



MODEL NO : TM121JD SG10

MODEL VERSION: 01

SPEC VERSION : V1.0

ISSUED DATE: 2020-10-12

☐ Preliminary Specification

☒ Final Product Specification

Customer : _____

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Panpan Cao	Longping Deng	Kevin Kim

This technical specification is subjected to change without notice



Table of Contents

Table of Contents	2
Record of Revision.....	3
1 General Specifications.....	4
2 Input/Output Terminals	5
3 Absolute Maximum Ratings.....	6
4 Electrical Characteristics	7
5 Timing Chart.....	10
6 Optical Characteristics	13
7 Environmental / Reliability Test.....	17
8 Mechanical Drawing	18
9 Packing Drawing	19
10 Precautions For Use of LCD Modules.....	21



Record of Revision

Rev	Issued Date	Description	Editor
1.0	2020-10-12	Final Specification Released.	Panpan Cao



1 General Specifications

Feature		Spec
Display Spec.	Size	12.1 inch
	Resolution	1280(RGB) x 800
	Technology Type	SFT
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel Pitch (mm)	0.204x0.204
	Display Mode	Transmissive, Normally Black
	Surface Treatment(Up Polarizer)	AG
	Viewing Direction	All direction
Mechanical Characteristics	LCM (W x H x D) (mm)	278.0x184.0x9.9
	Active Area(mm)	261.1x163.2
	With /Without TSP	Without TSP
	Matching Connection Type	JAE:FI-X30CL
	Weight (g)	439
Electrical Characteristics	Interface	1port LVDS, 8bit
	Color Depth	16.7M
	Driver IC	RM91M39, RM76M59

Note 1: Viewing direction for best image quality is different from TFT definition, there is a 180 degree shift.

Note 2 : Requirements on Environmental Protection: Q/S0002

Note 3 : LCM weight tolerance : +/- 5%



2 Input/Output Terminals

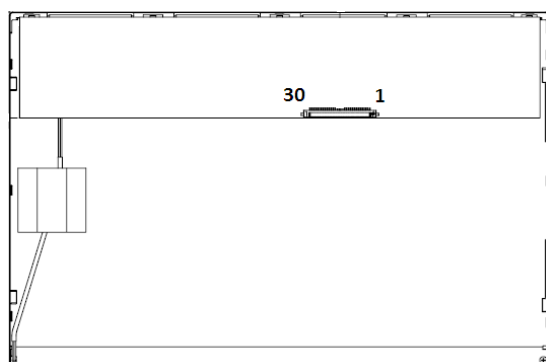
2.1 TFT LCD Panel

Connector type: 093G30-B0001A-G4(Starconn) Matching Connector: JAE FI-X30CL or compatible

No	Symbol	I/O	Description	Comment
1	VLED	P	Backlight power supply +12V	
2	VLED	P	Backlight power supply +12V	
3	VLED	P	Backlight power supply +12V	
4	VLED	P	Backlight power supply +12V	
5	VLED_EN	P	Backlight on/off control (default: NC is ON)	
6	VLED_PWM	P	Backlight dimming control (default: NC is 100% duty)	
7	GND	P	Power ground	
8	GND	P	Power ground	
9	VDD	P	Power Supply +3.3V	
10	VDD	P	Power Supply +3.3V	
11	GND	P	Power ground	
12	GND	P	Power ground	
13	Rxin0-	I	-LVDS differential data input(R0~R5,G0)	
14	Rxin0+	I	+LVDS differential data input(R0~R5,G0)	
15	GND	P	Power ground	
16	Rxin1-	I	-LVDS differential data input(G1~G5,B0~B1)	
17	Rxin1+	I	+LVDS differential data input(G1~G5,B0~B1)	
18	GND	P	Power ground	
19	Rxin2-	I	-LVDS differential data input(B2~B5,-,-,DE)	
20	Rxin2+	I	+LVDS differential data input(B2~B5,-,-,DE)	
21	GND	P	Power ground	
22	RxCLK-	I	-LVDS differential data input	
23	RxCLK+	I	+LVDS differential data input	
24	GND	P	Power ground	
25	Rxin3-	I	-LVDS differential data input(R6~R7,G6~G7,B6~B7)	
26	Rxin3+	I	+LVDS differential data input(R6~R7,G6~G7,B6~B7)	
27	GND	P	Power ground	
28	NC	-	No Connection	
29	GND	P	Power ground	
30	GND	P	Power ground	

Note: I/O definition:

I-----Input P----Power/Ground





3 Absolute Maximum Ratings

3.1 Driving TFT LCD Panel

GND=0V

Item	Symbol	MIN	MAX	Unit	Remark
Voltage Input	V _{in}	-0.50	5.00	V	Note1
Operating Temperature	T _{op}	-20.0	70.0	°C	
Storage Temperature	T _{st}	-30.0	80.0	°C	
Relative Humidity (Note2)	RH	--	≤95	%	Ta≤40°C
		--	≤85	%	40°C<Ta≤50°C
		--	≤55	%	50°C<Ta≤60°C
		--	≤36	%	60°C<Ta≤70°C
		--	≤24	%	70°C<Ta≤80°C
Absolute Humidity	AH	--	≤70	g/m ³	Ta>70°C

Table 3.1 absolute maximum rating

Note1: Input voltage include Rxin0-/+, Rxin1-/+, Rxin2-/+, Rxin3-/+, RxCLK-/+, PWM,EN,VDD.

