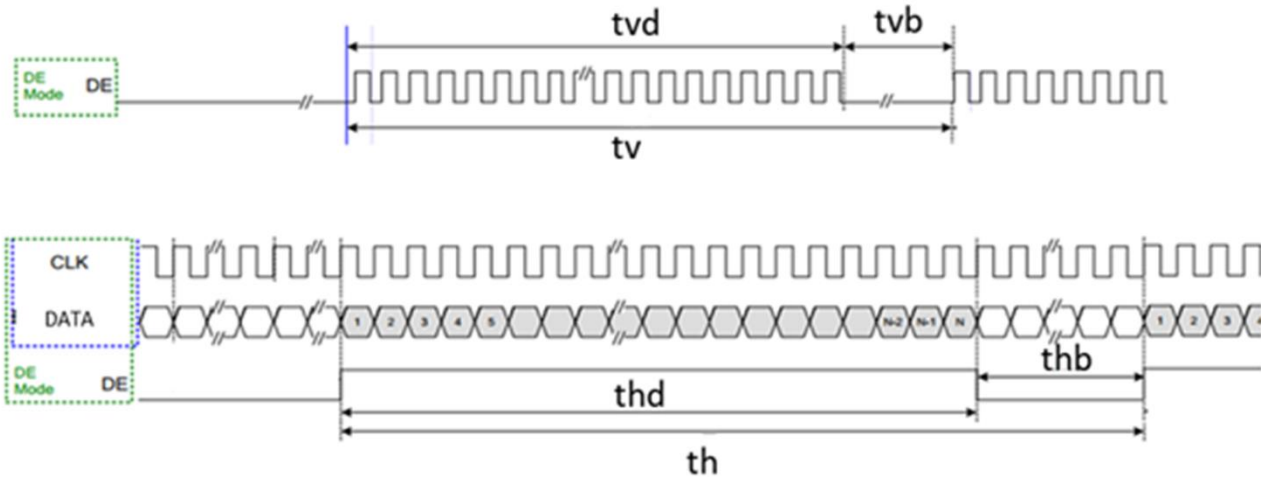
Electrical characteristics

Parameter	Symbol	Value			Unit	Note
		min	typ	max		
LVDS differential input high threshold voltage	R_{xVTH}	-	-	+100	**mV**	R_{xVCM}=1.2V
LVDS differential input low threshold voltage	R_{xVTL}	-100	-	-	**mV**	
LVDS differential input common mode voltage	R_{xVCM}	0.7	1.2	1.6	**V**	
LVDS differential voltage	V_{ID}	200	-	600	**mV**	



6.2 Timing table

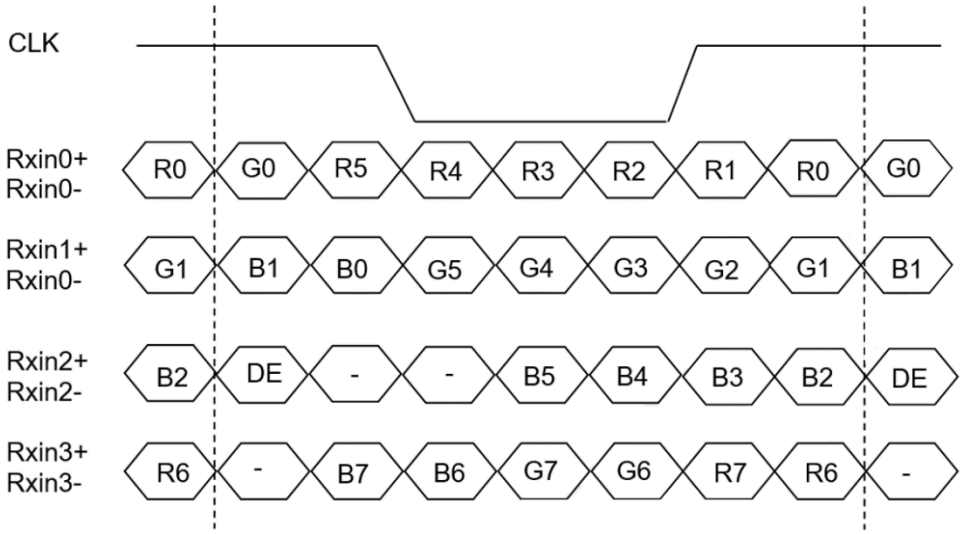
Parameter	Symbol	Value			Unit	Note
		min	typ	max		
CLK frequency	t_{clk}	70.1	71.9	74.9	Mhz	
Horizontal blanking time	t_{hb}	140	144	154	t_{clk}	
Horizontal display area	t_{hd}		1280		t_{clk}	
Horizontal period	t_h	1420	1424	1434	t_{clk}	
Vertical blanking time	t_{vb}	23	42	71	t_h	
Vertical display area	t_{vd}	800	800	800	t_h	
Vertical period	t_v	823	842	871	t_h	
Frame Rate	F		60		Hz	



