MODEL NO : TM116VDSP03

MODEL VERSION: 00

SPEC VERSION : 2.0

ISSUED DATE: 2020-11-10

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

Customer :

Approved by	Notes

TIANMA Confirmed :

Prepared by	Checked by	Approved by

This technical specification is subjected to change without notice

Table of Contents

Record of Revision

Rev	Issued Date	Description	Editor
1.0	2020-02-20	Preliminary Specification Release	Bei Lei
2.0	2020-11-10	Final Specification Release	Bei Lei

1. General Specifications

Feature		Spec
Display Spec.	Size	11.6inch
	Resolution	1920(RGB) X 1080
	Technology Type	a-Si
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel pitch(mm)	0.1335 x 0.1335
	Display Mode	Normally Black
	Surface Treatment	HC
	Viewing Direction	All
	Gray Scale Inversion Direction	N/A
Mechanical Characteristics	LCM (W x H x D) (mm)	273.50*166.50*7.80
	Active Area(mm)	256.32 x 144.18
	With /Without TSP	Without TSP
	Connection Type	LCM：IPEX 20453-230T-11(plug) IPEX 20455-030E-76 (socket) BL: Kyocera 04 6299 614 020 846+
	LED Numbers	54LEDs
	Weight (g)	527.78
Electrical Characteristics	Interface	LVDS
	Color Depth	16.7M
	Driver IC	NT51625*3+NT52601*2

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+HF

Note 3: LCM weight tolerance: ± 5%

2 Input/Output Terminals

2.1 Pin assignment (TFT Interface)

Recommend connector: IPEX 20453-230T-11(plug)
IPEX 20455-030E-76 (socket)

No	Symbol	I/O	Description	Remarks
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 0	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 2	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.

2.2 Pin assignment (Backlight Interface)

Recommend Connector: Kyocera 04 6299 614 020 846+

No	Symbol	I/O	Description	Remarks
1	A1(LED+)	P	Anode 1	
2	A2(LED+)	P	Anode 2	
3	A3(LED+)	P	Anode 3	
4	A4(LED+)	P	Anode 4	
5	NC	N	No Connect	
6	NC	N	No Connect	
7	NC	N	No Connect	
8	NC	N	No Connect	
9	K1(LED-)	P	Cathode 1	
10	K2(LED-)	P	Cathode 2	
11	K3(LED-)	P	Cathode 3	
12	K4(LED-)	P	Cathode 4	
13	K5(LED-)	P	Cathode 5	
14	K6(LED-)	P	Cathode 6	

I/O definition:

P---- Anode/ Cathode N—No Connect

3 Absolute Maximum Ratings

Ta=25℃

Item	Symbol	Min	Max	Unit	Remark
Power Voltage	VCC	-0.3	5	V	
Operating Temperature	T_{OPR}	-20	70	℃	Note1
Storage Temperature	T_{STG}	-30	80	℃	
Relative Humidity (Note1)	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/m^3	Ta＞70℃

Note1: 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

Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Power Supply Voltage	VCC	3.0	3.3	3.6	V	
Power supply current	Ivcc	320	470	700	mA	At VCC=3.3V reduce SD film thickness
Permissible ripple voltage	VRP	--	--	300	mVp-p	For VCC
Power For Analog Circuit	AVDD	10.5	10.7	10.9	V	
Gate On Voltage	VGH	19	20	21	V	
Gate On Voltage	VGL	-6.5	-7.0	-7.5	V	
Terminating resistance	RT	--	100	--	Ω	
(Panel+LSI) Power Consumption	White mode (60Hz)	--	1600	2400	mW	Reduce SD film thickness

Table 4.1 LCD module electrical characteristics

Note1: Power supply current and Power Consumption are just for reference because of limited test.

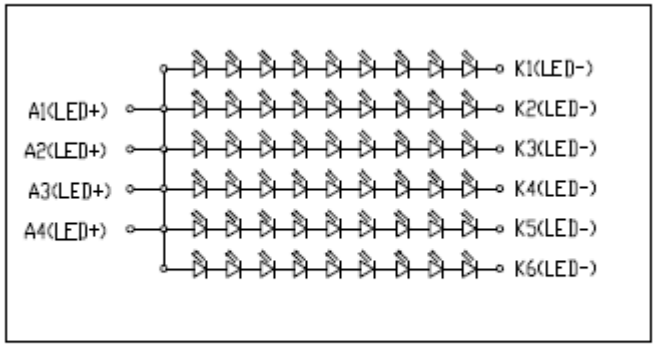
4.2 Driving Backlight

Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Forward Voltage (per string)	V_F	24.3	26.1	29.7	V	54LED(9LED Serial，6LED Parallel)
Forward Current(per string)	I_F	--	60	--	mA	
Backlight Power Consumption	W_{BL}	1458	1566	1782	mW	
LED life time	--	30000	50000	--	Hrs	

Table 4.2 Backlight Unit Electrical Characteristics

Note1: The figure below shows the connection of backlight LED.