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.



4 Electrical Characteristics

4.1 Driving TFT LCD Panel

VCC=3.3V,GND=0V, Ta=25℃

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Power supply Voltage		VDD	3.20	3.30	3.40	V	
Power supply ripple		Vp-p	-	-	100	mV	
Power supply current		IDD	-	660	1040	mA	
Power consumption		P	-	2178	3432	mW	Note1
Differential input voltage		Vid	200	-	600	mV	
Differential input common voltage		Vcm	-	1.2	-	V	
Differential input threshold voltage	Low level	VTL	-100	-	-	mV	
	High level	VTH	-	-	100	mV	
Inrush current		Irush	-	-	1.5	A	

Table 4.1 LCD module electrical characteristics

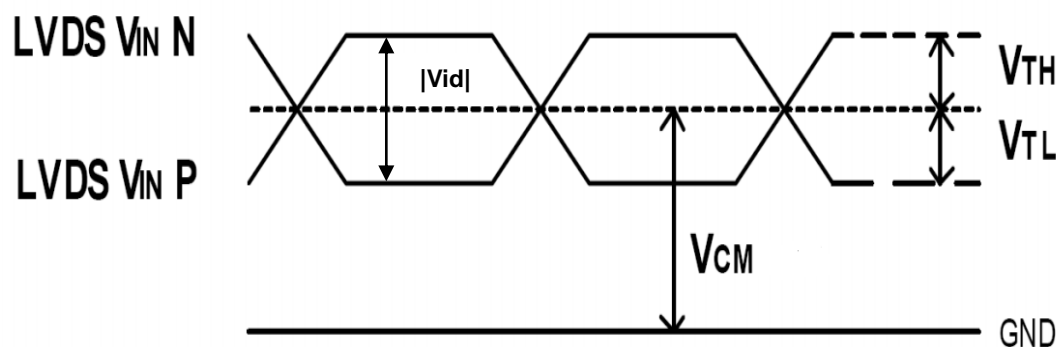


Figure4.1 LVDS characteristics

Note1: To test the current dissipation, using the “white pattern” shown.



4.2 Driving Backlight

Ta=25℃

Item		Symbol	Min	Typ	Max	Unit	Remark	
Backlight power supply voltage		VLED	10	12	15	V		
Backlight power supply current		I_LED	350	600	850	mA		
Backlight power consumption		P_LED	3500	7200	12750	mW		
Input voltage for VLED_PWM signal	High level	-	2.0	-	5.0	V		
	Low level	-	0	-	0.4	V		
Input voltage for VLED_EN	High level	-	2.0	-	5.0	V		
	Low level	-	0	-	0.4	V		
VLED_PWM frequency		Fpwm	200	-	10K	HZ		
VLED_PWM duty		D	1	-	100	%	Note1	
Operating Life Time		--	40000	50000	--	hrs	Note2	

Note 1: According to LED driver IC characteristics, the minimum value of VLED_PWM duty may vary with VLED_PWM frequency, higher the frequency, bigger the duty.

