SPECIFICATION

[◉] Preliminary Specification
[ ] Final Specification

Description **15.6” 1920xRGBx1080 TFT-LCD Module**
Part Number **P1560FHF3MB03**

Customer		Product Dept, PDBU Tianma Microelectronics Co., Ltd.	
Signatures	Date	Approved By	Date
		Longping Deng	2026/01/08
		Reviewed By	
		Longping Deng	2026/01/08
		Prepared By	
		Tong Zhang	2026/01/08
Comments:			

REVISION HISTORY

Rev	Date	Page	Revision Items	Editor
1.0	2025/8/6	-	Preliminary Specification Release	Tong Zhang
1.1	2025/8/12	-	Update Table 3.1.2 Pin Assignment Notes	Tong Zhang
1.2	2025/10/22	19	Update Chromaticity	Tong Zhang
1.3	2025/11/05	15	Update Mechanical Drawing	Tong Zhang
1.4	2026/01/08	16	Update Packing Instruction	Tong Zhang

CONTENTS

1. Summary

1.1 General Description

This is a 15.6 inch a - Si TFT LCD module with Normal - Black technology. It is composed of a TFT- LCD panel, a driver circuit, a PCB, and a LED backlight unit.

1.2 Features

- Ultra-wide viewing angle
- Interface: LVDS
- Surface treatment: AG
- Acquisition product for UL62368-1/CSA C22.2 No.62368-1-03 (File number: E333987)
- 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	15.6 inch	
	Resolution	1920 (RGB) x 1080	
	Pixel Pitch	0.17925 x 0.17925	mm
	TFT Active Area	344.16 x 193.59	mm
	Technology Type	a-Si	
	Pixel Configuration	R.G.B Vertical Stripe	
	Display Mode	SFT, Normally Black	
	Surface Treatment	AG	
	Viewing Direction	ALL	
Mechanical Characteristics	LCM (W x H x D)	363.8 x 215.91 x 9.1	mm
	Open Bezel	347.06 x 196.49	mm
	Weight	TBD	g
Optical Characteristics	Luminance	500	cd/m^2
	Contrast Ratio	1500 : 1	
	NTSC	72 Typ	%
	Viewing Angle	89 / 89 / 89 / 89	degree
Electrical Characteristics	Interface	LVDS	
	Color Depth	16.7 Million	color
	Power Consumption	LCD : TBD Backlight : TBD	mW

Table 2.1 General TFT Specifications

3. Input / Output Terminals

3.1 CN1 Pin assignment (LCD Interface)

Connector Information	
LCD Module Connector	I-PEX 20455-040E-66
Matching Connector	I-PEX 20453-040T-03 or equivalent.

Table 3.1.1 LCD Connector information

No	Symbol	I / O	Description	Comment
1	LED_VCC	P	Power Supply 12 V	
2	LED_VCC	P	Power Supply 12 V	
3	LED_VCC	P	Power Supply 12 V	
4	LED_VCC	P	Power Supply 12 V	
5	GND	P	Ground	
6	GND	P	Ground	
7	GND	P	Ground	
8	GND	P	Ground	
9	LED_EN	I	Backlight ON / OFF control	High: Backlight ON Low or Open： Backlight OFF
10	LED_PWM	I	Backlight Adjust	
11	LCD_VCC	P	Power Supply 3.3 V	
12	LCD_VCC	P	Power Supply 3.3 V	
13	LCD_VCC	P	Power Supply 3.3 V	
14	NC	N	No Connection	
15	NC（SCL）	N	No Connection. For TIANMA Internally use.	Note 3
16	NC（SDA）	N	No Connection. For TIANMA Internally use.	Note 3
17	NC	N	No Connection	
18	DA0-	I	Odd pixel data 0 -	
19	DA0+	I	Odd pixel data 0 +	
20	DA1-	I	Odd pixel data 1 -	
21	DA1+	I	Odd pixel data 1 +	

22	DA2-	I	Odd pixel data 2 -	
23	DA2+	I	Odd pixel data 2 +	
24	GND	P	Ground	
25	CLKA-	I	Odd pixel CLK -	
26	CLKA+	I	Odd pixel CLK +	
27	GND	P	Ground	
28	DA3-	I	Odd pixel data 3 -	
29	DA3+	I	Odd pixel data 3 +	
30	DB0-	I	Even pixel data 0 -	
31	DB0+	I	Even pixel data 0 +	
32	DB1-	I	Even pixel data 1 -	
33	DB1+	I	Even pixel data 1 +	
34	GND	P	Ground	
35	DB2-	I	Even pixel data 2 -	
36	DB2+	I	Even pixel data 2 +	
37	CLKB-	I	Even pixel CLK -	
38	CLKB+	I	Even pixel CLK +	
39	DB3-	I	Even pixel data 3 -	
40	DB3+	I	Even pixel data 3 +	

Table 3.1.2 Pin Assignment for LCD Interface

Note 1: I / O definition: I --- Input, O --- Output, P --- Power / Ground, N -- No connection

Note 2: All of the GND pins should be connected to the system ground.

Note 3: The Pin 15 and Pin 16 are dedicated interfaces for Tianma internal testing and debugging. They are not open for external use.

4. Absolute Maximum Ratings

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	LCD_VCC	0.3	3.63	V	
Power Voltage for signal	LVDD	- 0.3	3.63	V	Note 1
BL_POWER Input	LED_VCC	- 0.3	27	V	
BL_PWM signal input	LED_PWM	- 0.3	27	V	
BL ENABLE	LED_EN	- 0.3	27	V	
Operating Temperature	Top	- 20	70	℃	
Storage Temperature	Tst	- 20	70	℃	
Relative Humidity Note 2	RH	--	≤ 95	%	Ta ≤ 40℃
		--	≤ 85	%	40℃ ＜ Ta ≤ 50℃
		--	≤ 55	%	50℃ ＜ Ta ≤ 60℃
Absolute Humidity	AH	--	≤ 70	g/m³	Ta ＞ 60℃

Table 4.1 Absolute Maximum Ratings

Note 1: LVDD include DA0 ~ 3E+/-, DB0 ~ 3E+/-.