Backlight Circuit Diagram
9S-6P; If=60mA/LED

Note2: Each LED : I=60 mA, V =2.9V

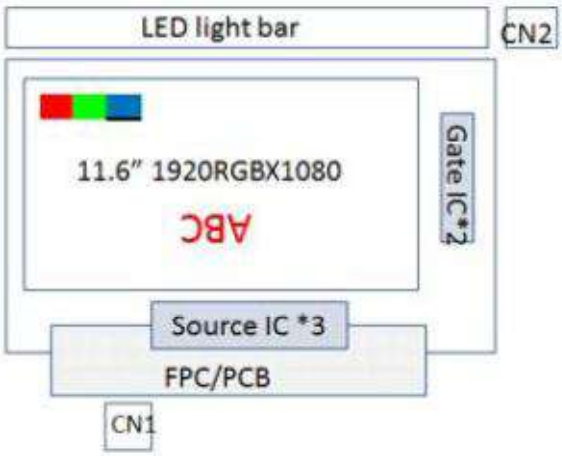
Note3: IF is defined for one channel LED.

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

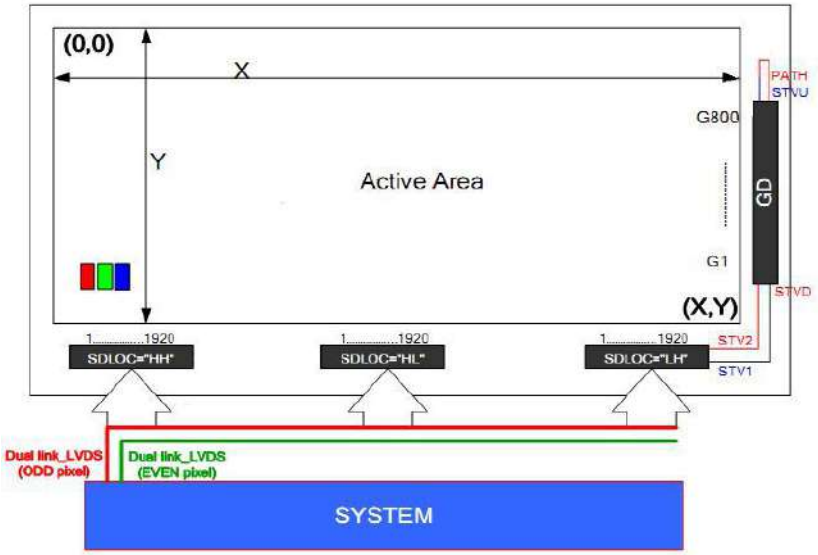
If LED is driven by high current, high ambient temperature & humidity condition, the life time of LED will be reduced.

Operating life means brightness goes down to 50% initial brightness. Typical operating life time is estimated data.

4.3 Clock Diagram



4.4 Location Setting for Gate Driver



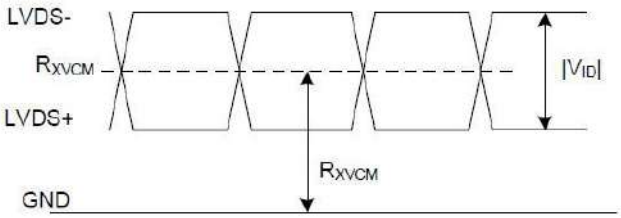
Note1: In Dual-Link LVDS mode: The first pixel on panel(top-left) is odd.

5 Timing Characteristics

5.1 LVDS Interface DC Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential input high threshold voltage	R_{xVTH}	-	-	+200	mV	
Differential input low threshold voltage	R_{xVTL}	-200	-	-	mV	
Differential input common mode voltage	R_{xVCM}	1.0	1.2	1.7-$\|V_{ID}\|$/2	V	
Differential input voltage	$\|V_{ID}\|$	200	-	600	mV	
Input Terminal Resistance tolerance	R_{TERM}	-20%	-	+20%	%	RTERM[2:0] ≠ "HHH"
Differential input leakage current	I_{xVLK}	-10	-	+10	uA	VCC_IF=1.8V, CLKP/N, DxP/N RTERM[2:0] = "HHH"
LVDS Digital Stand-by current	I_{xVST}	-	-	150	mA	VCC_IF=1.8V, Clock & all functions are stopped, STBYB = L
LVDS Digital Operating current	I_{xVOP}	-	-	40	uA	VCC_IF=1.8V, F_{CLK} =85MHz, Data pattern: 55h→AAh→55h→AAh

Single-end Signal



Differential Signal

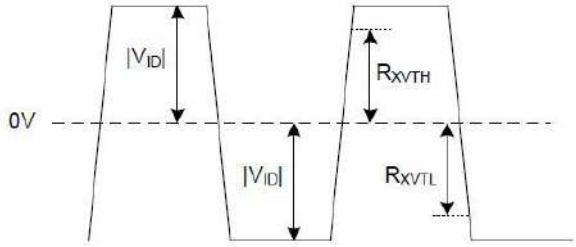


Figure 5.1 LVDS DC Diagram

5.2 AC characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Clock frequency	FLVCLK	25	-	85	MHz	Refer to input timing table for each display resolution.
Clock Period	TLVCLK	40	-	11.76	nsec	
Clock high time	TLVCH	-	4/(7* RXFCLK)	-	ns	
Clock low time	TLVCL	-	3/(7* RXFCLK)	-	ns	
Input data skew margin	TRSKM	-	-	0.25	UI	VCC_IF=1.8V w/o SSC
Strobe width	TSW	0.5	-	-	UI	
1 data bit time	UI	-	1/7	-	TLV CLK	
Position 1	TPOS1	-0.25	0	0.25	UI	
Position 0	TPOS0	0.75	1	1 25	UI	
Position 6	TPOS6	1.75	2	2 25	UI	
Position 5	TPOS5	2.75	3	3 25	UI	
Position 4	TPOS4	3.75	4	4 25	UI	
Position 3	TPOS3	4.75	5	5 25	UI	
Position 2	TPOS2	5.75	6	6 25	UI	
PLL wake-up time	TenPLL	-	-	150	us	
Modulation Frequency	SSCMF	23	-	93	KHz	
Modulation Rate	SSCMR	-3	-	+3	%	LVDS clock = 81MHz, center spread

