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MODEL NO. : P1160FHF1MA00

MODEL VERSION:

SPEC VERSION: 1.0

ISSUED DATE: 2021-12-21

■**Preliminary Specification**
□**Final Product Specification**

Customer :

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by
Xiaoxiao Han	Zhijie Song	Jinquan Liu

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Record of Revision

Rev	Issued Date	Description	Editor
1.0	2021-12-21	Preliminary Specification release	Xiaoxiao Han

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1 General Specification

Item	Feature	Spec
Display Spec.	Size	11.6 inch
	Resolution	1920(RGB) x 1080
	Technology Type	a-Si
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel Pitch (mm)	0.1335*0.1335
	Display Mode	Normally black
	Surface Treatment (Up Polarizer)	HC
	Viewing Direction	All angle
	Gray Scale Inversion Direction	All angle
Mechanical Characteristics	LCM (W x H x D) (mm)	273.50*166.50*7.80
	Active Area (mm)	256.32*144.18
	With / Without TSP	Without TSP
	Matching Connection Type	LCM: IPEX20453-230T-11 (Plug) IPEX 20455-030E-76 (Socket) BL: Kyocera 04 6299 614 020 846+
	LED Numbers	48 LEDs
	Weight (g)	525
Electrical Characteristics	Interface	LVDS
	Color Depth	16.7M
	Drive IC	RM5365B*3+RM57951*2

Note 1: Viewing direction for best image quality is different from Gray Scale Inversion Direction, there is a 180 degree shift.
Note 2: Requirements on Environmental Protection: Q/S0002
Note 3: LCM weight tolerance: ± 5%

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2. Input/output Terminals

2.1 Pin assignment (TFT Interface)

Matched Connector: Plug: IPEX 20453-230T-11
Socket: IPEX 20455-030E-76

Pin No.	Symbol	I/O (Note1)	Description	Comment
1	DA0-	I	Odd pixel data 0	Note1
2	DA0+	I	Odd pixel data 0	Note1
3	DA1-	I	Odd pixel data 1	Note1
4	DA1+	I	Odd pixel data 1	Note1
5	DA2-	I	Odd pixel data 2	Note1
6	DA2+	I	Odd pixel data 2	Note1
7	GND	P	Ground	Note2
8	CLKA-	I	Odd pixel clock	Note1
9	CLKA+	I	Odd pixel clock	Note1
10	DA3-	I	Odd pixel data 3	Note1
11	DA3+	I	Odd pixel data 3	Note1
12	DB0-	I	Even pixel data 0	Note1
13	DB0+	I	Even pixel data 0	Note1
14	GND	P	Ground	Note2
15	DB1-	I	Even pixel data 1	Note1
16	DB1+	I	Even pixel data 1	Note1
17	GND	P	Ground	Note2
18	DB2-	I	Even pixel data 2	Note1
19	DB2+	I	Even pixel data 2	Note1
20	CLKB-	I	Even pixel clock	Note1
21	CLKB+	I	Even pixel clock	Note1
22	DB3-	I	Even pixel data 3	Note1
23	DB3+	I	Even pixel data 3	Note1
24	GND	P	Ground	Note2
25	GND	P	Ground	Note2
26	GND	P	Ground	Note2
27	GND	P	Ground	Note2
28	VCC	P	Power supply	Note2
29	VCC	P	Power supply	Note2
30	VCC	P	Power supply	Note2

I/O definition:
I----Input P----Power/Ground

Note 1: Twist pair wires with 100Ω（characteristic impedance）should be used between LCD panel signal processing board and LVDS transmitter.
Note 2: All GND and VCC terminals should be used without any non-connected lines.

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2.2 Pin assignment (Backlight Interface)

Matched Connector: Kyocera 04 6299 614 020 846+

Pin No.	Symbol	I/O (Note1)	Description	Comment
1	A1	P	Anode 1	Anode 1&2 must be separate from Anode 3&4 on the LED board.
2	A2	P	Anode 2	
3	A3	P	Anode 3	
4	A4	P	Anode 4	
5	NC	N	No Connection	-
6	NC	N	No Connection	-
7	K1	P	Cathode 1	-
8	K2	P	Cathode 2	-
9	K3	P	Cathode 3	-
10	K4	P	Cathode 4	-
11	K5	P	Cathode 5	-
12	K6	P	Cathode 6	-
13	K7	P	Cathode 7	-
14	K8	P	Cathode 8	-

I/O definition:
P----Anode/Cathode N----No Connection

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3. Absolute Maximum Ratings

Ta = 25℃

Item	Symbol	Min.	Max.	Unit	Remark
Power Voltage	VCC	-0.5	5	V	Note1
Operating Temperature	T_{OPR}	-20	80	℃	Note2
Storage Temperature	T_{STG}	-30	85	℃	
Relative Humidity Note2	RH	--	≤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 3.1 Absolute Maximum Rating

Note1: The parameter is for driver IC (gate driver, source driver) only.
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.

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4. Electrical Characteristics

4.1 Driving TFT LCD Panel

Ta = 25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Power supply voltage	VCC	3.0	3.3	3.6	V	
Power supply current	I_{VCC} (White pattern)	-	TBD	TBD	mA	at VCC=3.3V reduce SD film thickness
Permissible ripple voltage	VRP	-	-	200	mVp-p	for VCC
Terminating resistance	RT	-	100	-	Ω	
(Panel+LSI) Power Consumption	White Mode (60Hz)	-	TBD	TBD	mW	reduce SD film thickness

Table 4.1 LCD module electrical characteristics

Note: Power supply current and Power Consumption are just for reference because of limited test.