Note 2: 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.

Note 3: 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
Supply Voltage		LCD_VCC	3.2	3.3	3.4	V	
Input Signal Voltage	Low Level	VIL	0	--	0.3 × VCC	V	
	High Level	VIH	0.7 × VCC	--	VCC	V	
Output Signal Voltage	Low Level	VOL	0	--	0 + 0.4	V	
	High Level	VOH	VCC-0.4	--	VCC	V	
Power Consumption	60 Hz	P	--	TBD	--	mW	White pattern
VCC Inrush	Current	Inrush		TBD		A	

Table 5.1.1 Operating Voltages

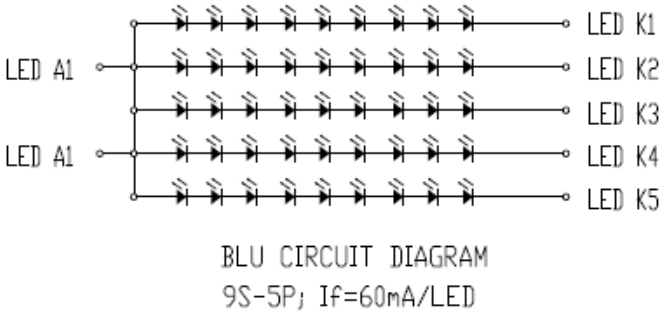
Note 1: Indicated the subsequent version may be updated.

5.2 DC Characteristics for Backlight Driving

Item		Symbol	Min	Typ	Max	Unit	Remark
Backlight power supply voltage		LED_VCC	11.5	12	12.5	V	
Backlight power supply current		I_LED	-	TBD	-	mA	
Backlight power consumption		P_LED	-	TBD	-	mW	
VL inrush current		Inrush	-	TBD	-	A	
Permissible ripple voltage		VRPD	-	TBD	-	V	
Input voltage for PWM signal	High level	-	2.0	-	5.3	V	
	Low level	-	0	-	0.8	V	
Input voltage for EN	High level	-	2.0	-	5.3	V	
	Low level	-	0	-	0.8	V	
PWM frequency		Fpwm	200	-	10 K	HZ	
PWM duty		D	1	-	100	%	
LED life time		--	--	50000	--	hrs	Note 2

Table 5.2.1 LED Backlight Characteristics

Note 1: The figure below shows the connection of backlight LED.

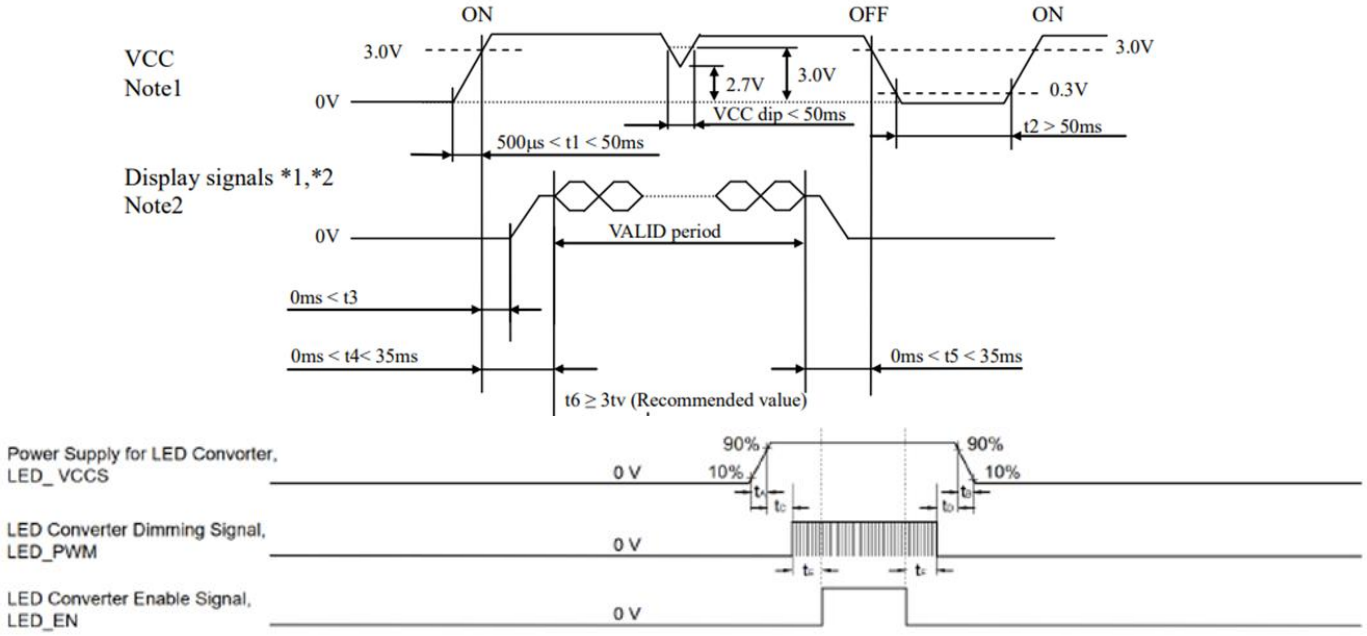


Note 2: Optical performance should be evaluated at Ta=25℃ only.

Note 3: If LED is driven by high current, high ambient temperature & humidity condition, the life time of LED will be reduced.

Note 4: 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



Item	Symbol	Min	Typ	Max	Unit	Remark
VCC on to VCC stable	t1	(0.5)	-	(50)	ms	
VCC off to next VCC on	t2	(50)	-	-	ms	
VCC stable to Signal on	t3	(0)	-	-	ms	
VCC stable to Signal stable	t4	(0)	-	(34)	ms	
Signal off to VCC of	t5	(0)	-	(35)	ms	
Signal stable to BL on	t6	(55)	-	-	ms	

Figure 5.3.1 Power on/off sequence

Note 1: If there is a voltage variation (voltage drop) at the rising edge of VCC below 3.0 V, there is a possibility that a product does not work due to a protection circuit.