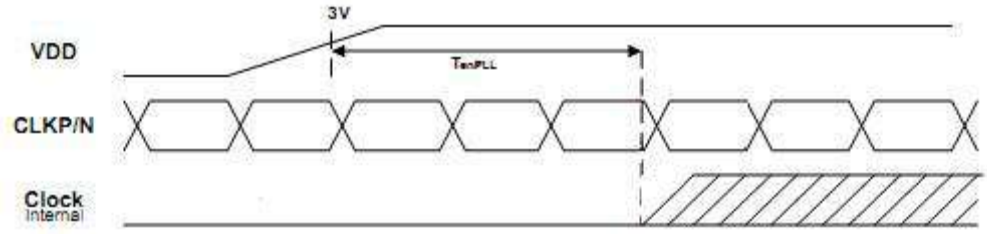


Figure 5.2.1 Relationship between VDD, LVDS clock, and internal clock

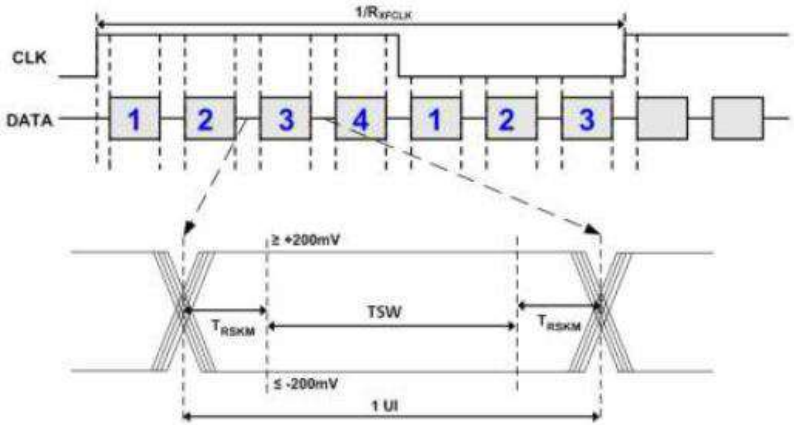


Figure 5.2.2 LVDS Data Skew

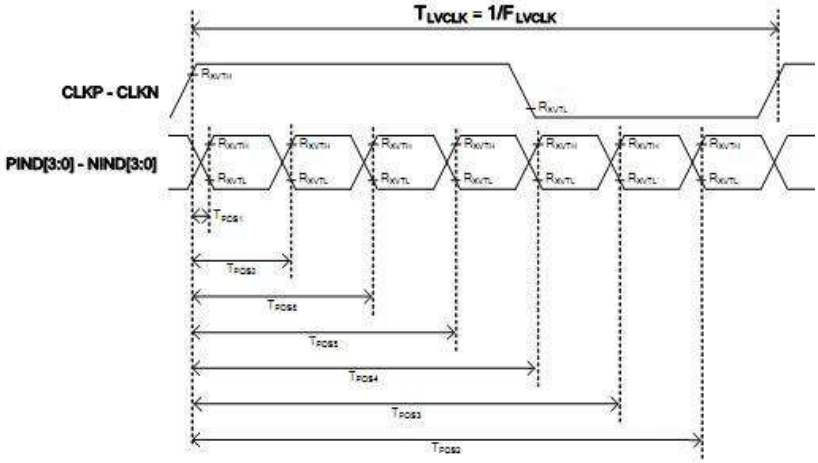
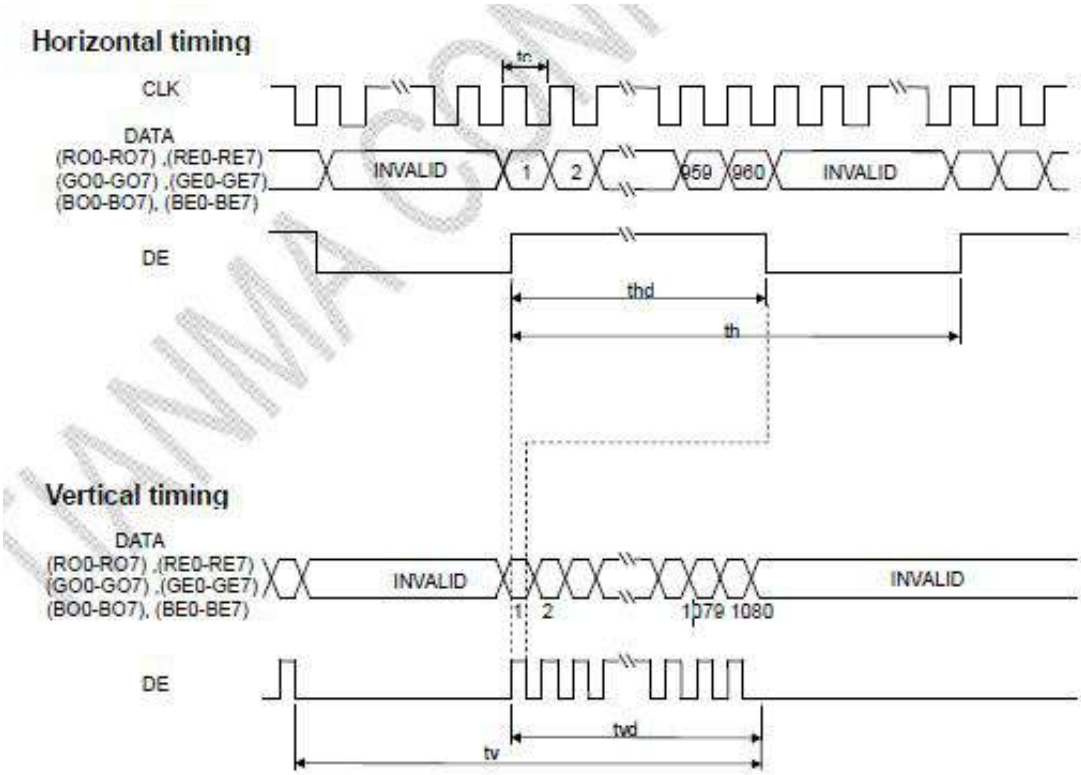