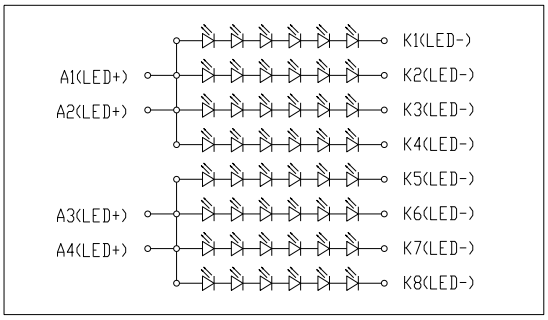
4.2 TFT Driving Backlight

Ta=25℃

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Forward Current(per string)	I_F	-	40	-	mA	48LED(6LED Serial，8LED Parallel)
Forward Current Voltage (per string)	V_F	-	36.6	-	V	
Backlight Power Consumption	W_{BL}	-	11712	-	mW	
LED life time		10000	3000		Hrs	

Table 4.2 Backlight Unit Electrical Characteristics

Note 1: Figure below shows the connection of backlight LED.



Backlight Circuit Diagram

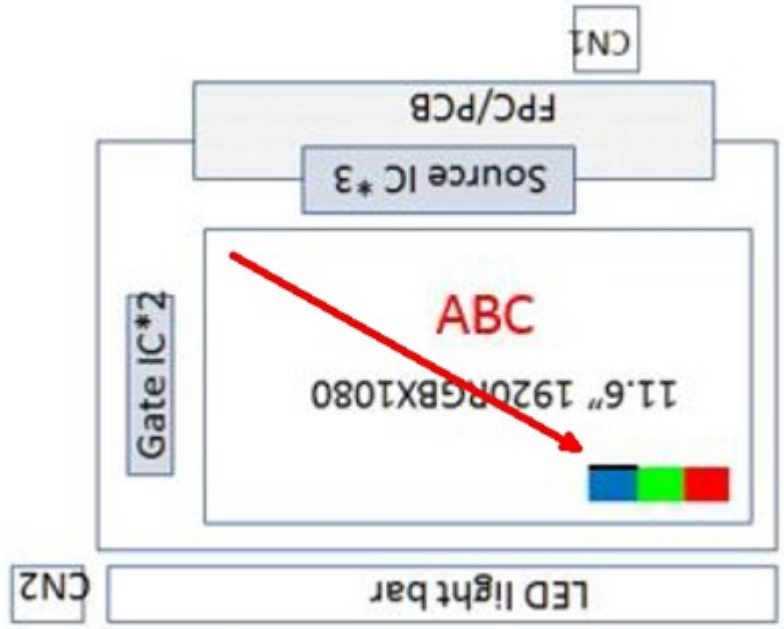
Figure 4.2.1 LED Driver Circuit

Note 2: One LED I = 40 mA, V = 6.1 V
Note 3: I_F / V_F is defined for one channel LED.
Optical performance should be evaluated at Ta=25℃ only.
If LED is driven by high current, high ambient temperature & humidity condition, the life time of LED will be reduced. Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

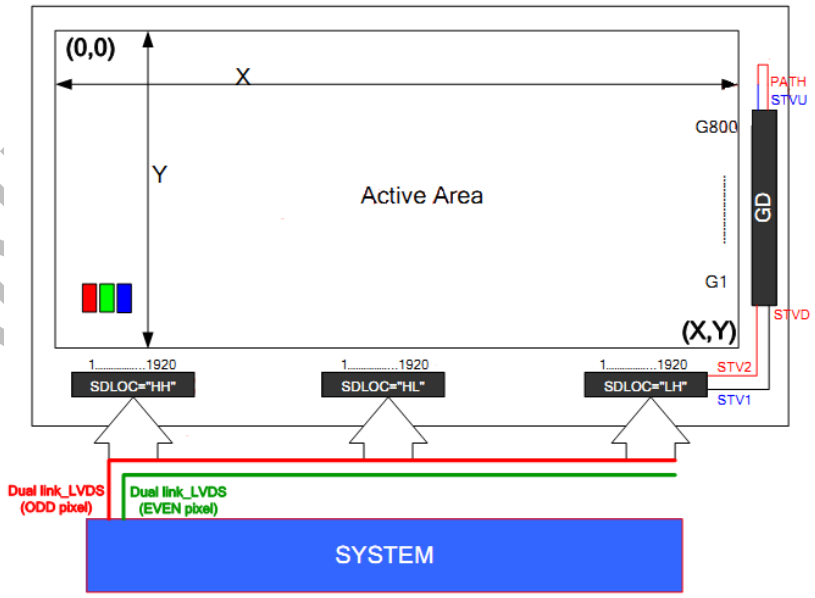
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4.3 TFT Block Diagram



4.4 Location Setting for Gate Driver and Source Driver



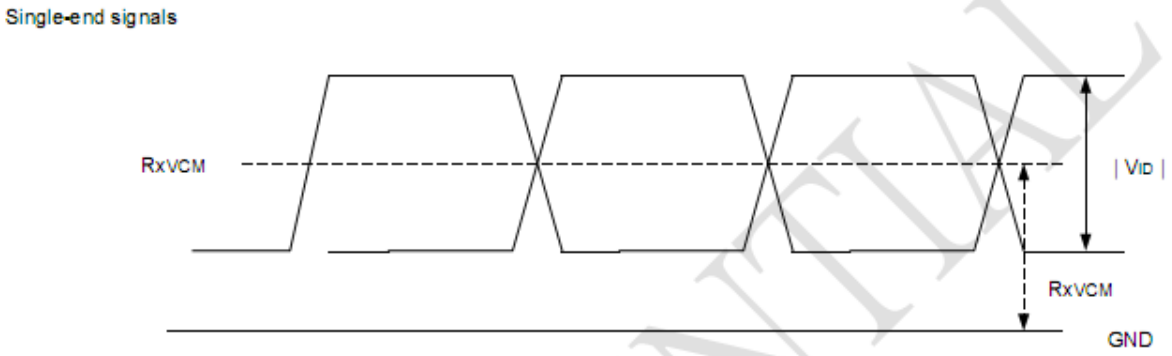
Note: In Dual-Link LVDS mode: The first pixel on panel (top-left) is odd.