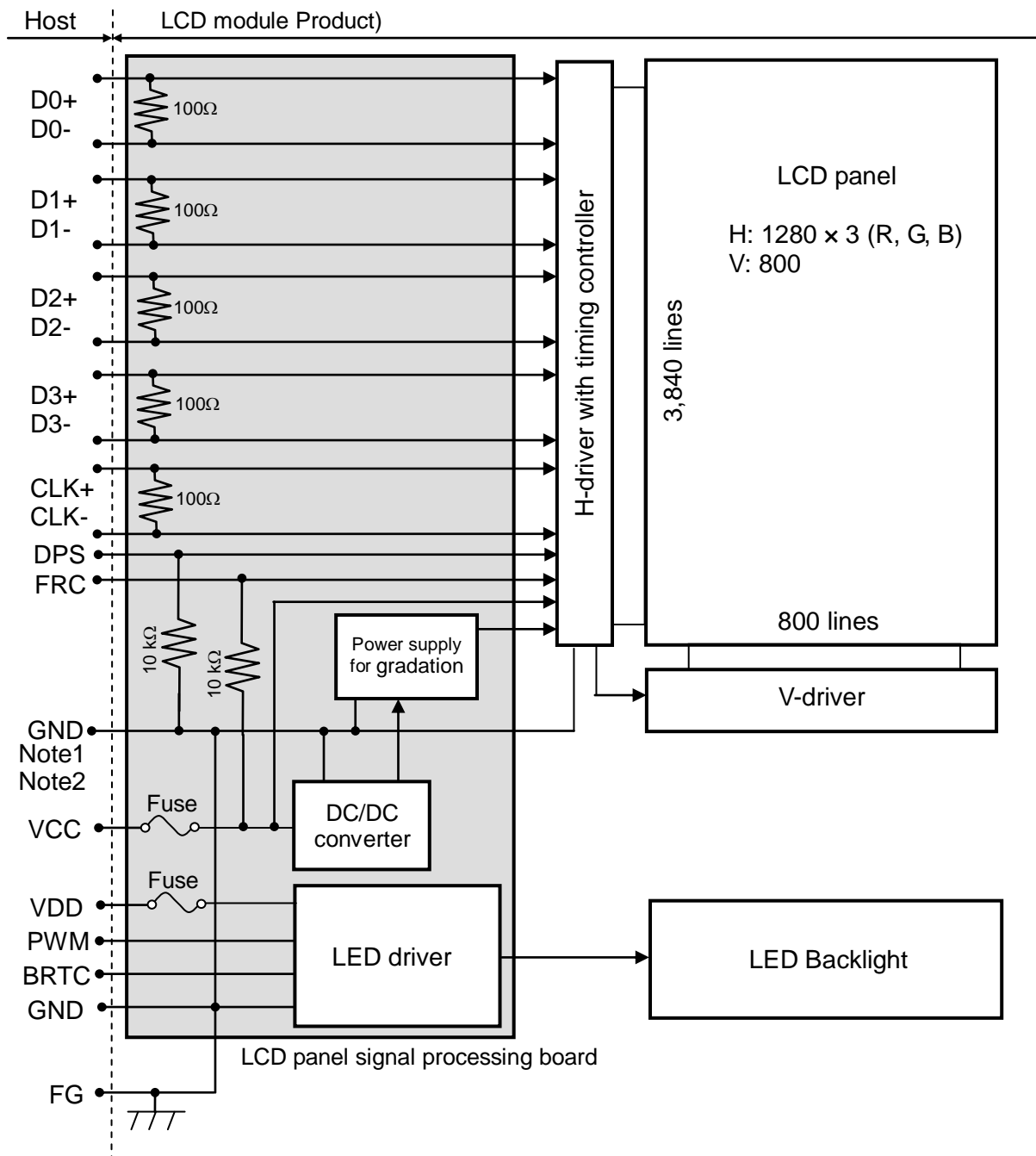
Note 2: Optical performance should be evaluated at Ta=25℃ only.

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.



4.3 Block Diagram



Note1: Relations between GND (Signal ground and LED driver ground) and FG (Frame ground) in the LCD module are as follows:

GND - FG	Connected
----------	-----------

Note2: GND and FG must be connected to customer equipment's ground, and it is recommended that these grounds be connected together in customer equipment.



5 Timing Chart

5.1 LVDS signal timing characteristics

VCC=3.3V, GND=0V, Ta=25°C

Parameter	Symbol	Min	Typ	Max	Unit	Remark
CLK frequency	1/tc	67	71	75	MHz	
Horizontal display area	thd	-	1280	-	tc	
Horizontal period	th	1290	1440	-	tc	
Vertical display area	tvd	-	800	-	th	
Vertical period	tv	810	823	-	th	
Frame Rate	F	-	60	-	HZ	