Figure 5.2.3 LVDS input timing

5.3 Timing input format

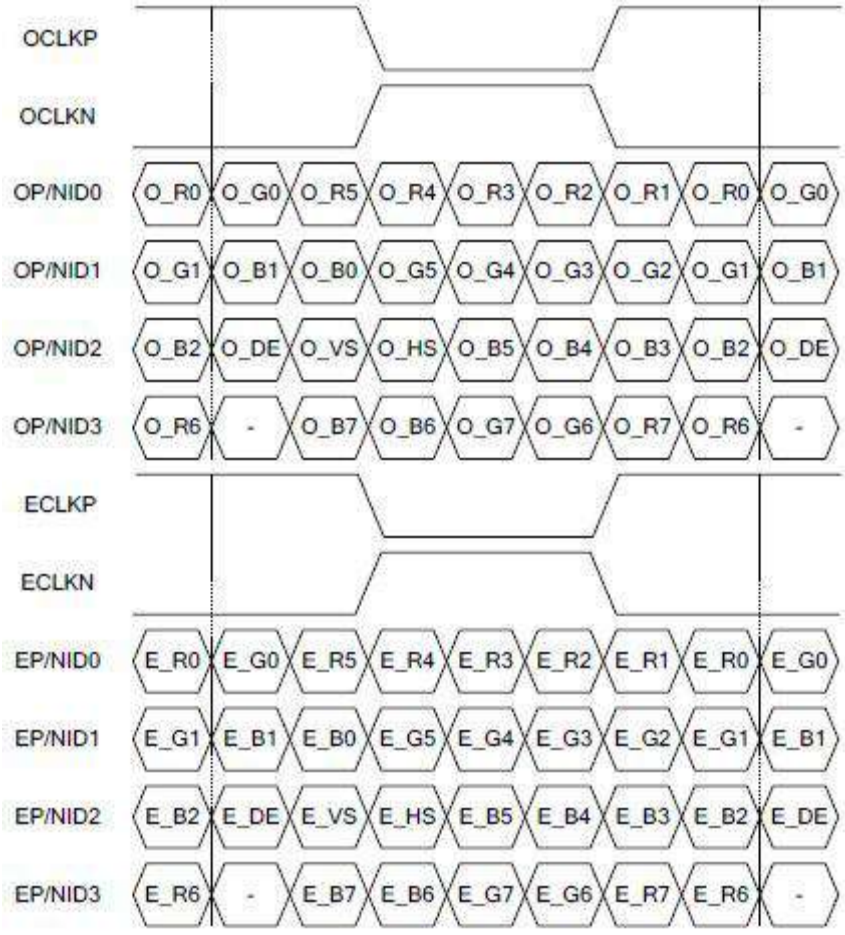


5.3.1 Timing characteristics

Parameter			Symbol	min.	typ.	max.	Unit	Remarks
CLK	Frequency		1/tc	66.6	66.8	75.1	MHz	14.97 ns (typ.)
DE	Horizontal	Cycle	th	1020	1024	1150	CLK	
		Display period	thd	960			CLK	-
	Vertical (One frame)	Cycle	tv	1086	1088	1209	H	
		Display period	tvd	1080			H	

Note1: Definition of parameters is as follows.
tc= 1CLK, th= 1H
Note2: See the data sheet of LVDS transmitter.
Note3: Vertical cycle (tv) should be specified in integral multiple of Horizontal cycle (th).