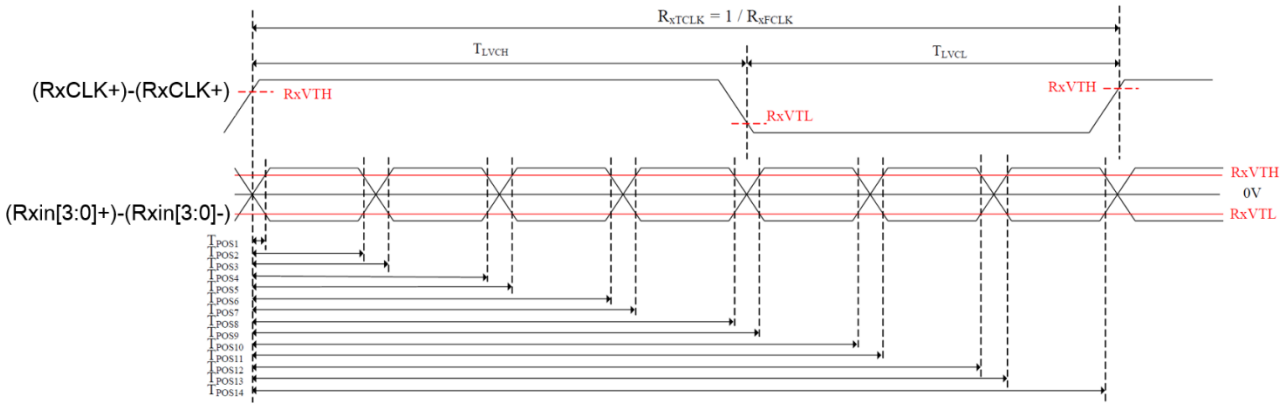
6.3 LVDS data input format

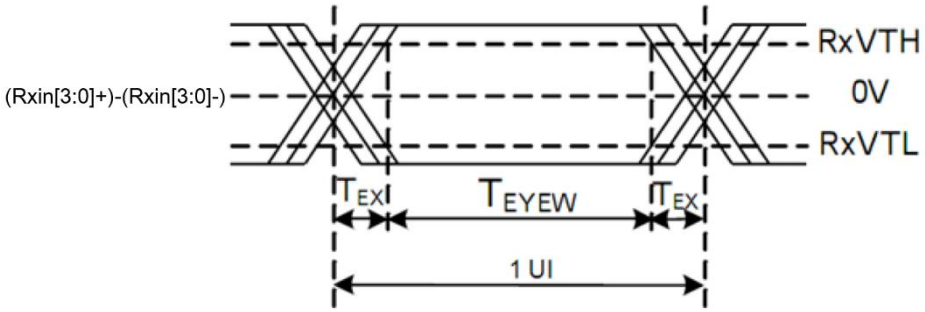
6.3.1 LVDS data mapping

8-bit mode data input



6.3.2 LVDS data input timming





Parameter	Symbol	Min.	Typ.	Max.	Unit
Clock period	R_{xTCLK}	13.3	-	14.3	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