Table 5.1 timing parameter

5.2 Input Clock and Data timing Diagram:

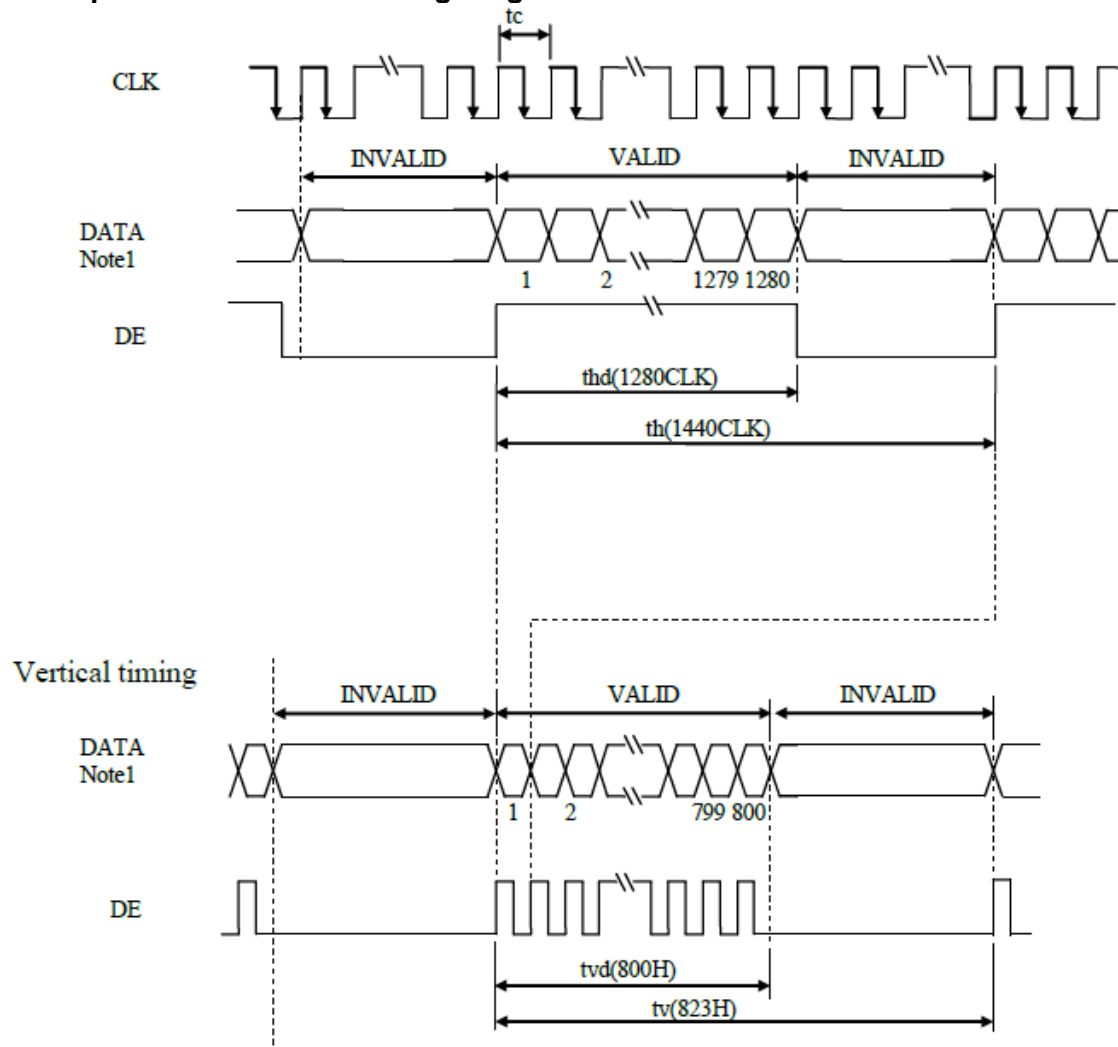


Figure 5.2 Input signal data timing



5.3 LVDS data input format

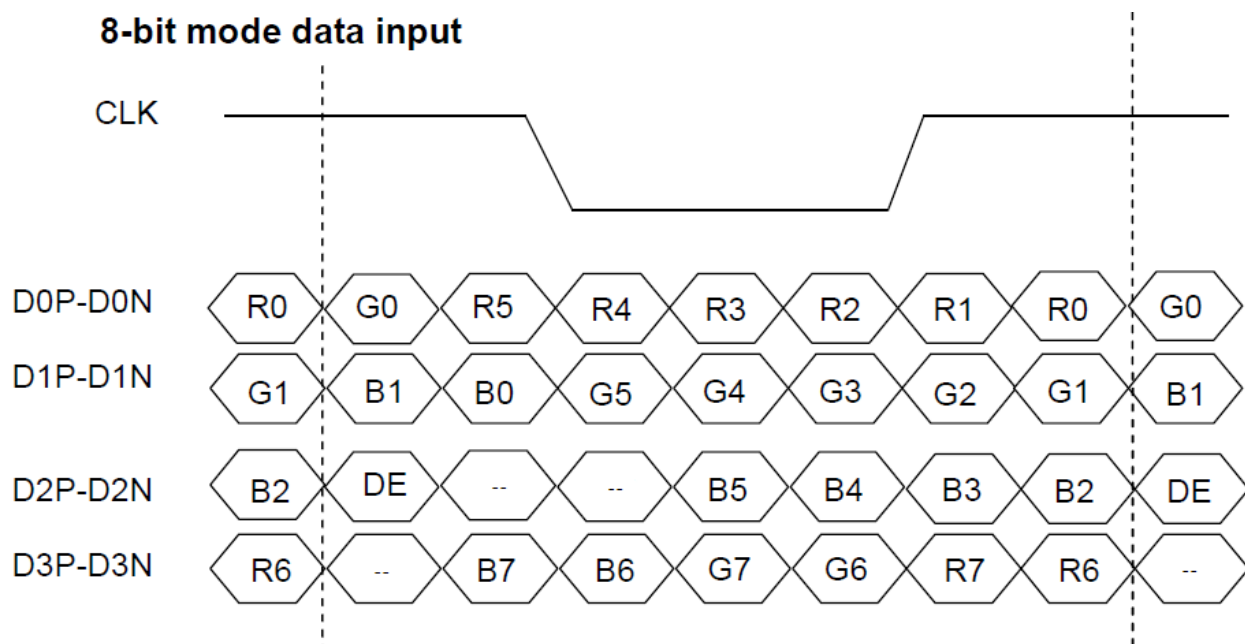


Figure 5.3 LVDS data input format (VESA standard)

Note: This LCD module supports DE mode only, so HSYNC&VSYNC signal can be ignored.



5.4 Power On/Off Sequence

Item	Symbol	Min	Typ	Max	Unit	Remark
VDD on to VDD stable	Tp1	0.5	-	10	ms	
VDD stable to signal on	Tp2	0	-	50	ms	
Signal on to VLED_EN on	Tp3	200	-	-	ms	
PWM on to VLED_EN on	Tp4	0	-	200	ms	
VLED to PWM on	Tp5	10	-	-	ms	
VLED on to VLED stable	Tp6	0.5	-	10	ms	
VDD off time	Tp7	0	-	10	ms	
VDD off to next VDD on	Tp8	500	-	-	ms	
Signal off before VDD off	Tp9	0	-	50	ms	
VLED_EN off before signal off	Tp10	200	-	-	ms	
VLED_EN off before PWM off	Tp11	0	-	200	ms	
PWM off before VLED off	Tp12	10	-	-	ms	