5.4 Data input format



8-bit LVDS Dual Link VESA

6 Optical Characteristics

6.1 Optical Specification

Ta=25℃

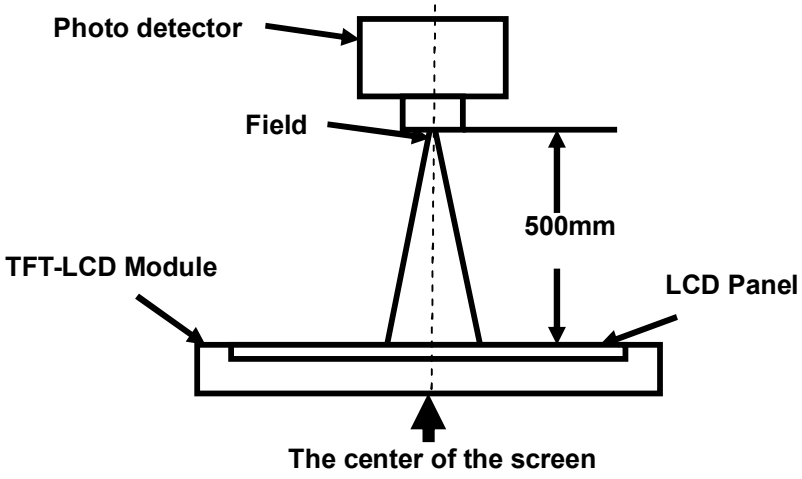
Item		Symbol	Condition	Min	Typ.	Max.	Unit	Remark
View Angles		θT	CR≧10	70	88	--	Degree	Note 2
		θB		70	88	--		
		θL		70	88	--		
		θR		70	88	--		
Contrast Ratio		CR	θ=0°	700	900	--		Note1 Note3
Response Time		T_{ON}	25℃	--	25	35	ms	Note1 Note4
		T_{OFF}						
Chromaticity	White	x	Backlight is on	0.260	0.310	0.360		Note5, Note1
		y		0.290	0.340	0.390		
	Red	x		0.581	0.631	0.681		
		y		0.287	0.337	0.387		
	Green	x		0.255	0.305	0.355		
		y		0.568	0.618	0.668		
	Blue	x		0.101	0.151	0.201		
		y		0.006	0.056	0.106		
Uniformity		U		70	80	--	%	Note1 Note6
NTSC				65	70	--	%	Note 5
Luminance		L		800	1000	--	cd/m^2	Note1 Note7

Test Conditions:

1. V_F =2.9V, I_F =60mA(LED current), the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note2.

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 EZ-Contrast。

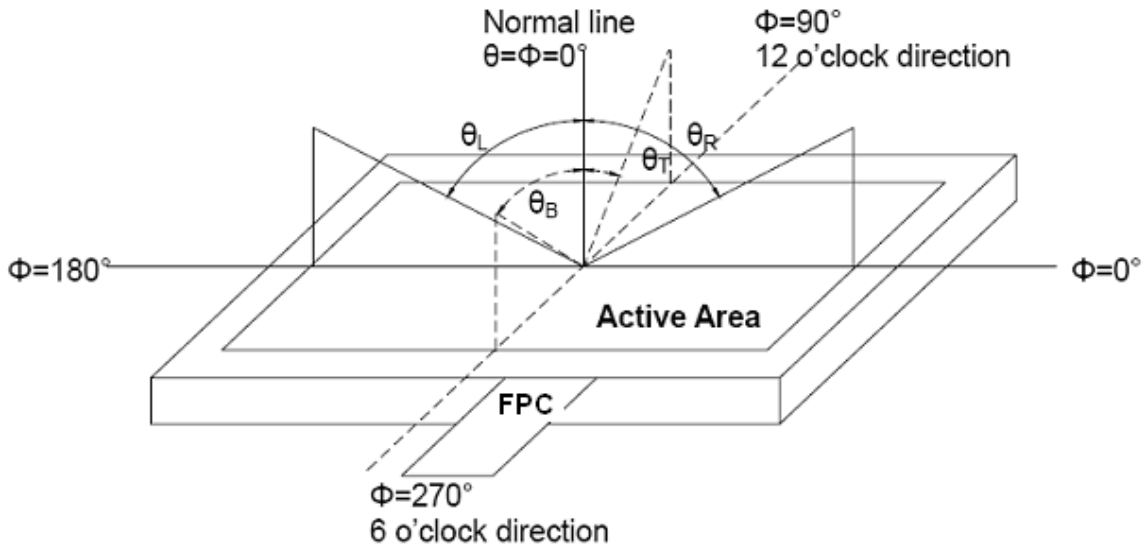


Fig. 1 Definition of viewing angle

Note 3: Definition of contrast ratio

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

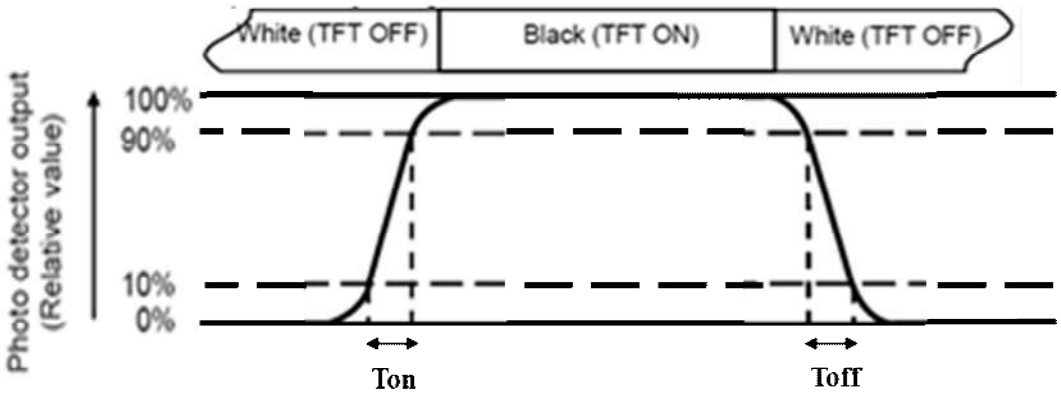
“White state “:The state is that the LCD should driven by Vwhite.

