

**MODEL NO : TM104TDGP10****MODEL VERSION: 00****SPEC VERSION : Ver 2.3****ISSUED DATE: 2021-12-02**

- ☐ Preliminary Specification  
☒ Final Product Specification

**Customer : \_\_\_\_\_**

Approved by	Notes

**TIANMA Confirmed :**

Prepared by	Checked by	Approved by
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## Record of Revision

Rev	Issued Date	Description	Editor
1.0	2019-01-14	Preliminary Product Specification Release	Panpan Cao
1.1	2019-07-17	Update mechanical drawing	Panpan Cao
1.2	2019-8-23	4.2 Driving Backlight Update LED life time 6 Optical Characteristics Update Luminance	Panpan Cao
1.3	2020-2-21	6 Optical characteristic Update Response time	Panpan Cao
1.4	2020-6-16	6 Optical characteristic Update Chromaticity Update mechanical drawing	Panpan Cao
2.0	2020-7-30	Final Product Specification Release	Panpan Cao
2.1	2020-9-3	Change Driving Backlight of page 11, High Level Input Voltage changed to 3.3V	Longping.Deng
2.2	2021-9-29	Update 4.1 Driving TFT LCD Panel& 4.2 Driving Backlight in page 8. Current of digital supply voltage: MAX 568mA Power consumption: MAX 1875mW Current of Backlight Power: MAX 0.46A Backlight Power Consumption: MAX5.52W	Panpan Cao
2.3	2021-12-02	Update LCM connector type in P4 ,P5 and P17	Panpan Cao

## 1 General Specifications

Feature		Spec
<b>Display Spec.</b>	Size	10.4 inch
	Resolution	1024(RGB) x 768
	Technology Type	a-Si
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel pitch(mm)	0.2055x0.2055
	Display Mode	TM with Normally Black
	Surface Treatment	Anti-Glare
	Viewing Direction	All direction
<b>Mechanical Characteristics</b>	LCM (W x H x D) (mm)	230.00x175.80x5.70
	Active Area(mm)	210.432×157.824
	With /Without TSP	Without TSP
	LCM connector	DF19K-20P-1H
	Matching Connector	DF19-20S-1C
	LED Numbers	32 pcs
	Weight (g)	430
<b>Electrical Characteristics</b>	Interface	1port LVDS, 6/8bit selectable
	Color Depth	16.7M/262K
	Driver IC	RM51150 *1+ RM76870*2

Note 1: Requirements on Environmental Protection: Q/S0002

Note 2: LCM weight tolerance: ± 5%

## 2 Input/Output Terminals

### 2.1 TFT LCD panel

CN1 Connector : DF19K-20P-1H

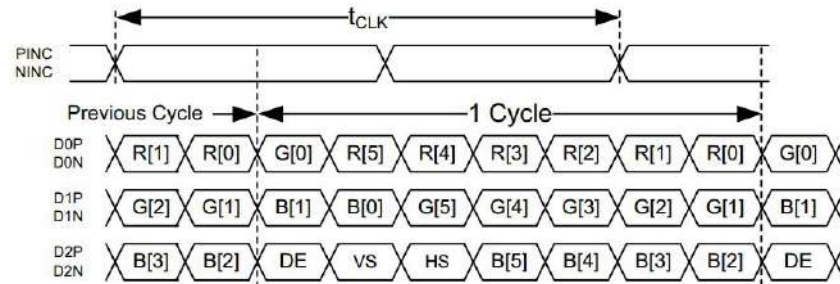
Matching Connector: DF19-20S-1C

Pin No	Name	Symbol	Pin Function Description
1	VDD	P	Power Voltage for digital circuit
2	VDD	P	Power Voltage for digital circuit
3	GND	P	Ground
4	DPS	I	L : Forward Scan H : Reverse Scan
5	RxCLKI N-	I	- LVDS differential clock input
6	RxCLKI N+	I	+ LVDS differential clock input
7	GND	P	Ground
8	RxIN0-	I	- LVDS differential data input
9	RxIN0+	I	+ LVDS differential data input
10	GND	P	Ground
11	RxIN1-	I	- LVDS differential data input
12	RxIN1+	I	+ LVDS differential data input
13	GND	P	Ground
14	RxIN2-	I	- LVDS differential data input
15	RxIN2+	I	+ LVDS differential data input
16	GND	P	Ground
17	RxIN3-	I	- LVDS differential data input
18	RxIN3+	I	+ LVDS differential data input
19	AG Mode	I	Normal operation/BIST pattern select H:BIST; L: Normal
20	HSD	I	6bit/8bit mode select : H:6bit; L:8bit