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5. Timing Chart

5.1 LVDS Interface DC Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential Input common Mode voltage	R_{XVCM}	1	1.2	1.4	V	-
Differential Input voltage	$\|V_{ID}\|$	0.1	-	$(1.5-R_{xVCM})*2$	V	-
Differential Input leakage Current	RVXIiz	-10	-	10	uA	-

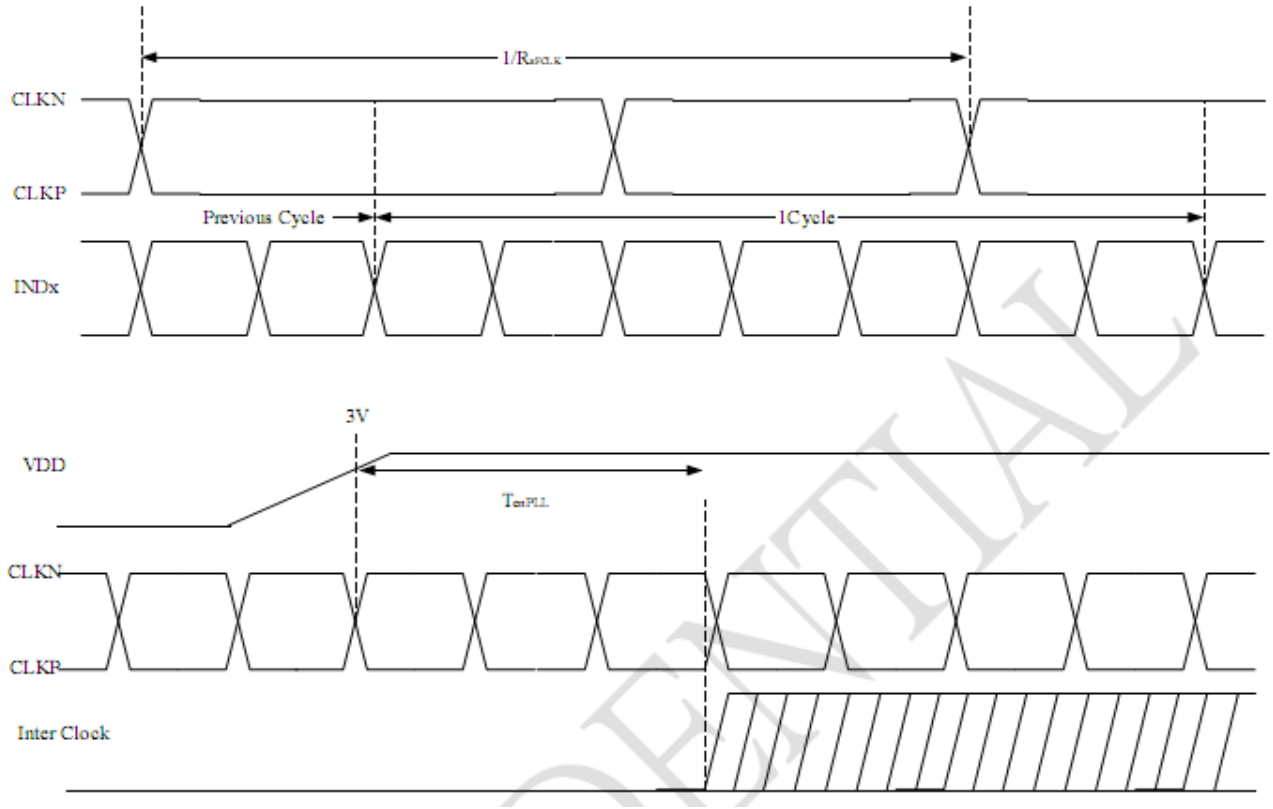


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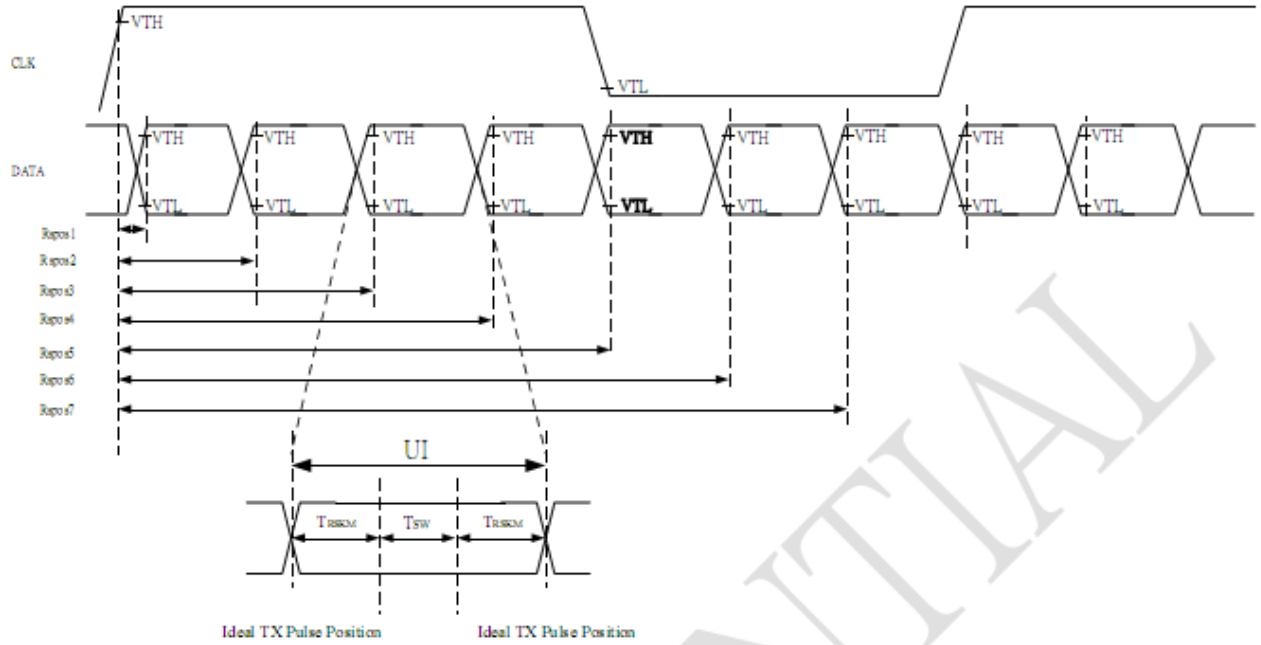
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5.2 AC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	RXFCLK	10	-	110	MHz	
1 data bit time	UI		1/7		1/RXFCLK	
Position 1	Rspos1	-0.2	0	0.2	UI	
Position 2	Rspos2	0.8	1	1.2	UI	