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°	600	800			Note 3
Response Time		T_{ON}	25℃	-	25	50	ms	Note 4
		T_{OFF}						
Chromaticity	**White**	x	Backlight is on	0.250	0.300	0.350		Note 1,5
		y		0.274	0.324	0.374		
	Red	x		0.530	0.580	0.630-		Note 1,5
		y		0.274	0.324	0.374		
	Green	x		0.299	0.349	0.399		Note 1,5
		y		0.538	0.588	0.638		
	Blue	x		0.104	0.154	0.204		Note 1,5
		y		0.045	0.095	0.145		
Uniformity		U		75	80	-	%	Note 6
NTSC				45	50	-	%	Note 5
Luminance		L		350	400	-	cd/m^2	Note 7

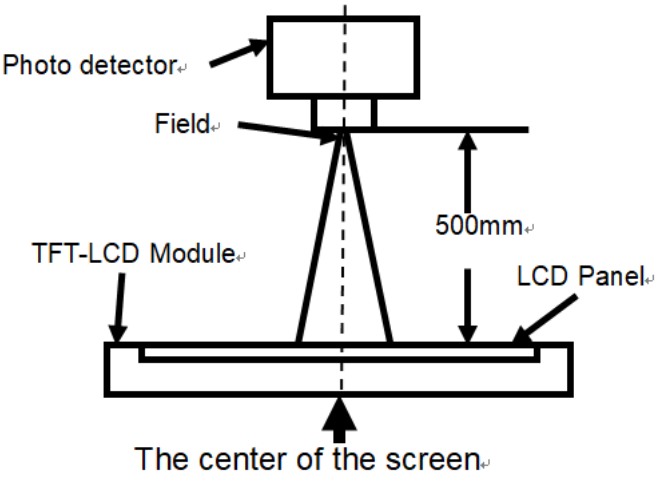
Table 7.1 Optical Parameters

Test Conditions:

1. I_F= 220 mA, and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

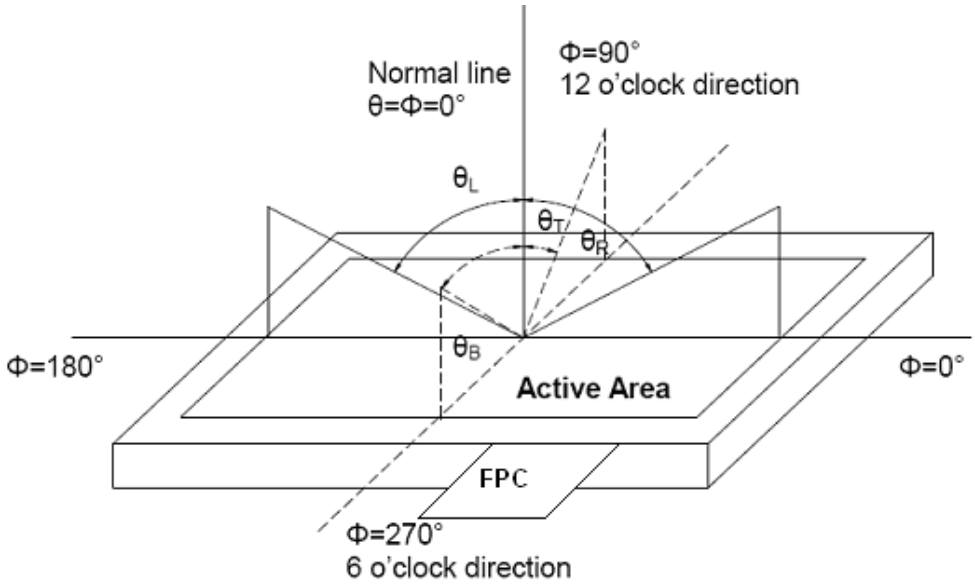
Note 1: Definition of optical measurement system.