P: Power/GND; I: input pin

**Note1: LVDS 6-bit data mapping when SEL68/HSD=H as follows:**

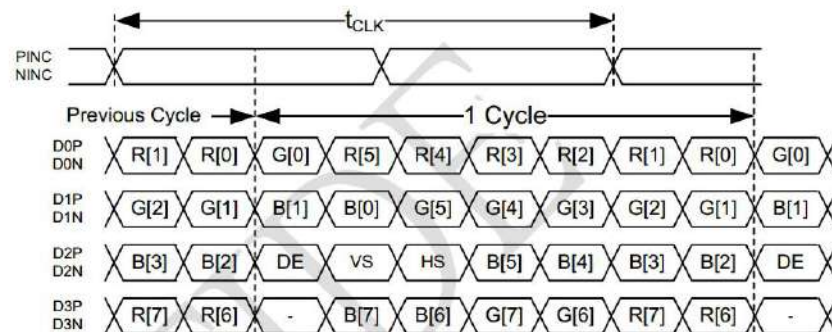
6-bit LVDS input ( HSD = "H" )



**Figure 2.1.1 Input signal data mapping**

**LVDS 8-bit data mapping when SEL68/HSD =L as follows:**

8-bit LVDS input ( HSD = "L" )



**Figure 2.1.2 Input signal data mapping**

**Note2: DPS: Scan direction setting**

DPS	Horizontal Scan direction	Vertical Scan direction
High	Right to left	Down to up
Low	Left to right	Up to down

## 2.2 CN2(Backlight Connector)

CN2 Connector: 3808K-F05N-03R (ENTERY)

Matching Connector: H208K-D05N-22B +M002N-F07N-22R

Pin No	Name	Symbol	Pin Function Description
1	VCC	P	Power Voltage for LED driver IC-12V
2	GND	P	Ground
3	Dimming	I	Dimming Control Input
4	EN	I	Enable (Active High) for LED driver IC
5	NC	-	No connection

P: Power/GND; I: input pin

### 3 Absolute Maximum Ratings

#### 3.1 Driving TFT LCD Panel

GND=0V, Ta = 25°C

Item	Symbol	Min	Max	Unit	Remark
Power Voltage for LCD	VDD	-0.5	5.0	V	Note1
Power for LED driving circuit	VCC	-0.3	13.0	V	
Input voltage for LCD	VIN	-0.5	5.0	V	
Input voltage for backlight	Vt	-0.3	13.0	V	Note2; Note3
Operating Temperature	TOPR	-20	+70	°C	Note4
Storage Temperature	TSTG	-30	+80	°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 <sup>3</sup>	Ta>70°C

**Table 3 Absolute Maximum Ratings**

Note1: V<sub>IN</sub> represents RxIN0±, RxIN1±, RxIN2±, RxIN3±, RxCLKIN±, DPS, AGMode, HSD.

Note2: V<sub>t</sub> represents EN and Dimming.

Note3: Should keep the maximum value of EN and Dimming are equal.

Note4: 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

GND=0V, Ta=25℃

Item		Symbol	MIN	TYP	MAX	Unit	Remark
Digital supply Voltage		VDD	3.1	3.3	3.5	V	
Input Signal Voltage	Low Level	V <sub>IL</sub>	0	-	0.3xVDD	V	R0~R7,G0~G7,0~B7,DE, DCLK,HSYNC,VSYNC,MODE, RESET, DITH
	High Level	V <sub>IH</sub>	0.7xVDD	-	VDD	V	
Current of digital supply voltage		I <sub>VDD</sub>	-	430	568	mA	VCC=3.3V,all white pattern
Power consumption		P	-	1419	1875	mW	This value may vary with different patterns.