Position 3	Rspos3	1.8	2	2.2	UI	
Position 4	Rspos4	2.8	3	3.2	UI	
Position 5	Rspos5	3.8	4	4.2	UI	
Position 6	Rspos6	4.8	5	5.2	UI	
Position 7	Rspos7	5.8	6	6.2	UI	
Input data skew margin	T_{RSKM}	-	-	0.2	UI	|VID|=100mV RXVCM=1.2V RXFCLK=75MHz
Clock high time	T_{LVCH}	-	4/(7*RXFCLK)	-	ns	
Clock low time	T_{LVCL}	-	3/(7*RXFCLK)	-	ns	
PLL wake-up time	T_{enPLL}	-	-	150	us	



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TRSKM: Receiver strobe margin
Tsw : Strobe width (internal data sampling window)
VTH=Rxvcm+|Vid|/2, VTL=Rxvcm-|Vid|/2

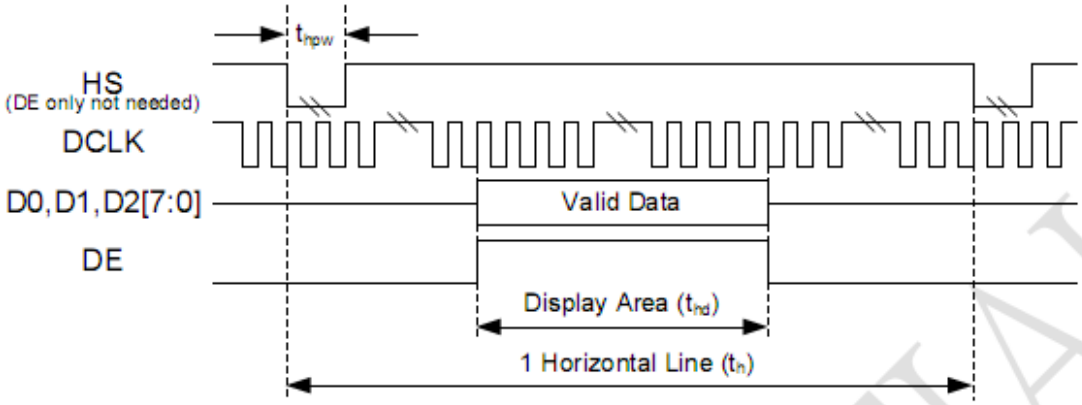
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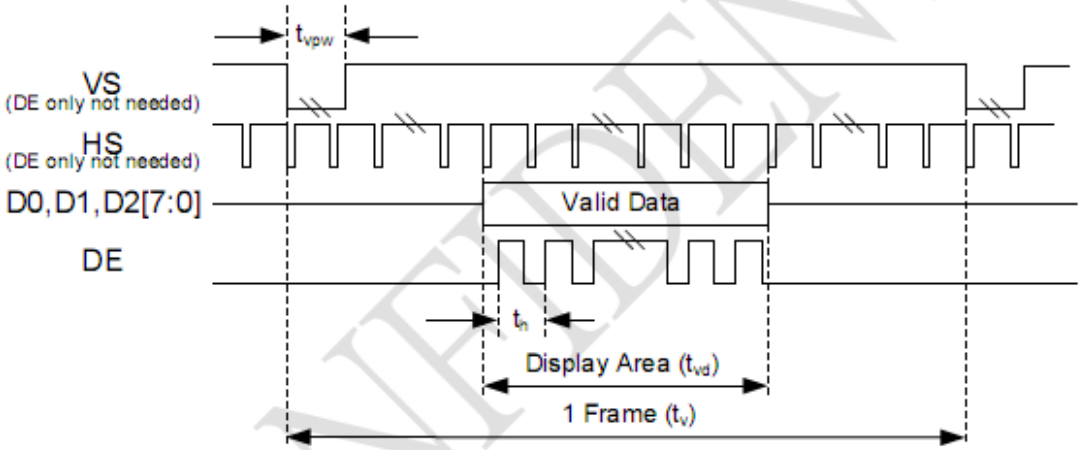
5.3 Timing input format