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 by CONOSCOPE(ergo-80)。



Note 3: Definition of contrast ratio

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

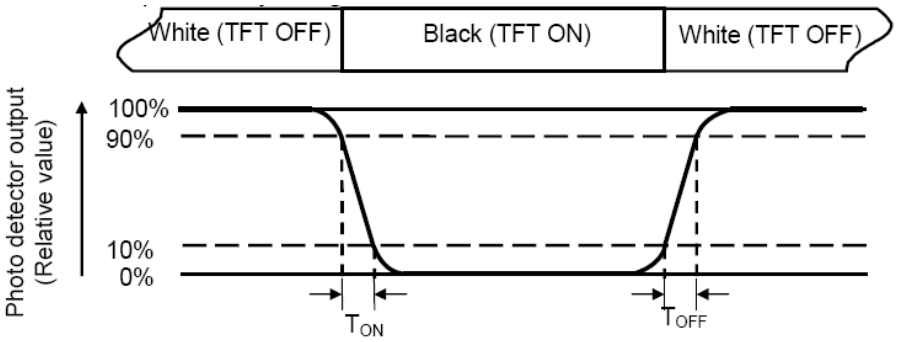
“White state “: The state is that the LCD should drive by Vwhite.

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



Note 5: Definition of color chromaticity (CIE1931)

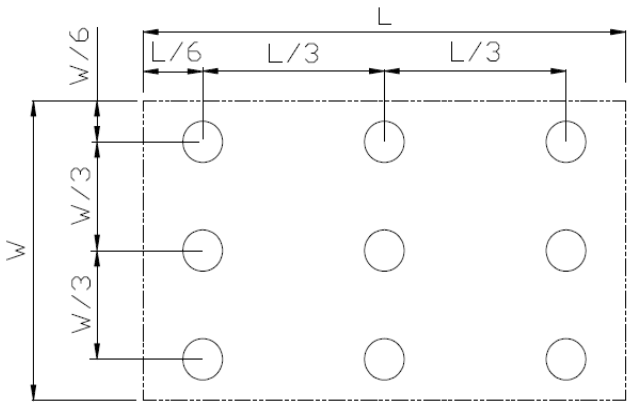
Color coordinates measured at center point of LCD.

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. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ts= +50℃,120hrs	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta= -10℃,120hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +60℃,120hrs	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -20℃,120 hrs	IEC60068-2-1:2007 GB2423.1-2008
5	Storage at High Temperature and Humidity	Ta=+40℃, 90% RH 120 hours	IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-10℃ 30 min~+50℃ 30 min, Change time:5min, 20 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2002
7	ESD	C=100pF, R=1500Ω,5points/panel Air:± 4KV, 5times, Contact:± 2KV, 5 times, （Environment: 15℃～35℃, 30%～60%, 86Kpa～106Kpa）	IEC61000-4-2:2001 GB/T17626.2-2006