**Figure 4.1.1 LVDS DC timing diagram**

Note1: For different LCM, the value may have a bit of difference.

Note2: There is tolerance in optimum VCOM voltage during production ,Minimum and maximum VCOM voltages indicate the range of optimum VCOM voltage shift due to production tolerance. Typ .VCOM is only a reference value, it must be optimized ,according to each LCM .Be sure to use VR.

### 4.2 Driving Backlight

Ta=25℃

Item	Symbol	Min	Typ	Max	Unit	Remark
Power for LED driving circuit	VCC	11.0	12.0	13.0	V	
Current of Backlight Power	I <sub>VCC</sub>	-	0.33	0.46	A	
Rush Current	I <sub>rush_VCC</sub>		-	1.5	A	
Backlight Power Consumption	W <sub>BL</sub>	-	3.96	5.52	W	
Dimming Frequency	F <sub>PWM</sub>	0.1K	-	20K	Hz	
Dimming duty cycle	-	0	-	100%	-	
High Level Input Voltage	V <sub>IH</sub>	3.0	3.3	3.5	V	For Dimming, EN pin
Low Level Input Voltage	V <sub>IL</sub>	-	-	0.5	V	For Dimming, EN pin
LED Life time	-	40000	50000		Hr	

Note1: 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.



The diagram illustrates the internal architecture of a 10.4-inch LCD module. The main display area is labeled "10.4'' 1024RGB\*768". It is connected to a "Source IC" and two "Gate IC"s. The "Source IC" is connected to the "FPC" (Flexible Printed Circuit). The "FPC" is connected to the "BLU LEDs" (Backlight Light Emitting Diodes) and the "BLU circuit". The "BLU circuit" is connected to the "CN2" (Connector 2). The "FPC" is also connected to the "LVDS Interface" (Low Voltage Differential Signaling Interface), which is connected to the "CN1" (Connector 1). The "LVDS Interface" is connected to the "Gamma Buffer" and the "DC-DC" (Direct Current-Direct Current) converter. The "Gamma Buffer" is connected to the "V1~V14" (Voltage 1 to Voltage 14) pins. The "DC-DC" converter is connected to the "AVDD, VGH, VGL, VCOM" (Analog Voltage, Gate Voltage High, Gate Voltage Low, and Common Voltage) pins. The "PCB" (Printed Circuit Board) is shown at the bottom right.

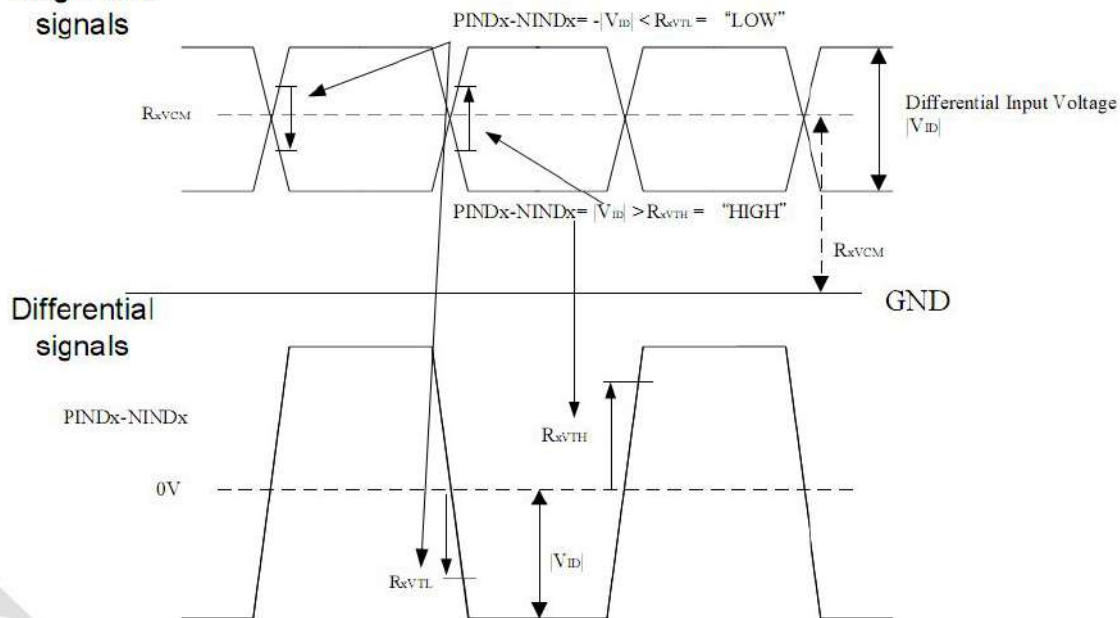
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## 5 Timing Chart