Table 5.4 Power on/off sequence

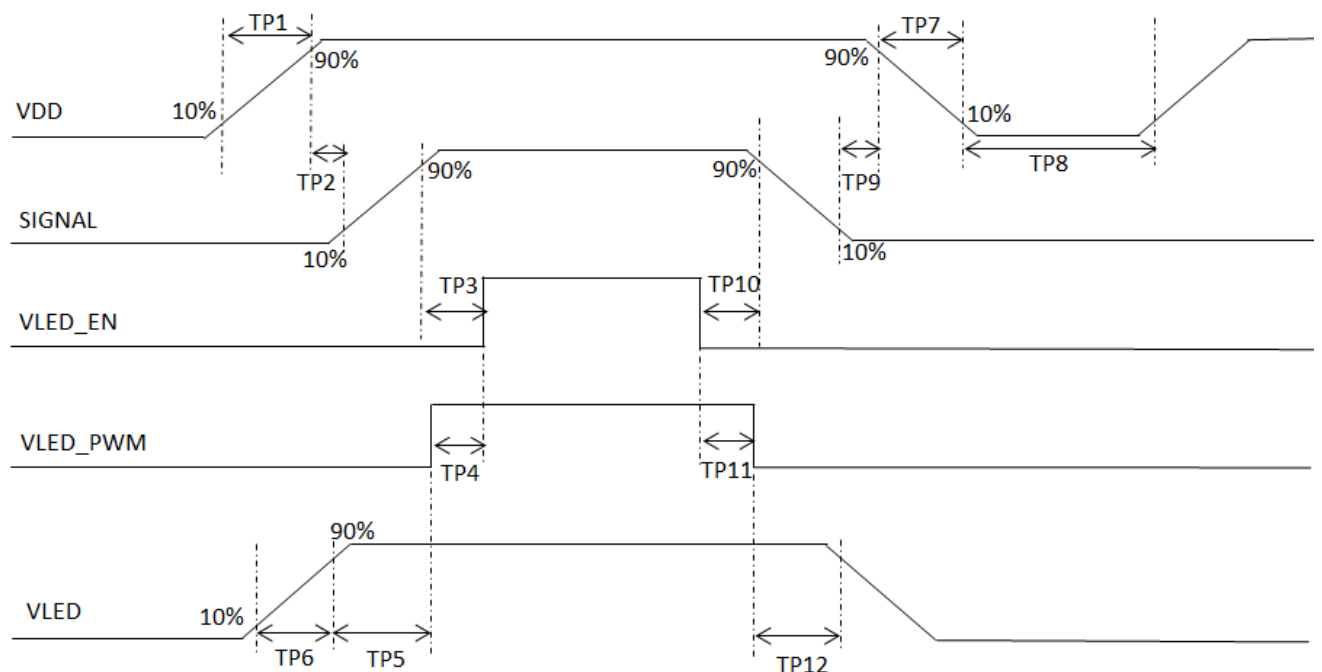


Figure 5.4 Interface power on/off sequence

Note: It is advised that backlight turned on later than display stabilized.



6 Optical Characteristics

6.1 Optical Specification

Ta=25℃

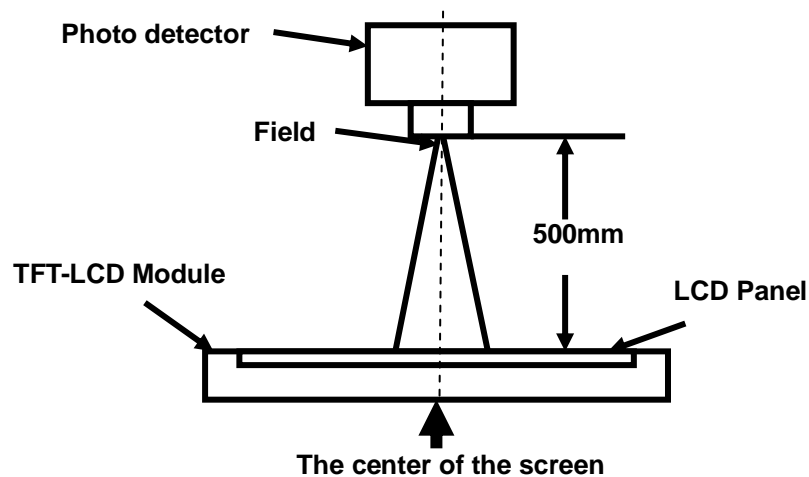
Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR ≥ 10	75	85	-	Degree	Note 2
		θB		75	85	-		
		θL		75	85	-		
		θR		75	85	-		
Contrast Ratio		CR	θ=0°	800	1000	-	-	Note1 Note3
Response Time		T _{ON}	25℃	-	12	-	ms	Note1
		T _{OFF}		-	13	-		Note4
Chromaticity	White	x	Backlight is on	0.266	0.316	0.366	-	Note5 Note1
		y		0.300	0.350	0.400		
	Red	x		0.517	0.567	0.617		
		y		0.299	0.349	0.399		
	Green	x		0.308	0.358	0.408		
		y		0.507	0.557	0.607		
	Blue	x		0.116	0.166	0.216		
		y		0.103	0.153	0.203		
Uniformity		U	-	70	75	-	%	Note1 Note6
NTSC		-	-	35	40	-	%	Note 5
Luminance		L		360	450	-	cd/m ²	Note1 Note7