Note 2: Display signals (DA0+/-, DA1+/-, DA2+/-, DA3+/-,CLKA+/-, DB0+/-, DB1+/-, DB2+/-, DB3+/-, CLKB+/-) must be set to Low or High-impedance, except the VALID period (See above sequence diagram), in order to avoid the circuitry damage. If some of display 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 signals, VCC also must be shut down.

Note 3: The power on/off sequence is only for reference. It will be updated when the design is fixed.

Note 4: VCC and LCD_VCC are the same signal

5.4 LCD Module Block Diagram

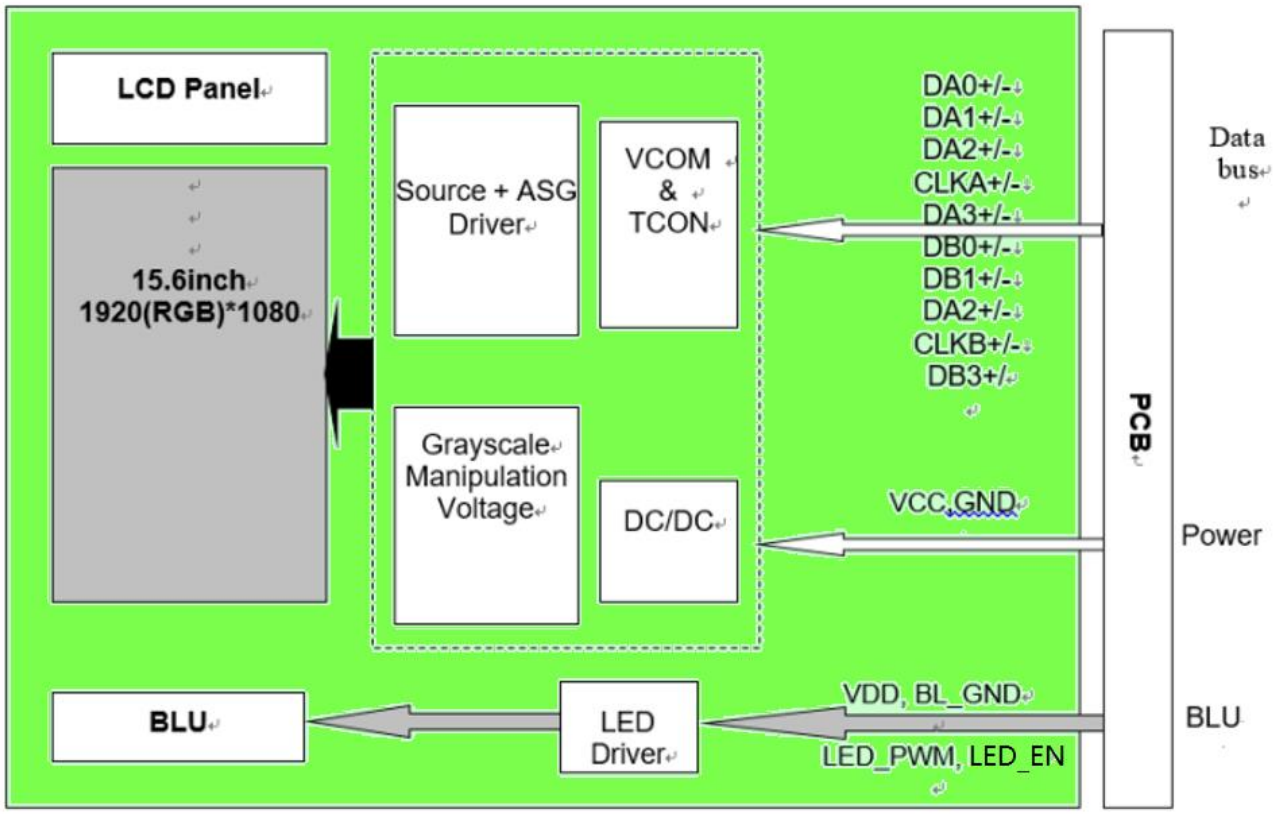
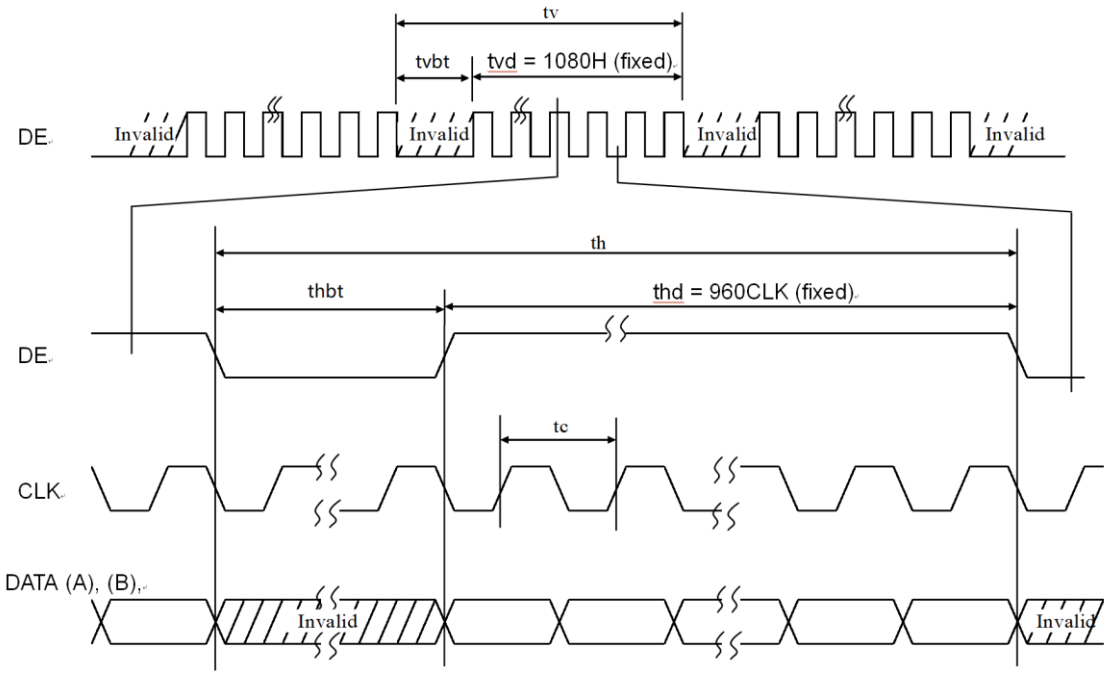