“Black state”: The state is that the LCD should 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 (TON) is the time between photo detector output intensity changed from 90% to 10%. And fall time (TOFF) 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

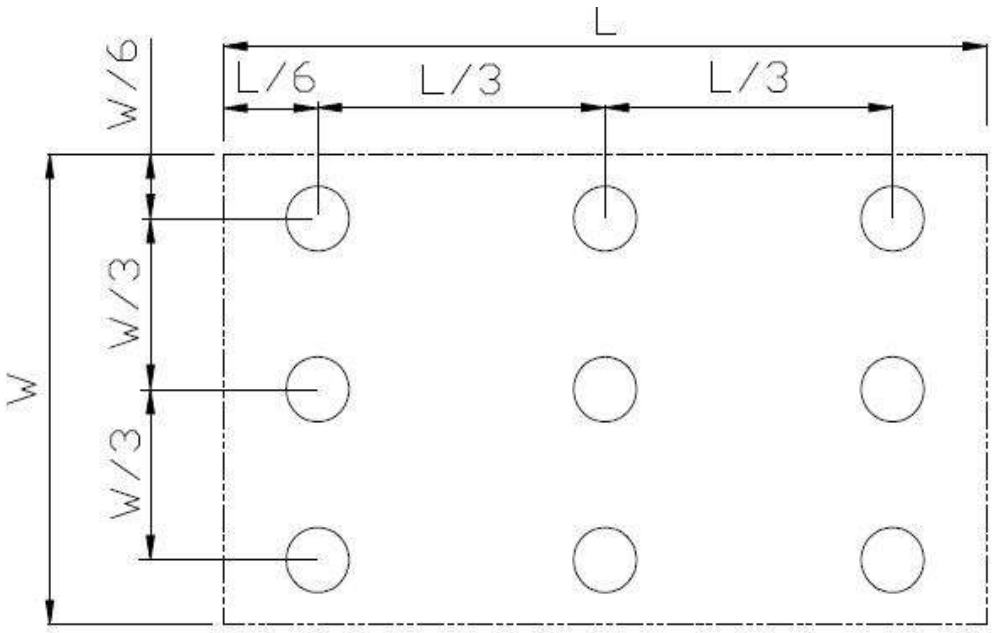


Fig. 2 Definition of uniformity

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.

7 Environmental / Reliability Tests

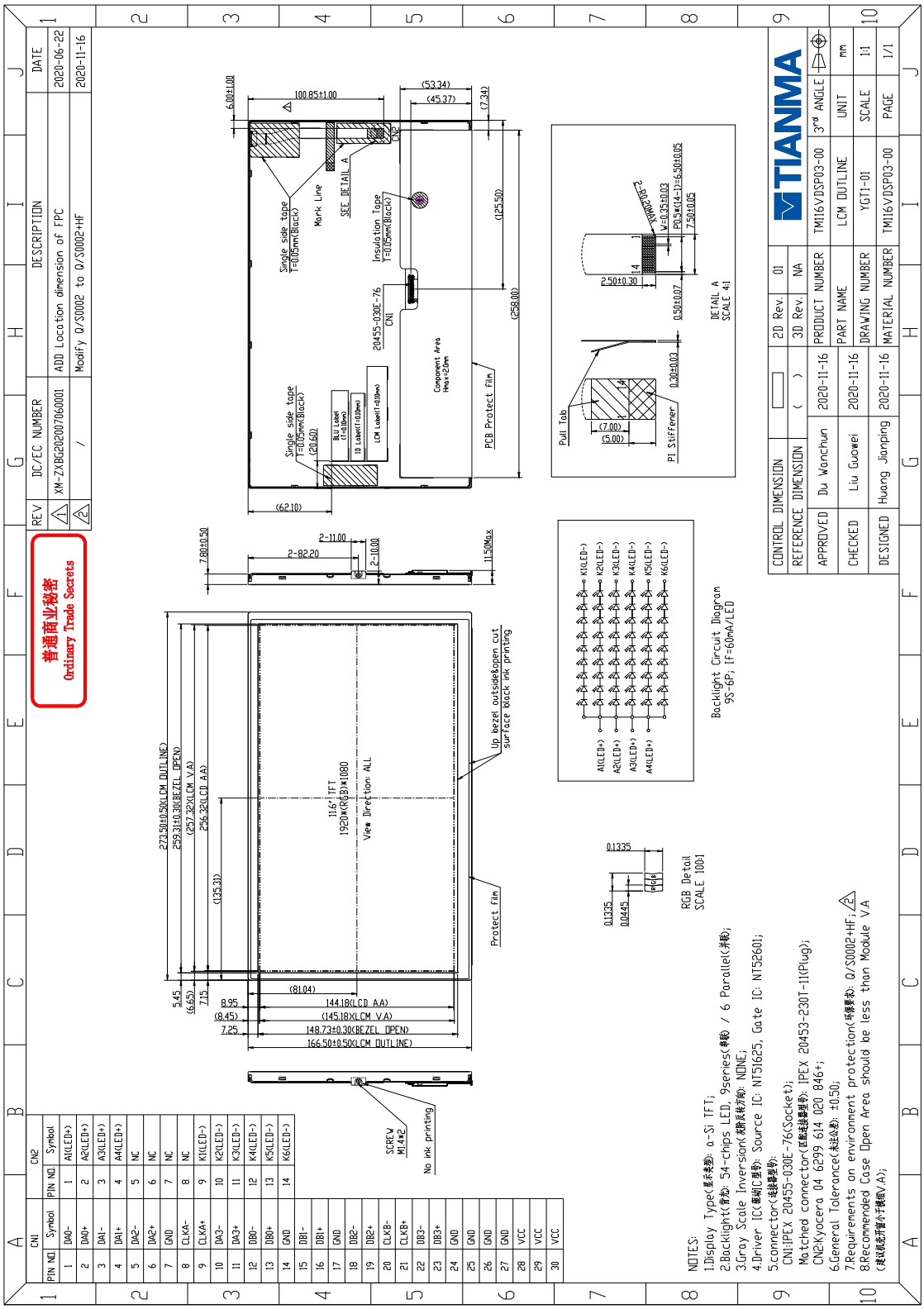
No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta=+70℃, 240hrs	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta=-20℃, 240hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta=+80℃, 240hrs	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta=-30℃, 240hrs	IEC60068-2-1:2007 GB2423.1-2008
5	Temperature & Humidity Operation	Ta=60℃, 90% RH 240 hours	IEC60068-2-78 :2001 GB/T2423.3-2006
6	Thermal Shock (Non-operation)	-30℃ 30 min~+80℃ 30 min, Change time:5min, 100 Cycles	Start with cold temperature, End with high temperature, IEC60068-2-14:1984,GB2423.22-2012
7	Electro Static Discharge (Operation)	C=150pF, R=330Ω，5points/panel Air:±8KV, 5times; Contact:±4KV, 5 times; （Environment: 15℃～35℃, 30%～60%, 86Kpa～106Kpa）	IEC61000-4-2:2001 GB/T17626.2-2006
8	Vibration (Non-operation)	Frequency range：10~55Hz Stroke：1.5mm Sweep：10Hz~55Hz~10Hz 2h for x,y,z（total 6h）	IEC60068-2-6:1982 GB/T2423.10-2008
9	Shock (Non-operation)	Half Sine Wave 60G ,6ms,±X,±Y,±Z 3times for each direction	IEC60068-2-27:1987 GB/T2423.5-1995
10	Package Drop Test	Height: 60 cm, 1 corner, 3 edges, 6 surfaces	GB/T 4857.5-1992