### 5.1 Timing Parameter

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Differential Input high Threshold voltage	$R_{XVTH}$	-	-	+0.2	V	$R_{XVCM}=1.2V$
Differential Input Low Threshold voltage	$R_{XVTL}$	-0.2	-	-	V	
Input voltage range (signaled-end)	$R_{XVIN}$	0	-	$VDD-1.2$	V	-
Differential Input common Mode voltage	$R_{XVCM}$	$ V_{ID} /2$	-	$VDD-1.2- V_{ID} /2$	V	-
Differential Input voltage	$ V_{ID} $	0.2	-	0.6	V	-
Differential Input leakage Current	$RV_{XIZ}$	-10	-	+10	$\mu A$	-
LVDS Digital Operating Current	$I_{ddlvds}$	-	15	30	mA	Fclk=65MHz, VDD=3.3V
LVDS Digital Stand-by Current	$I_{stlvds}$	-	10	50	$\mu A$	Clock & all functions are stopped

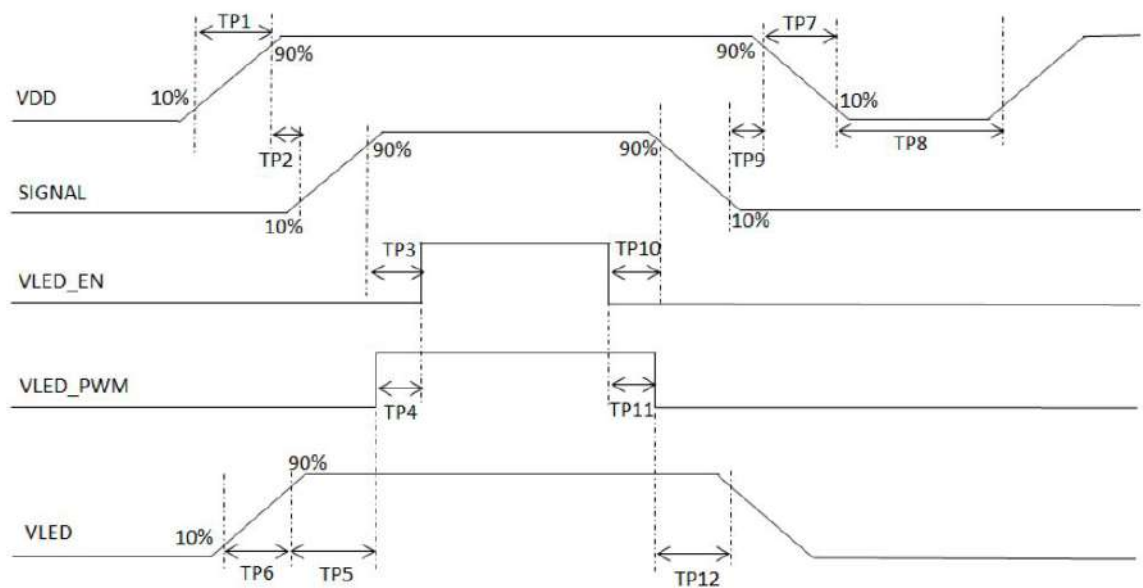
Single-end signals



## 5.2 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 VELD 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 5.2 Interface power on/off sequence**