Figure 5.4.1 LCD Module Block Diagram

6. Timing Characteristics

6.1 Input Data Timing



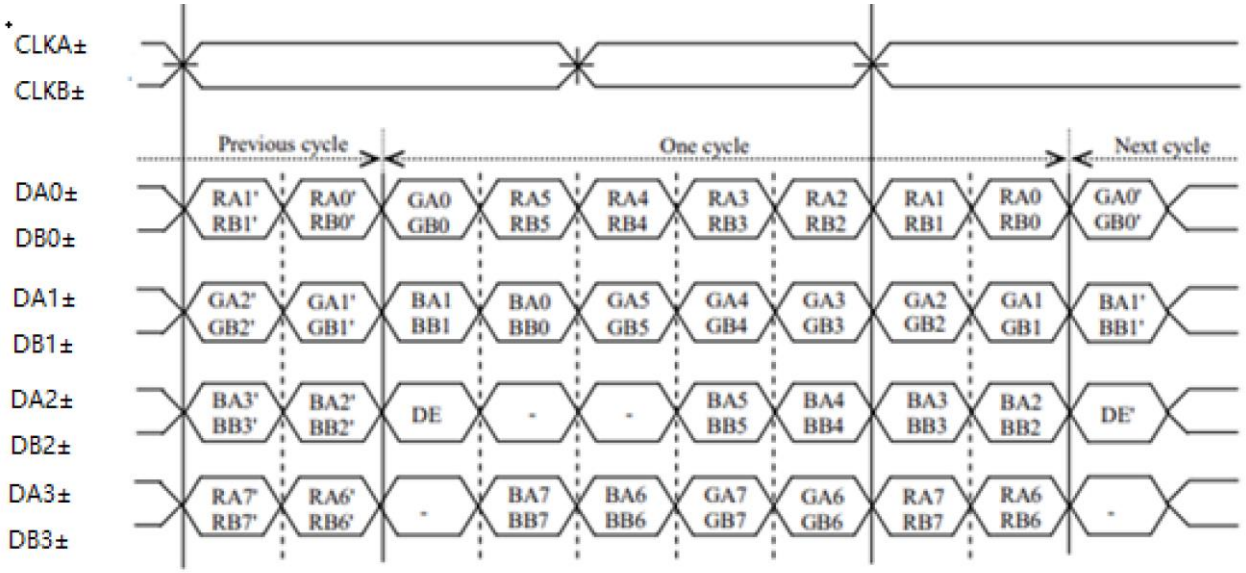
Parameter		Symbol	Min.	Typ.	Max.	Unit	Remarks
CLK	Frequency	Tclk	68.95	74.25	76.60	MHz	
Vertical Display Term	Frame Rate	Fr	60	60	60	Hz	
	V-Total	Tv	1105	1125	1140	th	
	V-Active	Tvd	-	1080	-	th	
	V-Blank	Tvb	25	45	60	th	-
Horizontal Display Term	H-Total	Th	1040	1100	1120	tc	
	V-Active	Thd	-	960	-	tc	-
	V-Blank	Thb	80	140	160	tc	

Table 6.1 AC characteristics Timing Characteristics

Note 1: Definition of parameters is as follows. tc= 1CLK, th= 1H

Note 2: Vertical cycle (tv) should be specified in integral multiple of Horizontal cycle (th).

6.2 Input Data Mapping

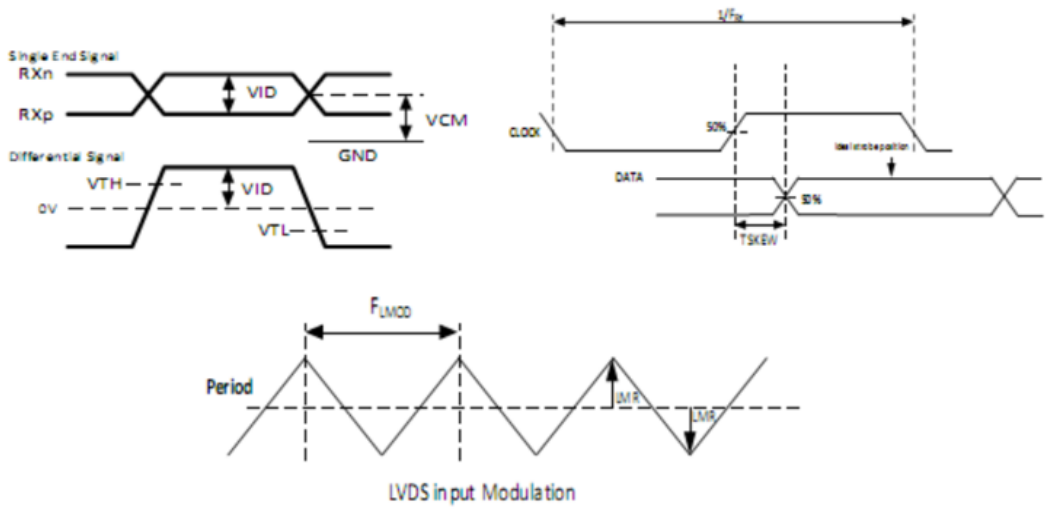


Note1: LSB (Least Significant Bit) – R0, G0, B0 MSB (Most Significant Bit) – R7, G7, B7
Note2: Twist pair wires with 100Ω (Characteristic impedance) should be used between LCD panel signal processing board and LVDS transmitter.