Note 1: Ta is the ambient temperature of sample.

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

Note 3: 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.

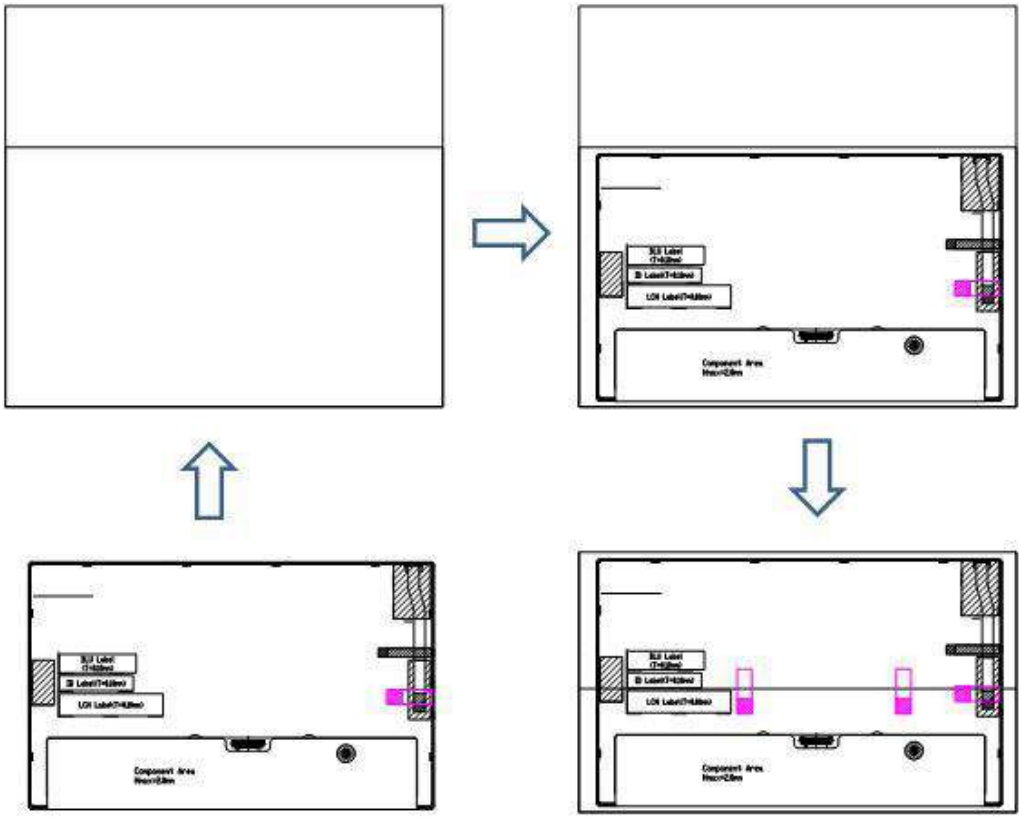
8 Mechanical Drawing

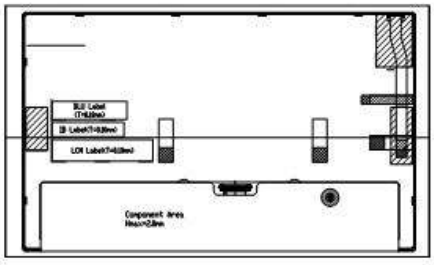


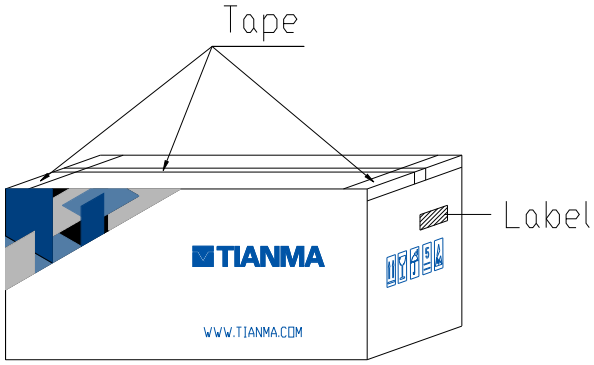
9 Packing drawing

No	Item	Model (Materiel)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Remark
