

**MODEL NO : TM057QDHG10****MODEL VERSION: 00****SPEC VERSION : V2.0****ISSUED DATE: 2020-12-01**

- Preliminary Specification
- Final Product Specification

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

Approved by	Notes

TIANMA Confirmed :

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This technical specification is subjected to change without notice

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**1. General Specifications**

Feature		Spec
<b>Display Spec.</b>	Size	5.7 inch
	Resolution	640(RGB) x 480
	Technology Type	a-Si
	Pixel Configuration	R.G.B. Vertical Stripe
	Pixel pitch(mm)	0.180x0.180
	Display Mode	TN with Normally White
	Surface Treatment	Anti-Glare(3H)
	Viewing Direction	6 o'clock
	Gray Scale Inversion Direction	12 o'clock
<b>Mechanical Characteristics</b>	LCM (W x H x D) (mm)	144.00x104.60x12.30
	Active Area(mm)	115.20x86.40
	With /Without TSP	Without TSP
	Matching Connector	CN1: 0.5pitch, bottom contact FFC CN2: SHR-06V-S-B(JST)
	Weight (g)	152
<b>Electrical Characteristics</b>	Interface	RGB 18 bits
	Color Depth	262K

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:  $\pm 5\%$

## 2. Input/Output Terminals

### 2.1 CN1 pin assignment (Signal interface)

Connector type: 101005-203350

No	Symbol	I/O	Description	Comment
1	GND	P	Ground	
2	CLK	I	Dot clock. Latch data at falling edge of CLK.	
3	NC	-	No connection	
4	NC	-	No connection	
5	GND	P	Ground	
6	R0	I	Red data (LSB)	
7	R1	I	Red data	
8	R2	I	Red data	
9	R3	I	Red data	
10	R4	I	Red data	
11	R5	I	Red data (MSB)	
12	GND	P	Ground	
13	G0	I	Green data(LSB)	
14	G1	I	Green data	
15	G2	I	Green data	
16	G3	I	Green data	
17	G4	I	Green data	
18	G5	I	Green data(MSB)	
19	GND	P	Ground	
20	B0	I	Blue data(LSB)	
21	B1	I	Blue data	
22	B2	I	Blue data	
23	B3	I	Blue data	
24	B4	I	Blue data	
25	B5	I	Blue data(MSB)	
26	GND	P	Ground	
27	DE	I	Data enabling signal	
28	VCC	P	Power supply	
29	VCC	P	Power supply	
30	R/L	I	Set horizontal scan direction: Low/NC: left to right; High: right to left	
31	U/D	I	Set vertical scan direction: High/NC: up to down; Low: down to up	
32	NC	-	No connection	
33	GND	P	Ground	

**Table 2.1 CN1 pin assignment**

Note1: I/O definition:

I----Input O----Output P----Power/Ground

Note2: CN1 Matching FPC type: 33 pin, pitch: 0.5mm, height: 0.3mm.

**2.2 CN2 pin assignment (Backlight interface)**

**Connector type: MS24011P6R(STM)**  
**Matching connector: SHR-06V-S-B(JST)**

No	Symbol	I/O	Description	Comment
1	VDD	P	BL driver power supply(+12V)	
2	VDD	P	BL driver power supply(+12V)	
3	GND	P	BL driver power ground	
4	GND	P	BL driver power ground	
5	PWM	I	Dimming control	
6	EN	I	BL on/off control(1:ON, 0:OFF)	

Note1 : P: Power/GND; I: input pin; I: input;

**Table 2.2 CN2 pin assignment**

### 3 Absolute Maximum Ratings

GND=0V, Ta = 25°C

Item	Symbol	MIN	MAX	Unit	Remark
Power Voltage	VCC	-0.5	5.0	V	
	VDD	-0.5	15.0	V	
Input voltage	V <sub>IN</sub>	-0.5	5.0	V	Note1
Operating Temperature	Top	-30	80	°C	
Storage Temperature	Tst	-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

Note1: Signals include R0~R5, G0~G5, B0~B5, CLK, DE, R/L, U/D, PWM, EN.

**Table 3.1 absolute maximum rating**

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## 4. Electrical Characteristics

### 4.1 Driving TFT LCD Panel

GND=0V, Ta=25°C

Item	Symbol	MIN	TYP	MAX	Unit	Remark
Supply Voltage	VCC	3.00	3.30	3.60	V	
Permissive input ripple voltage	V <sub>RF</sub>	-	-	100	mVp-p	VCC=3.3V
Input Signal Voltage	Low Level	V <sub>IL</sub>	0	-	0.3xVCC	V
	High Level	V <sub>IH</sub>	0.7xVCC	-	VCC	V
Current of VCC Power supply	I <sub>VCC</sub>	-	155	230	mA	Note1

Note1: To test the current dissipation, use "all Black Pattern".