### 5.3 Recommended Input Timing of LVDS transmitter

	Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Dclk frequency		1/Tclk	52	65	71	MHz	-
Horizontal section	Horizontal total	Th	1114	1344	1400	DCLK	-
	Horizontal blanking	Thb	90	320	376	DCLK	-
	Valid Data Width	Thd	1024			DCLK	-
Vertical section	Frame rate	-	-	60	-	Hz	-
	Vertical total	Tv	778	806	845	Th	-
	Vertical blanking	Tvb	10	38	77	Th	-
	Valid Data Width	Tvd	768			Th	-

#### Input Timing Control Conditions

## 6 Optical Characteristics

Ta=25℃

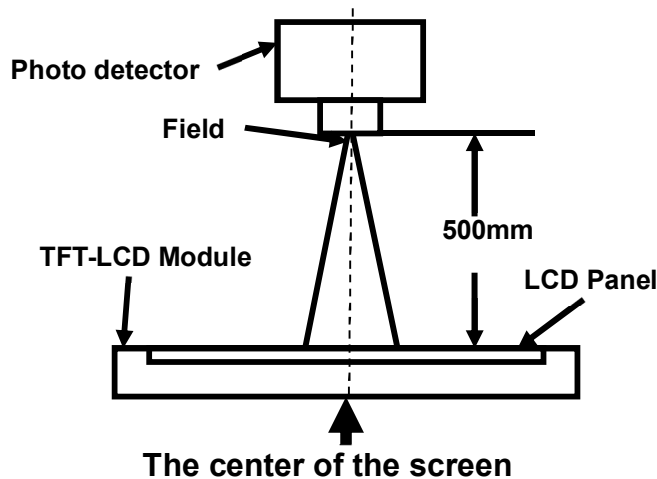
Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
<b>View Angles</b>	θT	CR≥ 10	75	85		Degree	Note2,3
	θB		75	85			
	θL		75	85			
	θR		75	85			
<b>Contrast Ratio</b>	CR	θ=0°	1000	1200			Note 3
<b>Response Time</b>	T <sub>ON</sub>	25℃	-	35	45	ms	Note 4
	T <sub>OFF</sub>						
<b>Chromaticity</b>	<b>White</b>	x	0.258	0.308	0.358		Note 1,5
		y	0.282	0.332	0.382		
	<b>Red</b>	x	0.548	0.598	0.648		Note 1,5
		y	0.272	0.322	0.372		
	<b>Green</b>	x	0.283	0.333	0.383		Note 1,5
		y	0.547	0.597	0.647		
	<b>Blue</b>	x	0.104	0.154	0.204		Note 1,5
		y	0.062	0.112	0.162		
<b>Uniformity</b>	U		75	85		%	Note 6
<b>NTSC</b>			45	50		%	Note 5
<b>Luminance</b>	L		400	450		cd/m <sup>2</sup>	Note 7

Test Conditions:

1. I<sub>F</sub>= 30 mA (for each LED), and the ambient temperature is 25℃.
2. The test systems refer to Note 1 and Note 2.

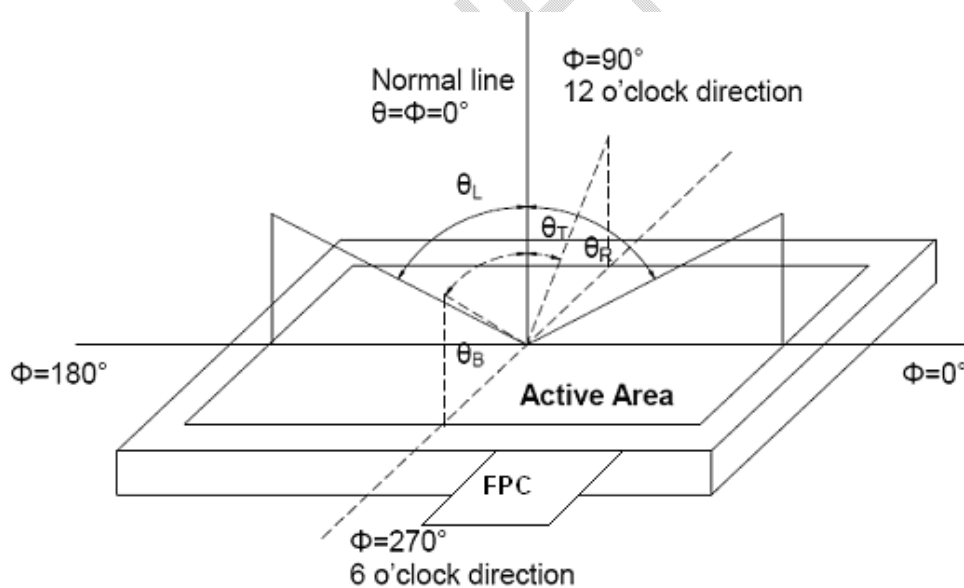
Note 1: Definition of optical measurement system.