6.3 LVDS DC Electrical Characteristics

Symbol	Parameter	Condition	Rating			Unit
			Min	Typ	Max	
VID	Differential Input Voltage		100	400	600	mV
VCM	Common Mode Voltage	VDD=2.5V	0.6	1.2	1.6 - |VID| / 2	mV
VTH	Differential Input High Threshold Voltage		-	-	100	mV
VTL	Differential Input Low Threshold Voltage		-100	-	-	mV
TSKEW	LVDS Channel to Channel Skew	40MHz~65MHz	-600	-	600	pS
TSKEW	LVDS Channel to Channel Skew	65MHz~90MHz	-400	-	400	pS
TSKEW	LVDS Channel to Channel Skew	90MHz~100MHz	-380	-	380	pS
TSKEW	LVDS Channel to Channel Skew	100MHz~110MHz	-250	-	250	pS
TSKEW	LVDS Channel to Channel Skew	110MHz~130MHz	-150	-	150	pS
F_LMOD	Input LVDS Signal Modulation Frequency	LMR=1%	-	-	300	KHz
LMR	Input LVDS Signal Modulation Range	F_LMOD=300kHz	-1	-	1	%
		F_LMOD=100kHz	-3	-	3	%

Table 6.2 1.1 LVDS DC electrical characteristics



7. Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	80	89		degree	Note2,3
		θB		80	89			
		θL		80	89			
		θR		80	89			
Contrast Ratio		CR	θ=0°	1000	1500			Note 3
Response Time		TON	25℃		25	35	ms	Note 4
		TOFF						
Chromaticity	White	x	Backlight is on	0.263	0.313	0.363		Note 1,5
		y		0.279	0.329	0.379		
	Red	x		0.602	0.652	0.702		Note 1,5
		y		0.288	0.338	0.388		
	Green	x		0.283	0.333	0.383		Note 1,5
		y		0.563	0.613	0.663		
	Blue	x		0.100	0.150	0.200		Note 1,5
		y		0.000	0.050	0.100		
Uniformity		U		75	80		%	Note 6
NTSC		-		67	72		%	Note 5
Luminance		L		400	500		cd/m^2	Note 7

Table 7.1 Optical Parameters

Test Conditions:

1. 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 characteristics are measured at the center point of the LCD screen.

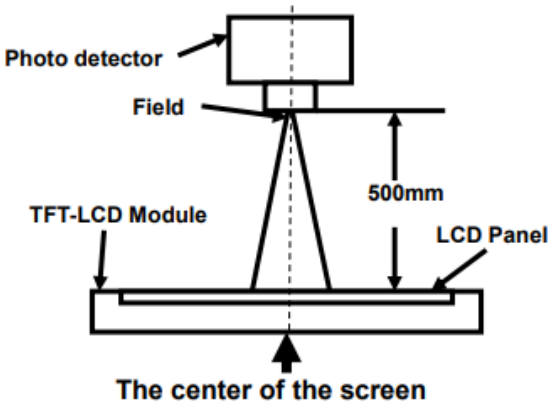


Figure 1. Measurement Set Up

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

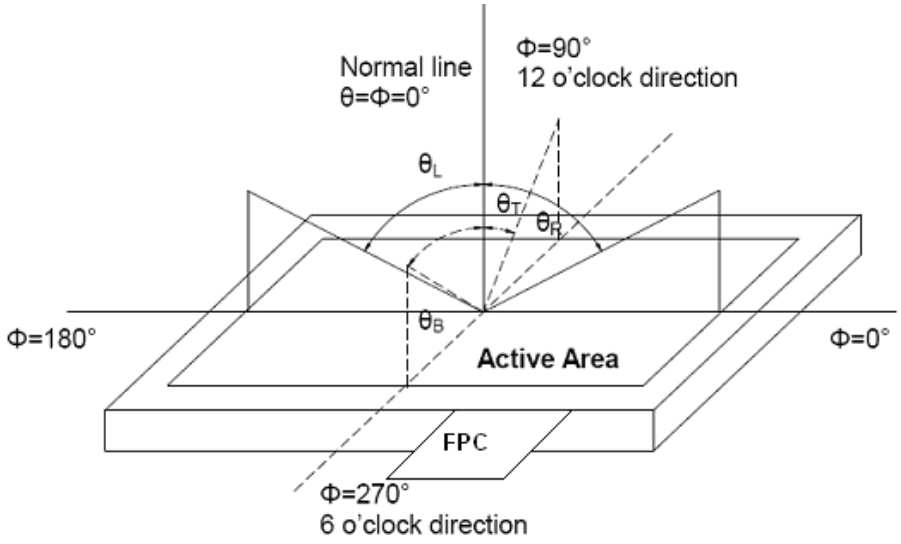


Figure 2. Measurement viewing angle

Note 3: Definition of contrast ratio

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

Note 4: 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%.

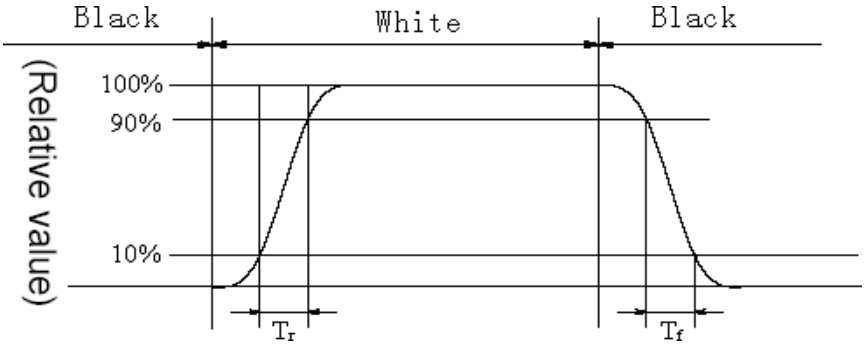


Figure 3. Response Time Testing (SFT)

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.4). 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.