1	LCM Module	TM116VDSP03-00	273.50*166.50*7.80	527.78	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	Anti-static
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	Beauty-grain	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	7.39±5%Kg				

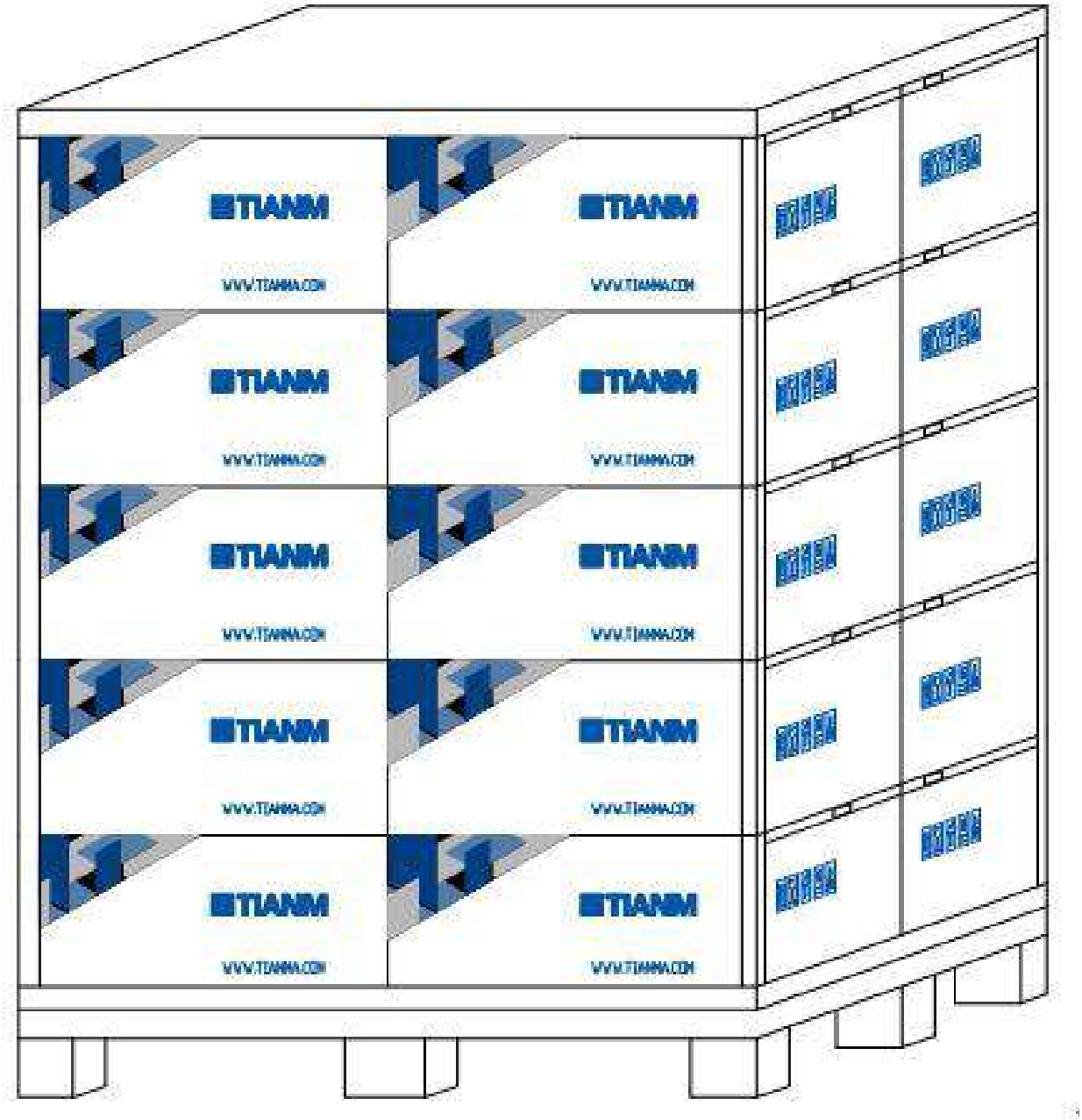
Total LCM quantity in Carton: 14







纸箱堆叠数按2×2/每层×共5层



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.

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.