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.



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 V<sub>white</sub>.

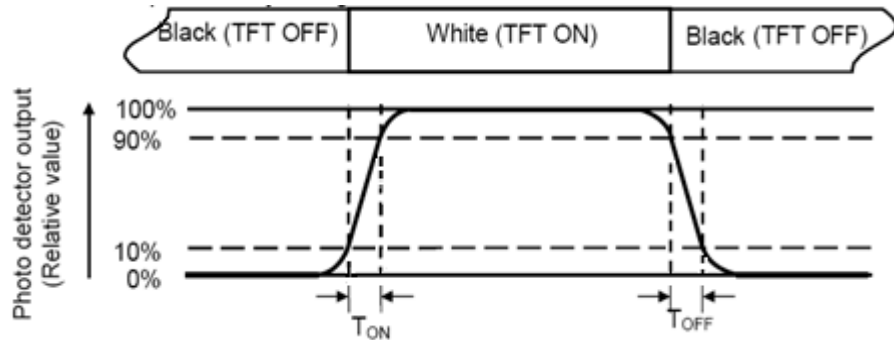
“Black state”: The state is that the LCD should drive by V<sub>black</sub>.

V<sub>white</sub>: To be determined      V<sub>black</sub>: To be determined.

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**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%.


**Note 5: Definition of color chromaticity (CIE1931)**

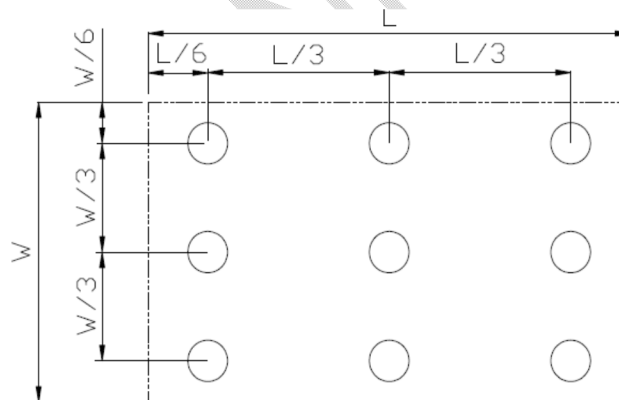
Color coordinates measured at center point of LCD.

**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



$L_{\max}$ : 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

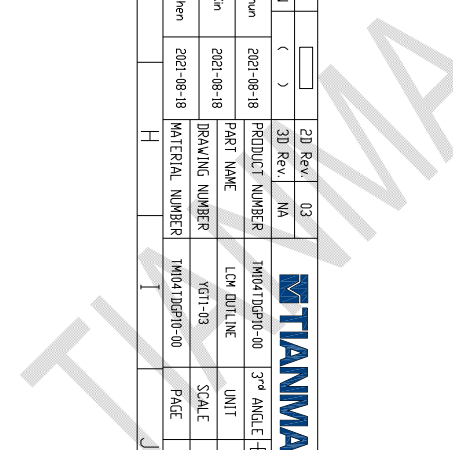
No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta=+70℃, 240hrs	IEC60068-2-1:2007 GB2423.2-2008
2	Low Temperature Operation	Ta=-20℃, 240hrs	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage+	Ta=+80℃, 240hrs	IEC60068-2-1:2007 GB2423.2-2008
4	Low Temperature Storage	Ta=-30℃, 240hrs	IEC60068-2-1:2007 GB2423.1-2008
5	Operation at High Temperature and Humidity	Ta = +60℃, 90% RH max,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,G B2423.22-2002
7	ESD	C=150pF, R=330Ω, 5point/panel Air: ±15kv, 5times; Contact: ±8kv, 5times; (Environment: 15℃~35℃, 30%~60%, 86Kpa~106Kpa)	IEC61000-4-2:2001 GB/T17626.2-2006

Note1: Ta is the ambient temperature of sample.