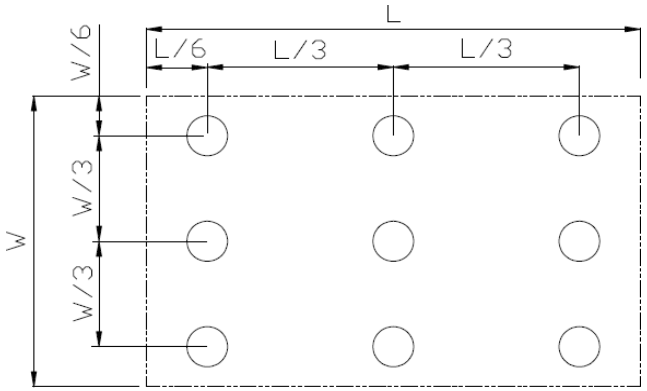


Figure 4. Luminance Uniformity Measurement Locations (9 points)

Note 7: Definition of Luminance:

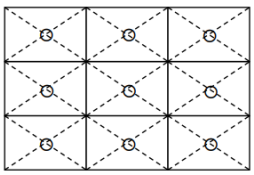
Measure the luminance of white state at center point.

8. Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = + 70℃ · 240H	Note 1 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 = + 70℃ · 240H	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = - 20℃ · 240H	IEC60068-2-1:2007 GB2423.1-2008
5	Operation at High Temperature and Humidity (operation)	Ta = +60℃ · 90%RH · 240H	IEC60068-2-78 :2001 GB/T 2423.3-2016
6	Thermal Shock (non-operation)	-20℃, 0.5 hour←→ 70℃, 0.5 hour; 100 cycles, change time: 5 min	Start with cold temperature, End with high temperature, IEC60068-2-14:1984, GB/T 2423.22-2012
7	ESD	C=150 pF, R=330 Ω, 9 point/panel Air：± 8 kv，10 times； Contact：± 4 kv，10 times； （Environment：15℃ ~ 35℃， 30% ~ 60%，86Kpa ~ 106Kpa）	Note 2 IEC61000-4-2:2001 GB/T 17626.2-2018
8	Vibration (Non-operation)	1.5G, 10 ~ 300 Hz sine wave, 10 min/cycle, 3 cycles each, X, Y, Z direction	IEC600682-6:1982 GB/T 2423.10-2019
9	Shock (Non-operation)	50G, 11ms, half sine wave, 1 time for ± X, ± Y, ± Z direction	IEC600682-6:1982 GB/T 2423.5-2019
10	Package Vibration	5~20-200Hz,PSD:0.01-0.01-0.001 Total:0.781g2/Hz; Time: X/Y/Z each 30min	GB/T 4857.23-2021
11	Package Drop Test	Height: X cm,1 corner, 3edges, 6 surfaces Note: Weight ＞ 10 Kg : X=60cm； Weight ≤ 10Kg, X= 80cm	IEC60068-2-32:1990 GB/T2423.8—1995

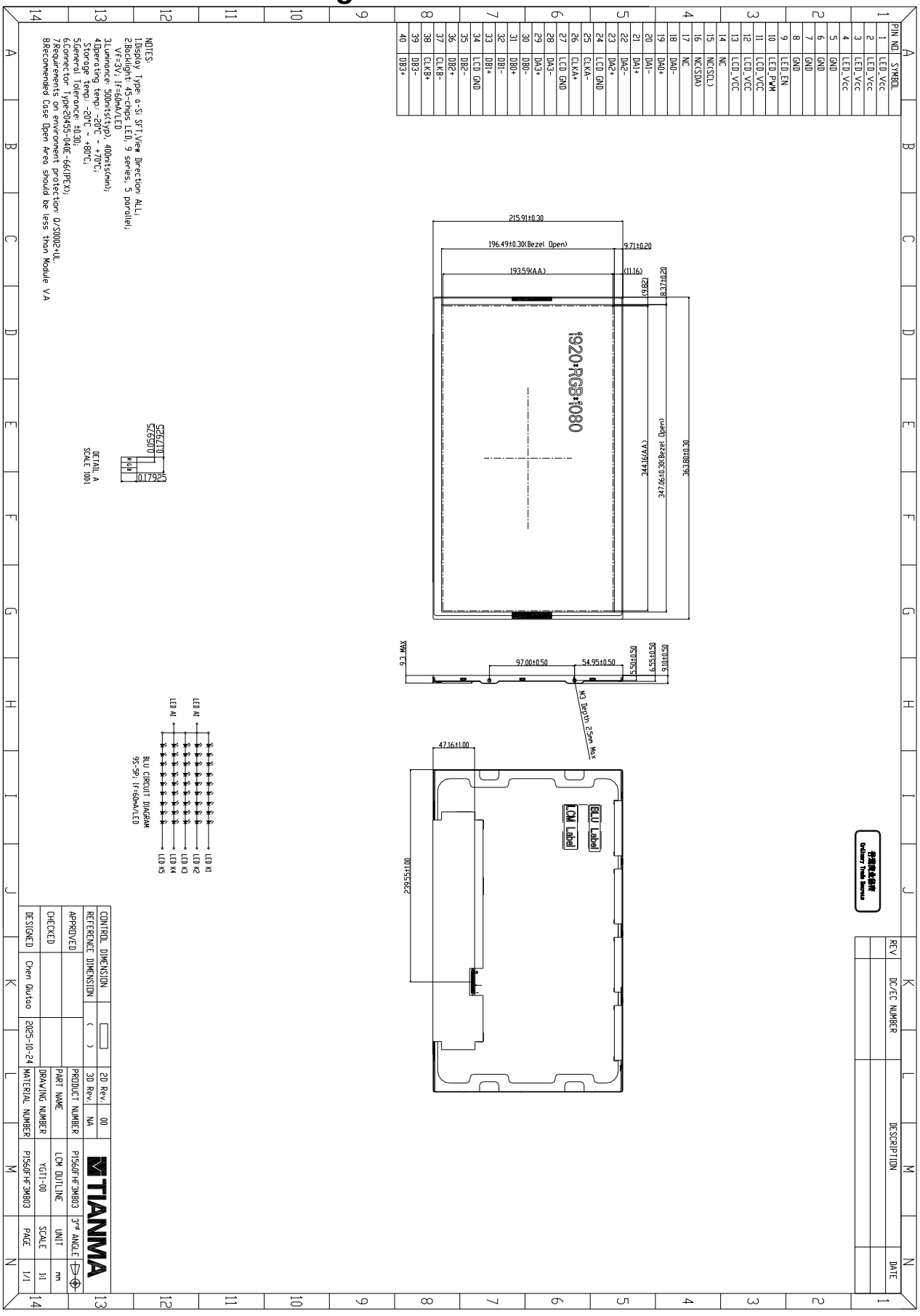
Table 8.1 RA test condition

Note 1: Temperature is the ambient temperature of sample
Note 2: See the following figure for discharge points



Note 3: 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, the product's function only be guaranteed, but not for all of the cosmetic specification.