DE Mode Data Input Format for IC as source driver with timing controller

Horizontal



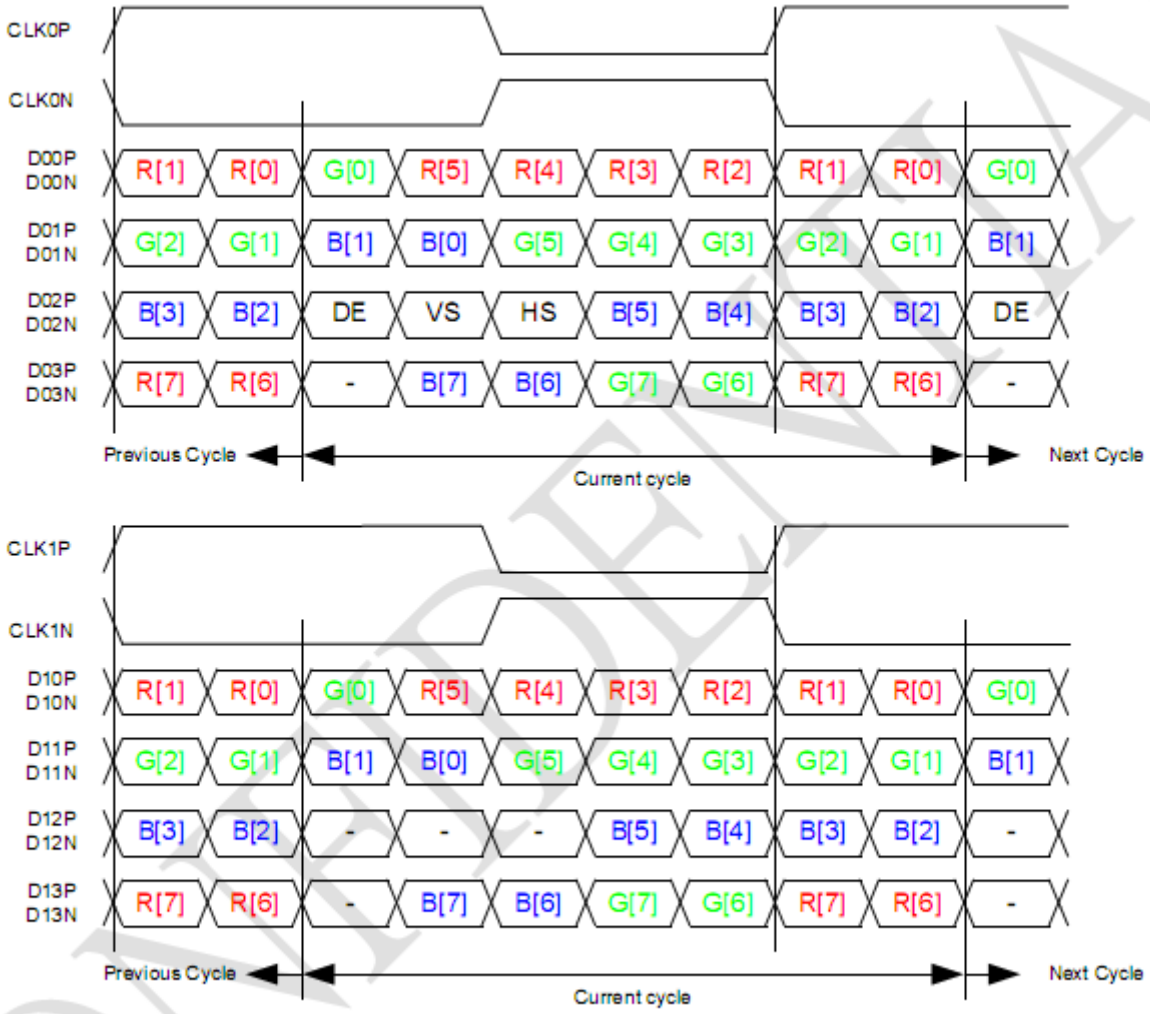
Vertical



Parameter	Symbol	1920RGBx1080 (Two Port)			Unit	Note
		Min.	Typ.	Max.		
DCLK Frequency	F_{DCLK}	66.46	66.85	83.42	MHz	
Horizontal valid data	t_{hd}		960		DCLK	
1 Horizontal Line	t_h	1020	1024	1150	DCLK	
Vertical valid data	t_{vd}		1080		H	
1 Vertical field	t_v	1086	1088	1209	H	if thermal enable, V-blank > 5line+315us
Frame rate	FR		60		Hz	

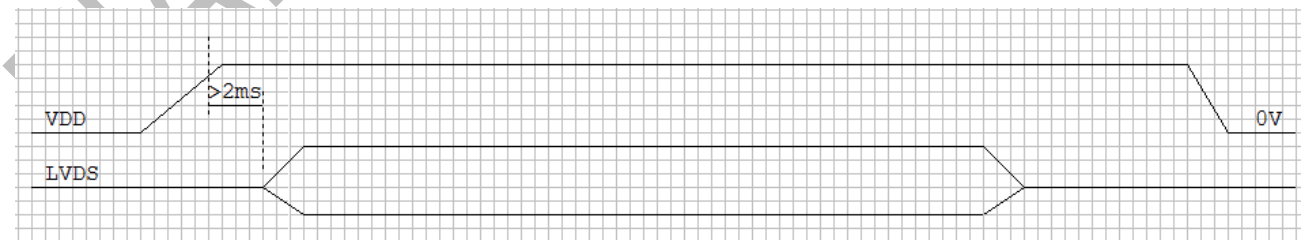
5.4 Data input format

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2-port LVDS signals, VESA format