Table 8.1 RA test condition

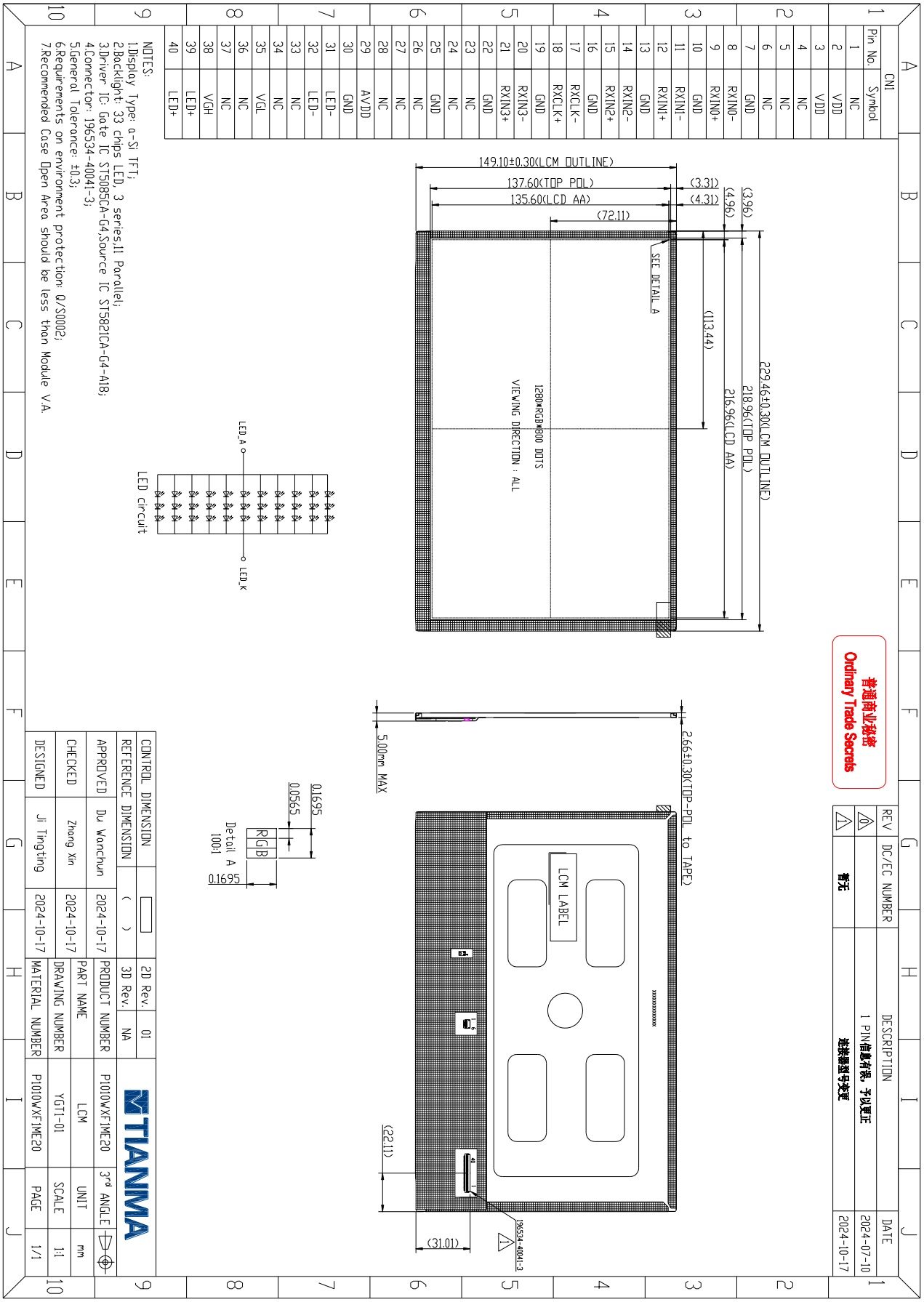
Note1: Ts is the temperature of panel's surface.

Note2: Ta is the ambient temperature of sample.