Table 4.1 LCD module electrical characteristics

### 4.2 Driving Backlight

Ta=25°C

Item	Symbol	Min	Typ	Max	Unit	Remark
LED drive voltage	VDD	9	12	15	V	Note 1
LED dimming signal	V <sub>on</sub>	2	3.3	5.5	V	
	V <sub>off</sub>	0	0	0.8	V	
	PWM	1	-	100	%	
	Frequency	200	-	10k	HZ	
LED_ON/OFF control voltage	ON	2	3.3	5.5	V	Lower the VDD, the higher current
	OFF	-	-	0.4	V	
Current of VDD(12V) input	I <sub>VDD</sub>	-	390	520	mA	
Life Time	LT	-	50,000	-	Hrs	Note 2

Note 1: Optical performance should be evaluated at Ta=25°C only.

Note 2: If LED is driven by high current, high ambient temperature &amp; 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.

Table 4.2 LED backlight characteristics

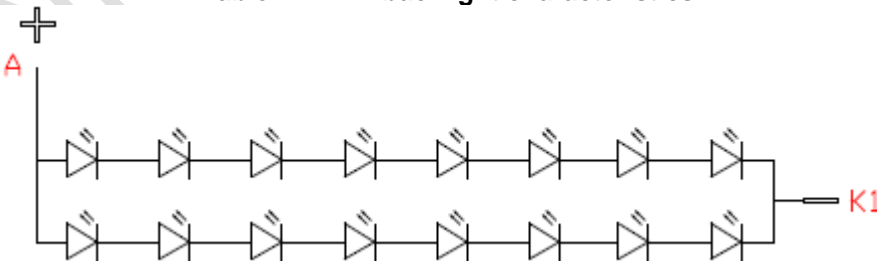
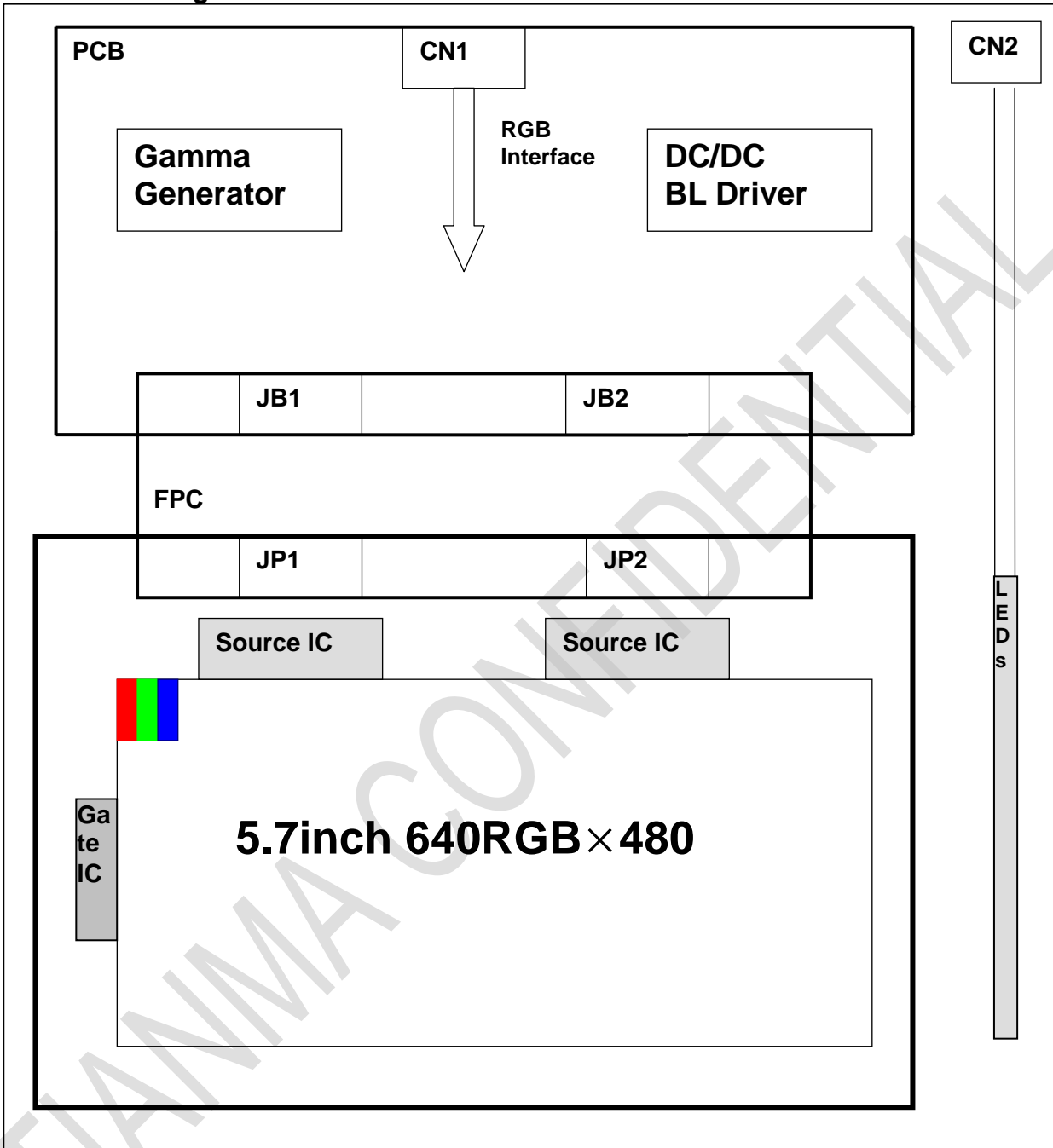