POWER on/off timing



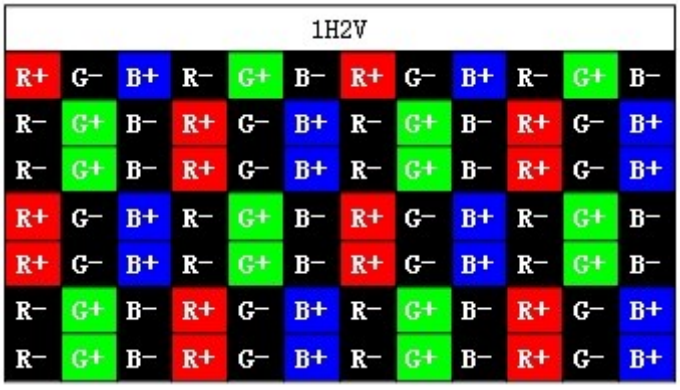
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6. Optical Characteristics

6.1 TFT Optical Characteristics

Item		Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles		θT	CR≧10	70	88	-	Degree	Note 2
		θB		70	88	-		
		θL		70	88	-		
		θR		70	88	-		
Contrast Ratio		CR	θ=0°	700	900	--		Left/right 0° Top/bottom 5°
Response Time		T_r	25℃	-	25	35	ms	Note1 Note4
		T_f						
Chromaticity	White	x	Backlight is on	0.254	0.304	0.354		Note5 Note1
		y		0.273	0.323	0.373		
	Red	x		0.581	0.631	0.681		
		y		0.286	0.336	0.386		
	Green	x		0.262	0.312	0.362		
		y		0.562	0.612	0.662		
	Blue	x		0.099	0.149	0.199		
		y		0.003	0.053	0.103		
Uniformity		U		70	80	-	%	Note1 Note6
NTSC				65	70	-	%	
Luminance		L		1400	1600	-	cd/m^2	Note7
Flicker				-	-	-30	dB	Note8
Crosstalk				-	-	1.2	%	

Test Conditions:
1. I_F= 40mA (one channel), the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.
3. Flicker pattern: 128 Grayscale

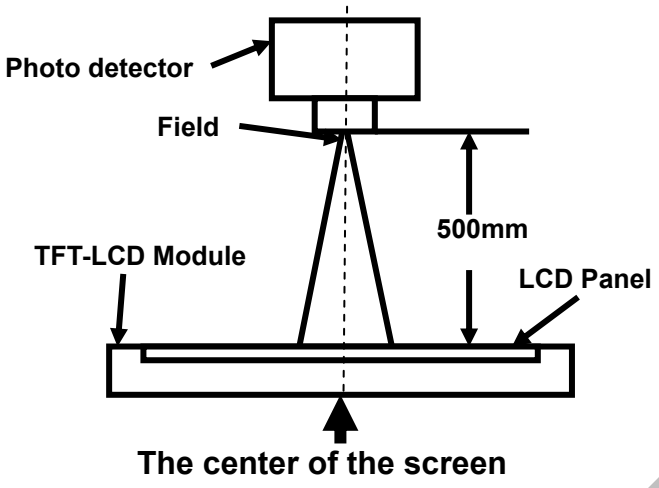


Note 1: Definition of optical measurement system.
The optical characteristics should be measured in dark room. After 10 Minutes operation, the optical

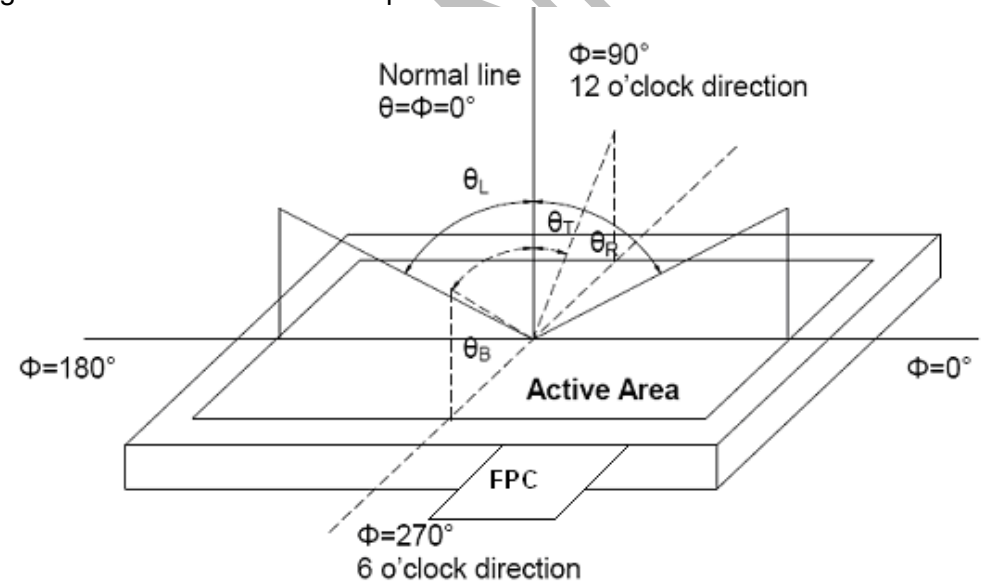
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properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