Note3: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

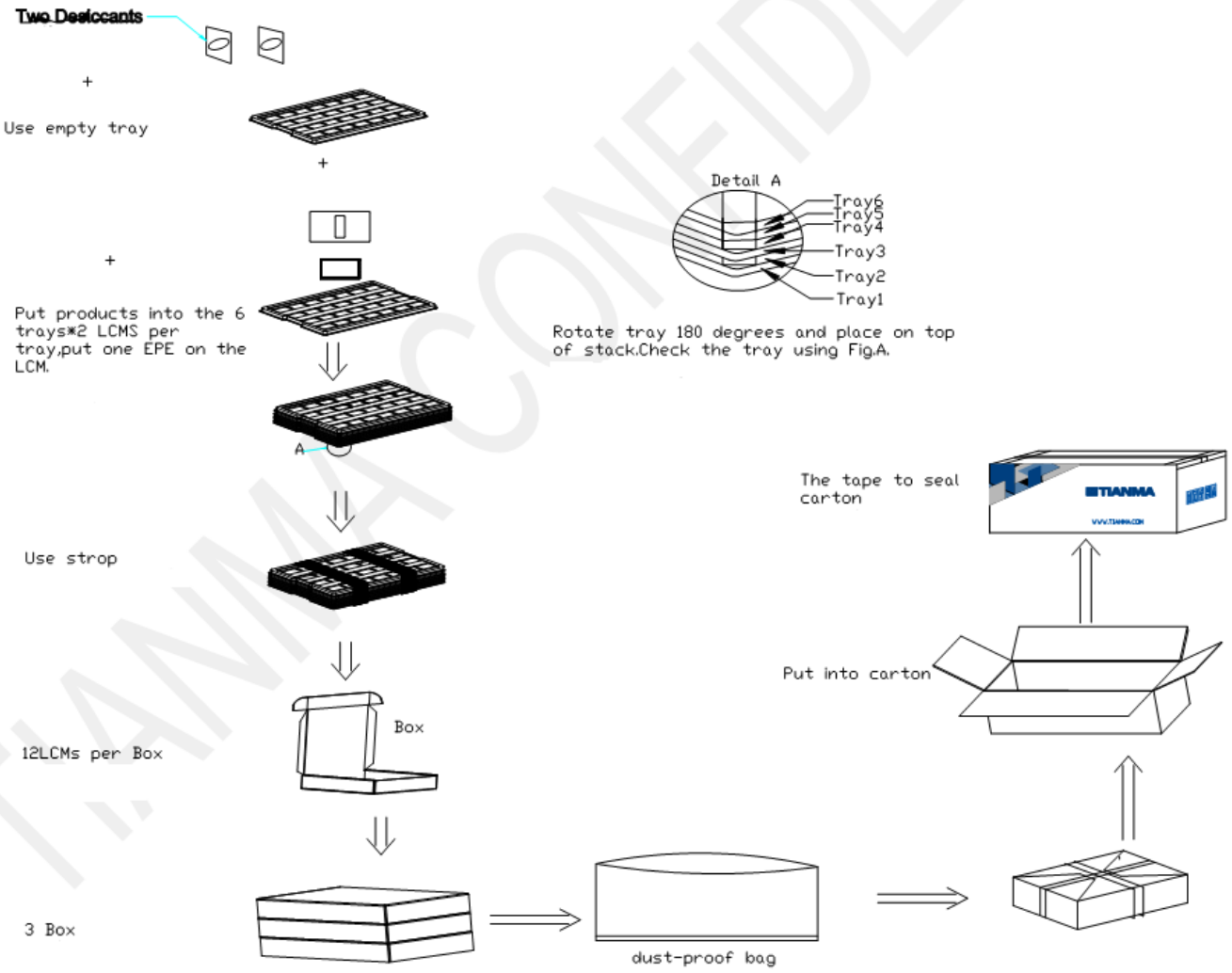
Note 4: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.

9. Mechanical Drawing



10. Packing Instruction

No	Item	Model (Materiel)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM Module	P1010WXF1ME20	229.46×149.1×5mm	0.192	36	
2	Tray	PET（Transmit）	485×330×13.8	0.196	21	
3	Dust-Proof Bag	PE	700×545	0.046	1	
4	BOX	Corrugated Paper	520×345×74	0.369	3	
5	Desiccant	Desiccant	45×50	0.002	6	
6	Carton	Corrugated Paper	544×365×250	0.76	1	
7	Label	Label	100*52	0.001	1	
8	EPE	EPE	349.4*228.06*1.0	0.0013	18	
9	Total Weight	13kg+-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.