9. Mechanical Drawing

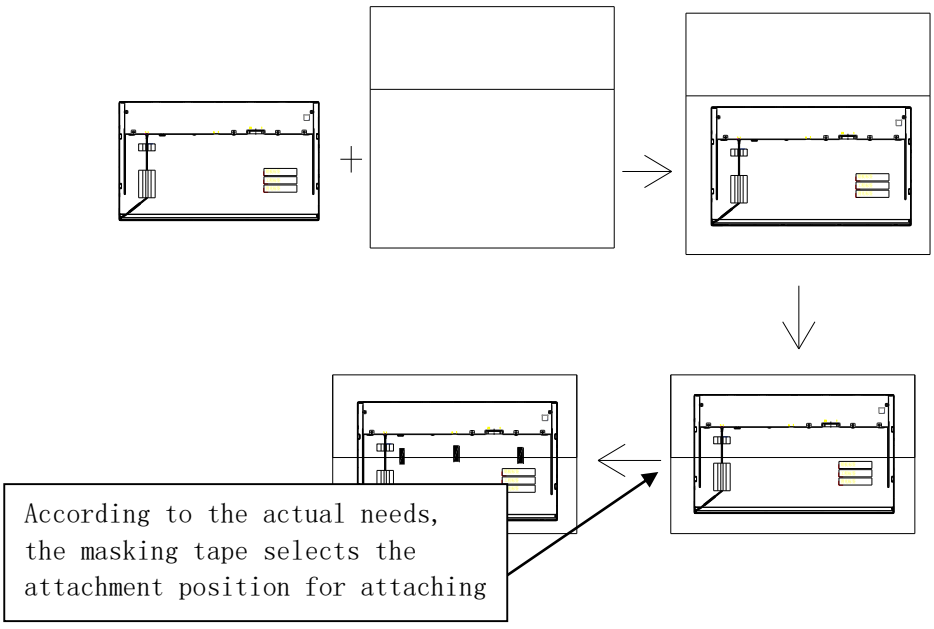


10. Packing Instruction

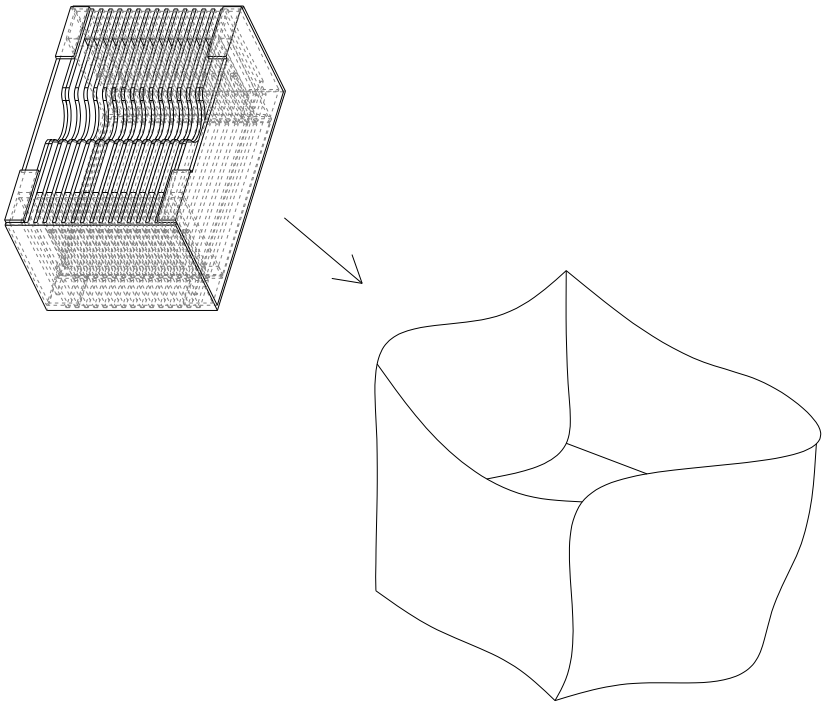
No	Item	Model (Material)	Dimensions(mm)	Unit Weight (Kg)	Quantity	Remark
1	LCM Module	P1560FHF3MB03	363.8×215.9×10.42	0.780	10	
2	Paper Card	Corrugated Paper	527×348×265	1.700	1	
3	Dust-proof Bag	PE	700×545×0.05	0.021	1	
4	Carton	Corrugated Paper	544×365×312.5	1.11	1	
5	Paper Board	Corrugated Paper	527×348×7	0.130	1	
6	Paper Holder	Corrugated Paper	276×375×17	0.035	1	
7	Label	Label	100×52	0.001	1	
8	Tape	Tape	485×330×5	0.001	30	
9	ESD Bubble Bag	PE	395×327×6	0.012	10	
10	Total Weight	10.95 ± 10.95 ± 10 % Kg				