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



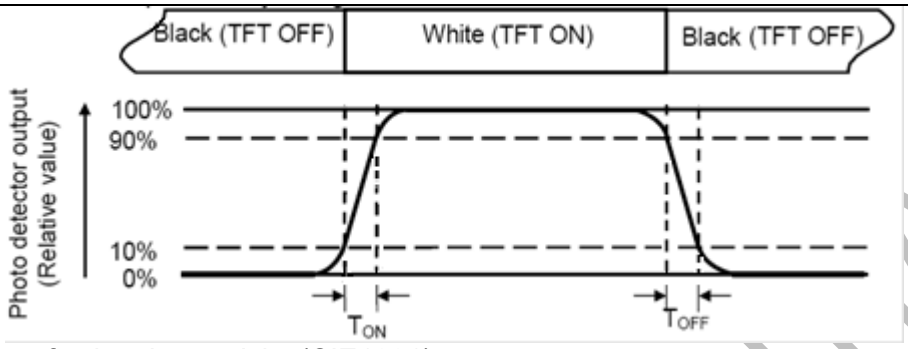
Note 3: Definition of contrast ratio

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

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

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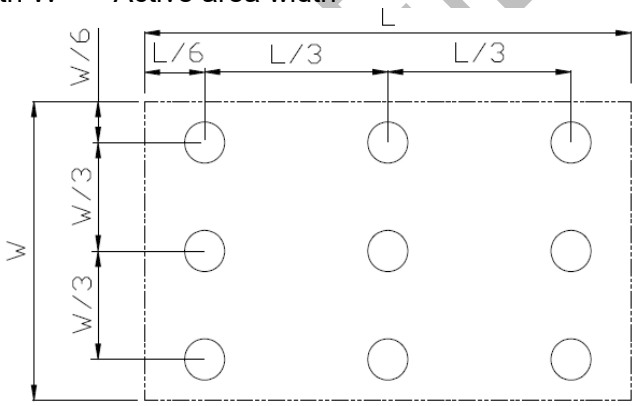


Note 5: Definition of color chromaticity (CIE1931)
Color coordinates measured at center point of LCD.

Note 6: Definition of Luminance Uniformity
Active area is divided into 9 measuring areas. 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.

Note 8：Flicker should be measured by CA 310.

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7 Environmental / Reliability Test

No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +80℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -20℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +85℃, 240 hours	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30℃, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	High Temperature & High Humidity	Ta=+60℃、RH=90%, 240 hours (Storage)	IEC60068-2-78 :2001 GB/T2423.3-2006
6	Thermal Shock	-30℃（30min）- 80℃（30min）, Change Time:5min,100cycle;	Start with cold temperature, End with high temperature. IEC60068-2-14:1984 GB2423.22-2012
7	ESD	C=150pF, R=330Ω, 5point/panel Air: ±8KV, 5times Contact: ±4KV, 5times (Environment:15℃~35℃,30%~60%, 86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006
8	Shock (Non-operation)	Half Sine Wave 60G, 6ms, ±X, ±Y, ±Z 3times for each direction	IEC 60068-2-27:1987 GB/T 2423.5-1995
9	Package Drop	Height:60cm, 1corner,3edges,6surfaces	IEC60068-2-32 GB/T2423.8

Note1: Ta is the ambient temperature of sample.

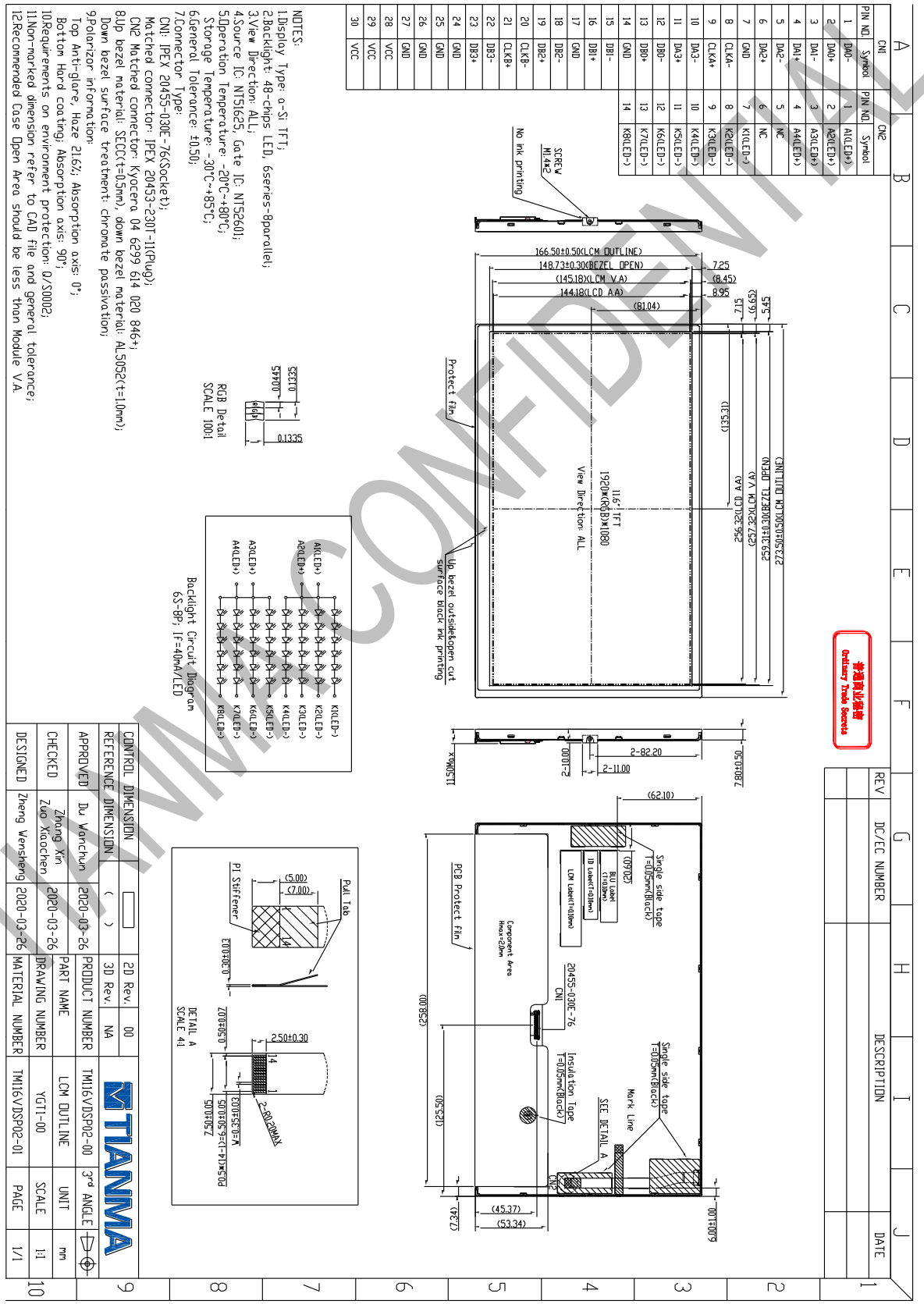
Note2: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.