Note2: Before cosmetic and function test, the product must have enough recovery time, at least 24 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



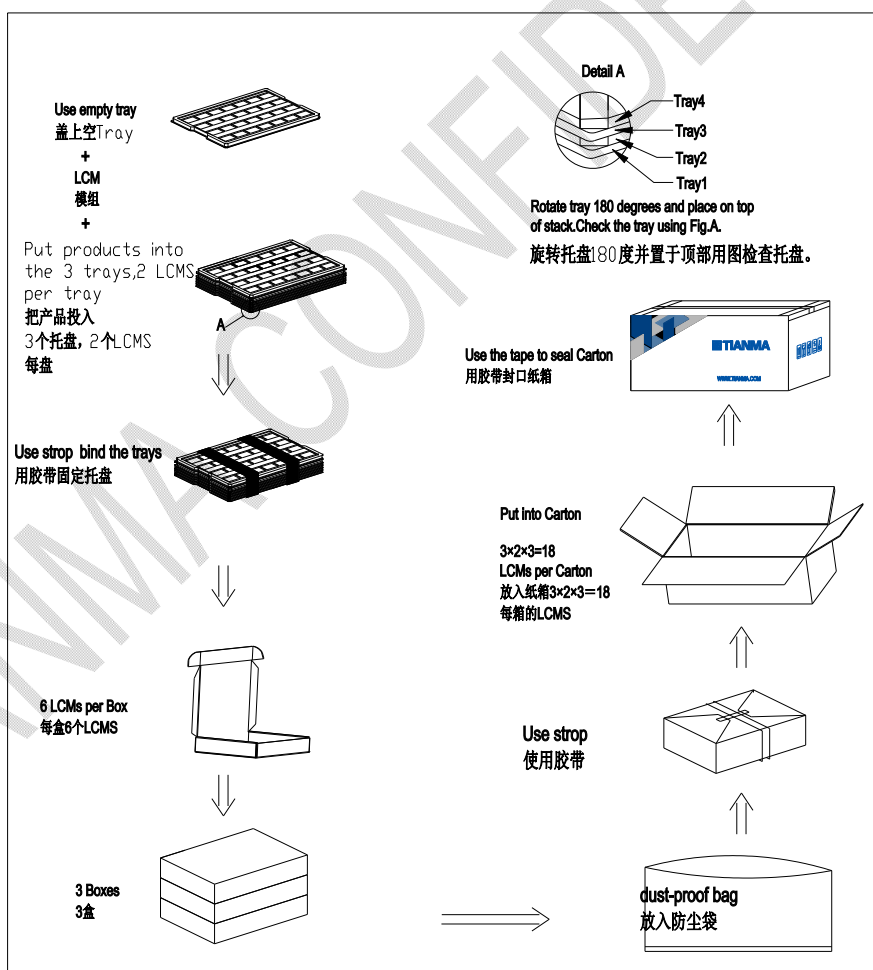
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## 9 Packing Drawing

### 1.包装材料规格表(Packaging Material)

#### Per Carton

No	Item	Model (Materiel)	Dimensions(mm)	Unit Weight(Kg)	Quantity	Material Number
1	LCM Module	TM104TDGP10-00	230.00×175.80×5.70	0.430	18	TM104TDGP10-00
2	Tray	PET (transmittance)	485×330×19	0.258	12	1150346240
3	Dust-Proof Bag	PE	700×545×0.05	0.05	1	1680009800
4	BOX	Corrugated Paper	520×345×74	0.369	3	1680319080
6	Carton	Corrugated Paper	544×365×250	0.76	1	1680342370
	Total Weight	12.753 ± 5%				



## **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**

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