Test Conditions:

1. The ambient temperature is 25±2℃.humidity is 65±7%
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).

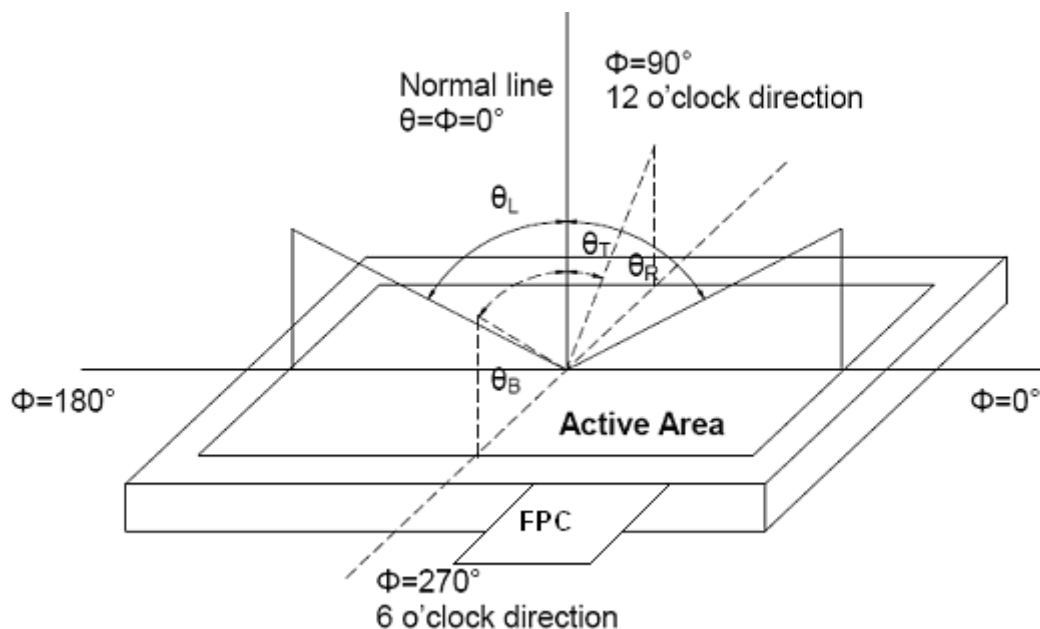


Fig. 1 Definition of viewing angle

**Note 3: Definition of contrast ratio**

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

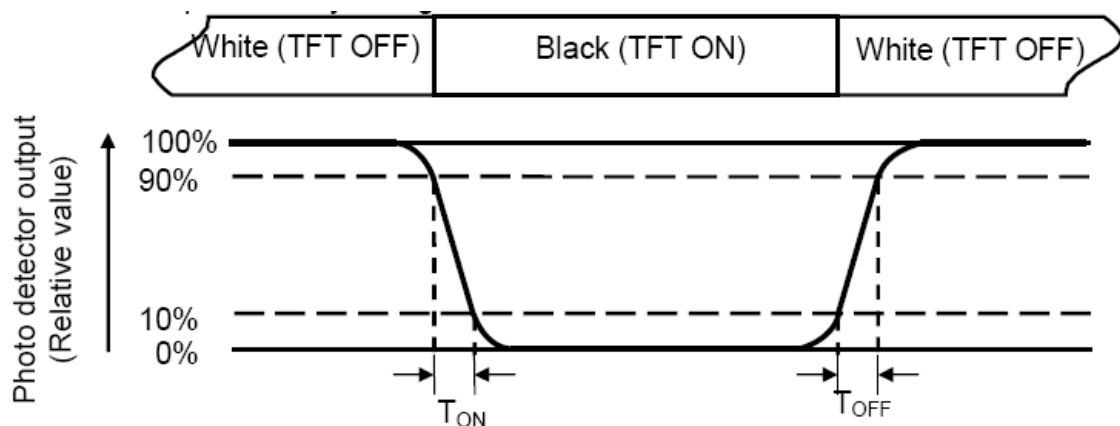
"White state": The state is that the LCD should driven by V_{white} .

"Black state": The state is that the LCD should driven by V_{black} .