1. The label of the module is below, put the module into a bubble bag, fold it and attach the masking tape.

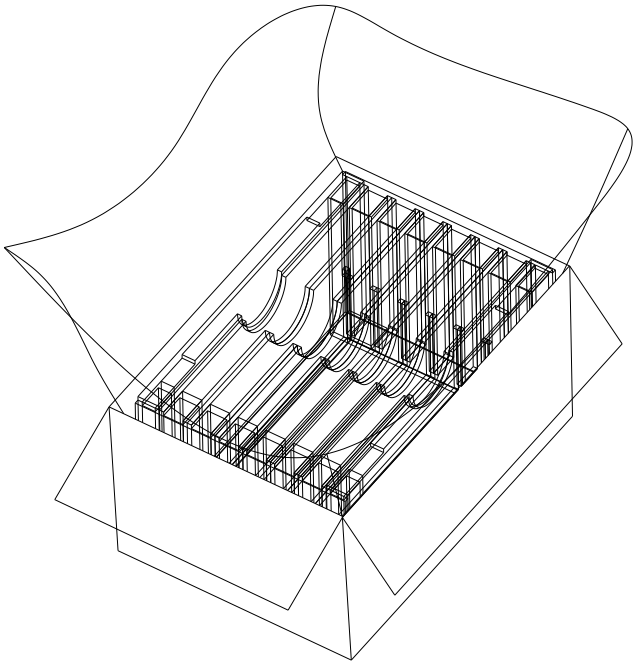
The label of the module is on the inside of the bubble bag.



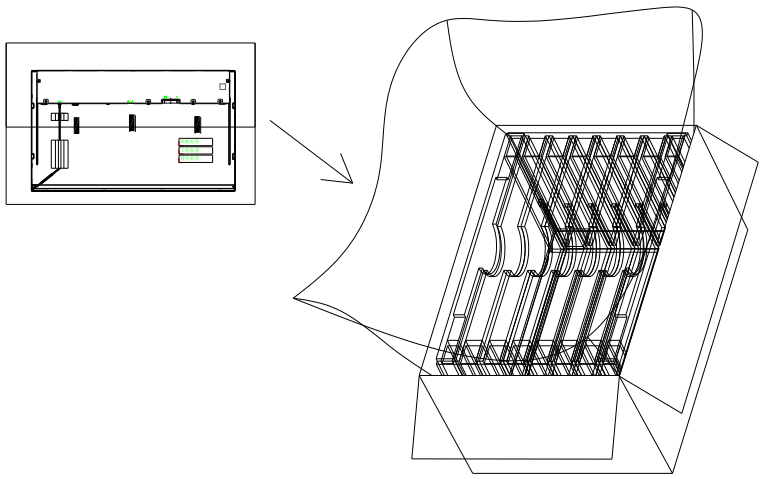
2. Place the paper card in a dust bag.



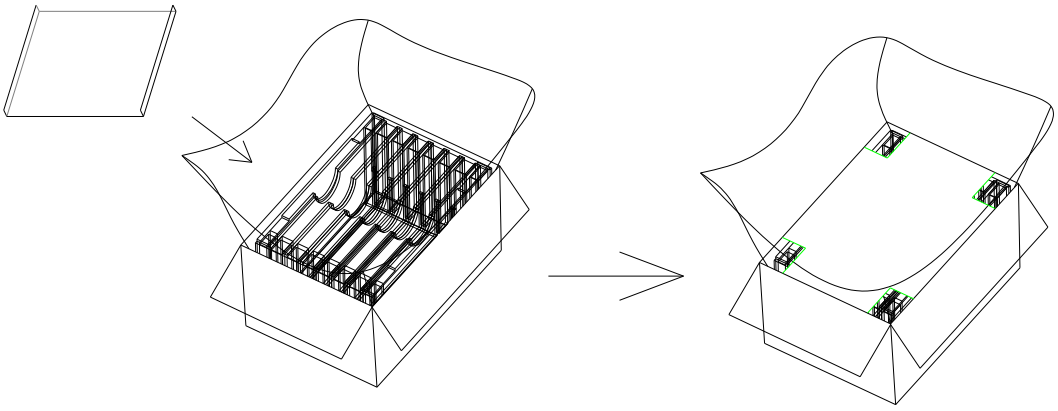
3. Put the combination of the paper card and dust bag in Step 2 into the cardboard box.



4. Put the modules into cartons, and each carton is loaded with 10 modules.

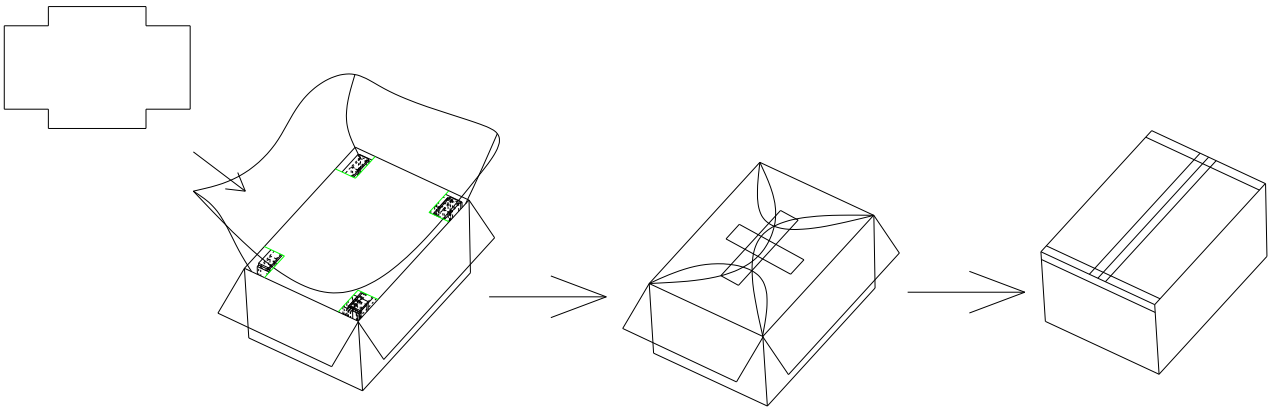


5. Load the paper holder into the paper card of the carton and cover it on the paper card.



6. Put the cardboard into the paper card in the carton, and on top of the paper holder, fold the excess part of the dust bag.

Attach and fix with tape, fold and close the carton lid.



7. The box will be sealed with tape and labeled.

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.