Note3: 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.

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8 Mechanical Drawing



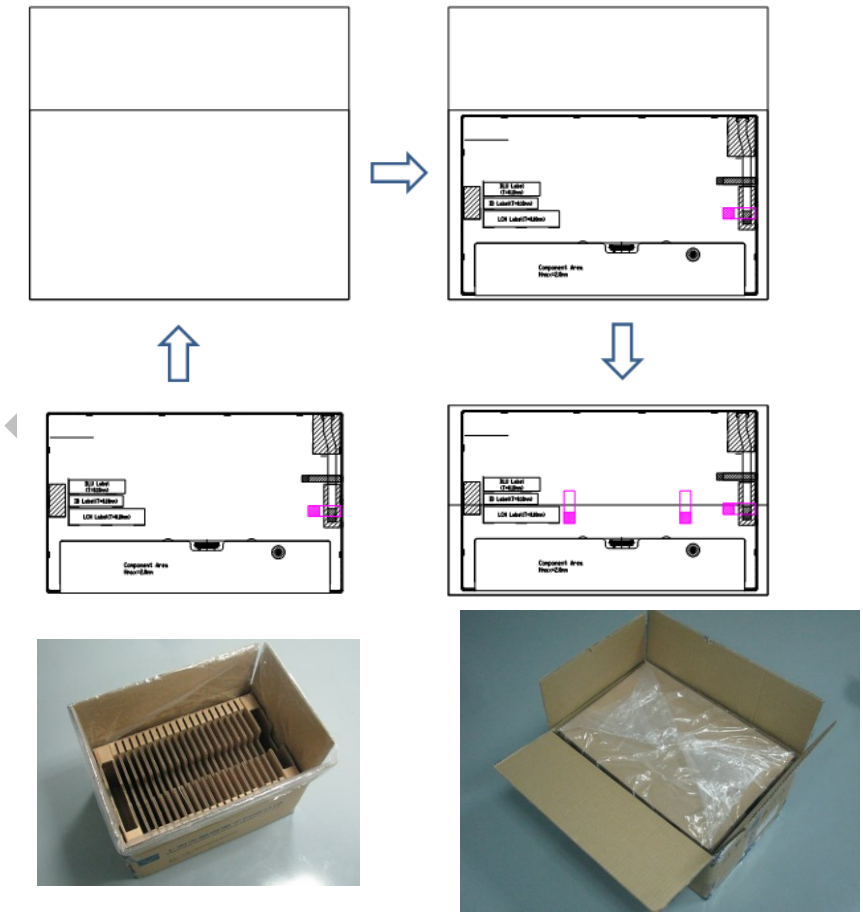
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9. Packaging Material

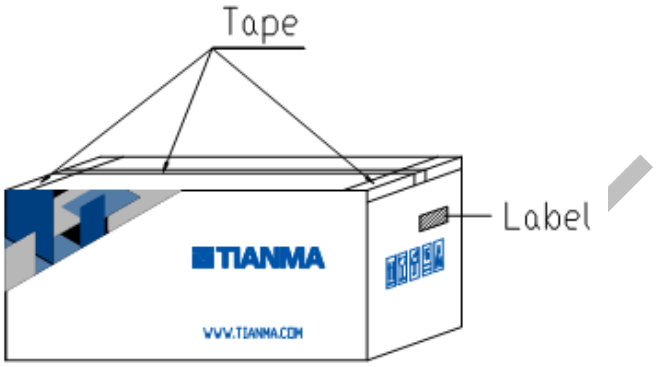
No	Item	Model (Material)	Dimensions(mm)	Unit Weight(Kg)	Quantity
1	LCM module	TM116VDSP02-00	273.50*166.50*7.80	0.252	14
2	Partition_1	Corrugated Paper	513.00×413.00×240	1.42	1
3.	Anti-Static Bubble Bag	PE	270×295	0.01	14
4	Dust-Proof Bag	PE	700*545	0.06	1
5	Partition_2	Corrugated Paper	513×413	0.1	1
6	Corrugated Bar	Corrugated Paper	367×305×48	0.08	1
7	Crepe Paper Tape	Tape	30*10	0.00003	42
8	Carton	Corrugated Paper	530×430×274	0.76	1
9	LABEL	Label	100×52	0.000345	1
10	Total weight	6.09±5%Kg			

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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 alcohol

Solvents 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.

a. Be sure to ground the body when handling the LCD Modules.
b. Tools required for assembly, such as soldering irons, must be properly ground.
c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
d. 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.

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

10.4 Bar Code definition on module



Take TM062RDS01 as an example.
Lot No:
01 1 A 1 14 9 23 001
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Management code
② Grade code
③ Version
④ Product line
⑤ Check year（14 meaning is 2014）
⑥ Check month（1~9、A meaning is October, B meaning is November, C meaning is December）
⑦ Check date（01~31）
⑧ Lot Serial No

OEM No：

S 062RD1 A 66 SA 1 SA 1 497 0007
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

① AVIC code
② Product No.
③ Version
④ Source IC&Gate IC vender code
⑤ Cell location code

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⑥ Cell line code
⑦ Module location code
⑧ Module line code
⑨ YEAR：0~9(1 meaning is 2011，2 meaning is 2012)，month：1~9，A~C，date：1~9，A~V。
⑩ Serial No.

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