V_{white} : To be determined V_{black} : 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.

$$\text{Luminance Uniformity}(U) = L_{\min} / L_{\max}$$

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

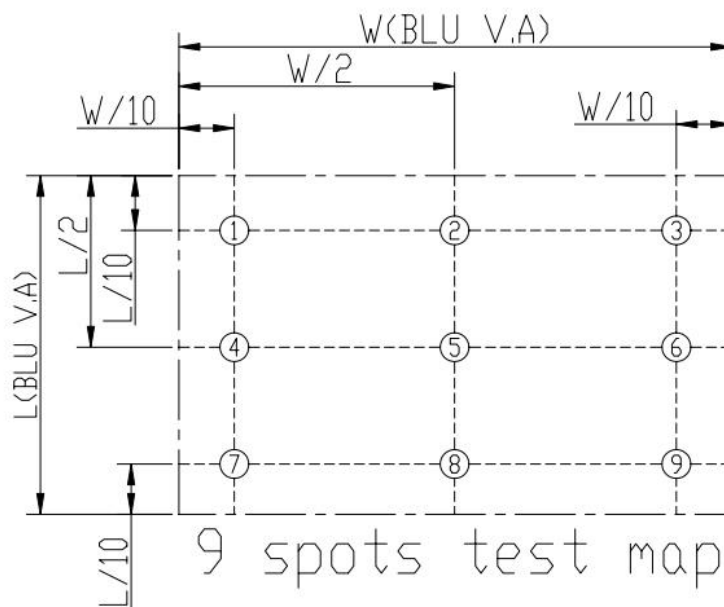


Fig. 2 Definition of uniformity

L_{\max} : The measured maximum luminance of all measurement position.

L_{\min} : The measured minimum luminance of all measurement position.

Note 7: Definition of Luminance :

Measure the luminance of white state at center point.



7 Environmental / Reliability Test

No	Test Item	Condition	Remark
1	High Temperature Operation	Ta=+70℃, 240hrs	(Note1) IEC60068-2-1:2007,GB2423.2-2008
2	Low Temperature Operation	Ta=-20℃, 240hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage (non-operation)	Ta=+80℃, 240hrs	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage (non-operation)	Ta=-30℃, 240hrs	IEC60068-2-1:2007 GB2423.1-2008
5	High Temperature & High Humidity Operation	Ta = +60℃, 90% RH max,240 hours	(Note2) IEC60068-2-78 :2001 GB/T2423.3—2006
6	Thermal Shock (non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min,100cycles	Start with cold temperature, End with high temperature, 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
10	Package Drop Test	Height:80 cm,1 corner, 3 edges, 6 surfaces	IEC60068-2-32:1990 GB/T2423.8—1995

Note1: Ta is the ambient temperature of sample.

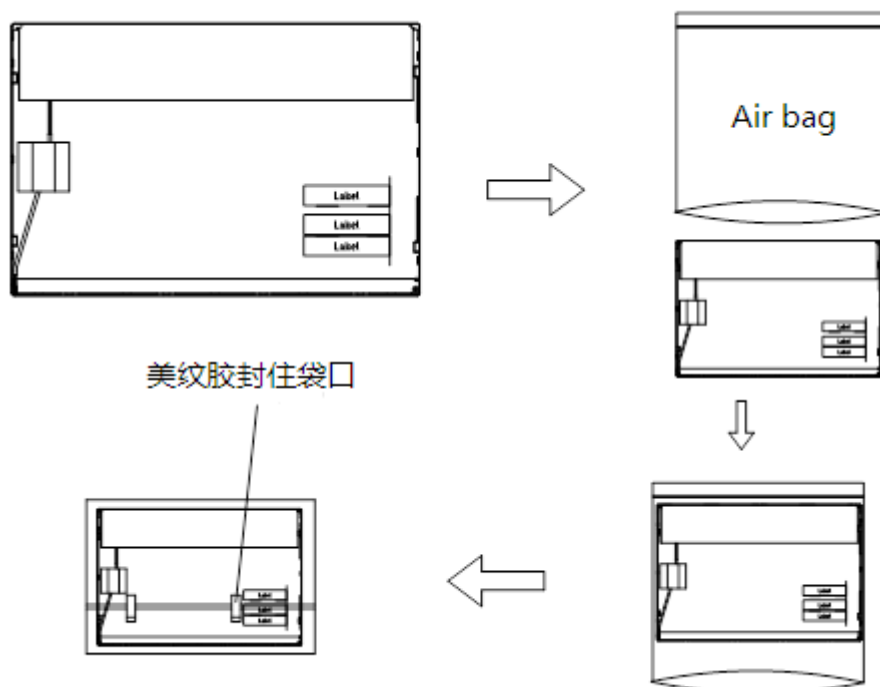


9 Packing Drawing

N o	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantit y	Remark
1	LCM module	TM121JD SG10-01	278.0x184.0x9.9	0.439	15	
2	Carton	CORRUGATED PAPER	530x430x274	1.06	1	
3	Dust-proof Bag	PE	700x530x0.08	0.06	1	
4	Label	Label	100x52	0.000345	1	
5	EPE	EPE	395.0x249.0x5.0	0.0115	1	
6	Corrugated Bar	Corrugated paper	379.0x300.0	0.1	1	
7	Partition_1	CORRUGATED PAPER	513.0x295.0x240	1.77	1	
8	Partition_2	CORRUGATED PAPER	513.0x413.0x7	0.142	1	
9	Anti-static Bag	PE	300.0x250	0.0106	15	
10	Total weight(Kg)	9.9 Kg \pm 5%				

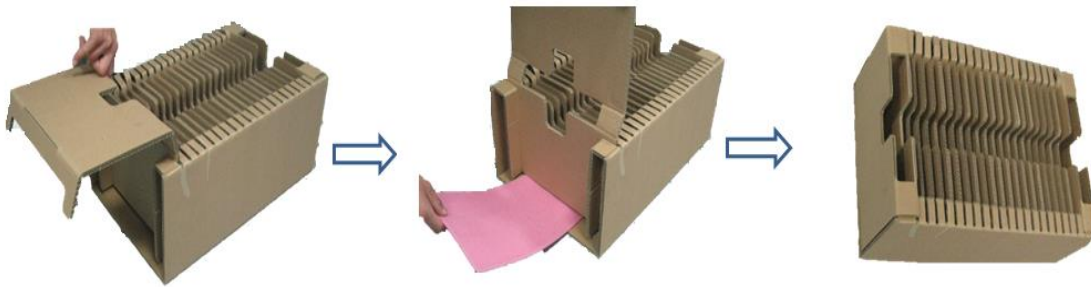
The packing method is shown as below:

1. Module in air bag.

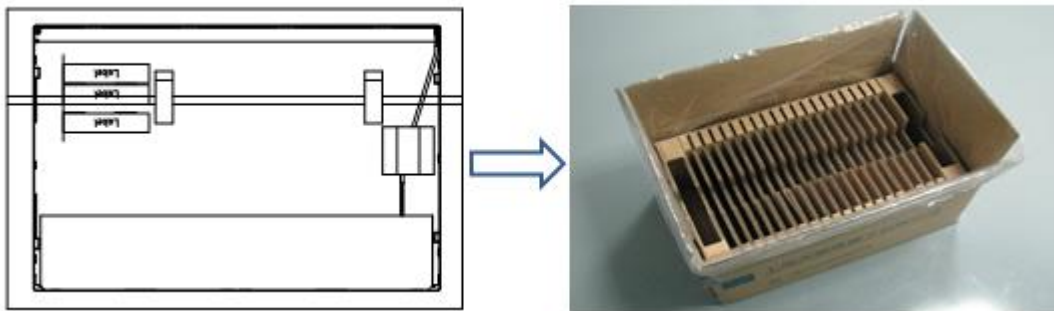




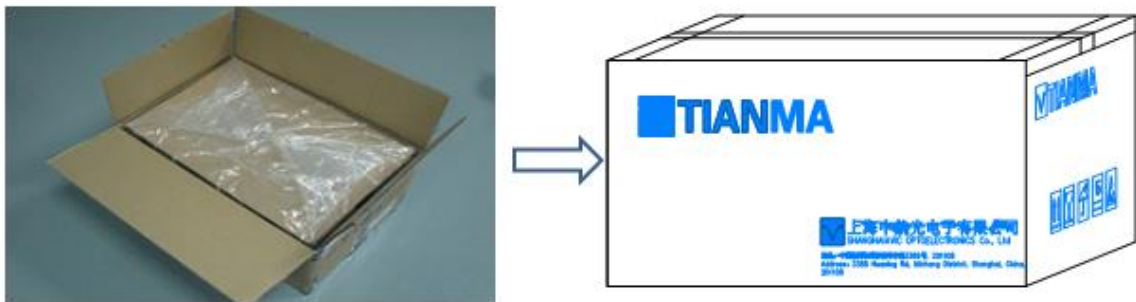
2. Dummy packing.



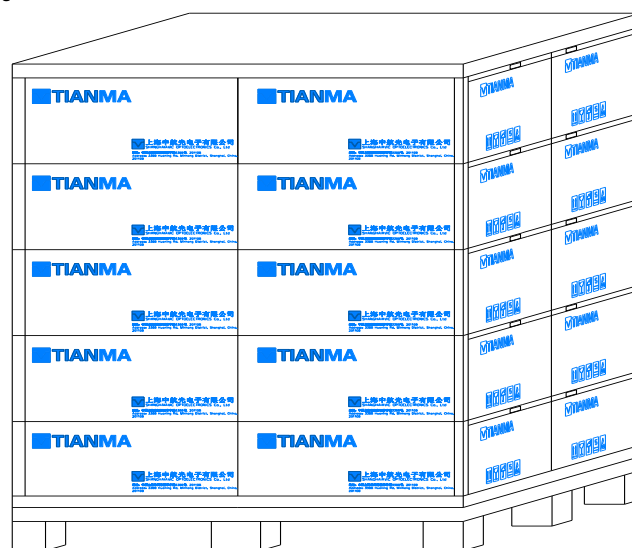
3. Module in carton.



4. Seal.



5. Carton on pallet



Note: 2x2x5

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10 Precautions For Use of LCD Modules

10.1 Handling Precautions

- 10.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- 10.1.2 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.
- 10.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- 10.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- 10.1.5 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 alcoholSolvents other than those mentioned above may damage the polarizer. Especially, do not use the following:
 - Water
 - Ketone
 - Aromatic solvents
- 10.1.6 Do not attempt to disassemble the LCD Module.
- 10.1.7 If the logic circuit power is off, do not apply the input signals.
- 10.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
 - 10.1.8.1 Be sure to ground the body when handling the LCD Modules.
 - 10.1.8.2 Tools required for assembly, such as soldering irons, must be properly ground.
 - 10.1.8.3 To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
 - 10.1.8.4 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.

10.2 Storage Precautions

- 10.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.
- 10.2.2 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%
- 10.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

10.3 Transportation Precautions

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