Figure 4.2 LED connection of backlight



**4.3 Block Diagram**



## 5. Data input timing

### 5.1 DE mode

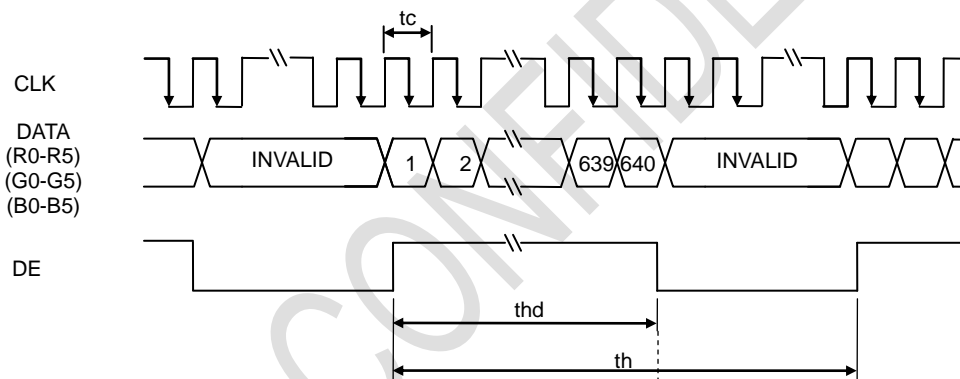
Description		Symbol	Min	Typ	Max	Unit
CLK	Dot clock frequency	Fclk	23.9	25.2	34.2	MHz
Horizontal section	Horizontal total	Th	770	800	1000	Tclk
	H Total blank	Thb+Thfp	130	160	360	Tclk
	Valid Data Width	Thd	-	640	-	Tclk
Vertical section	Frame rate	-	-	60	-	Hz
	Vertical total	Tv	516	525	570	Th
	V total blank	Tvb+Tvfp	36	45	90	Th
	Valid Data Width	Tvd	-	480	-	Th

Note: Hsync&Vsync is unnecessary in DE mode.

Table 5.1 DE mode input timing

### 5.2. Timing Diagram

Horizontal timing



Vertical timing

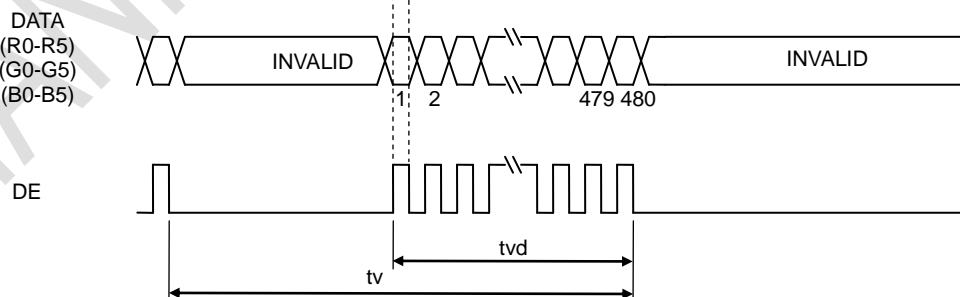


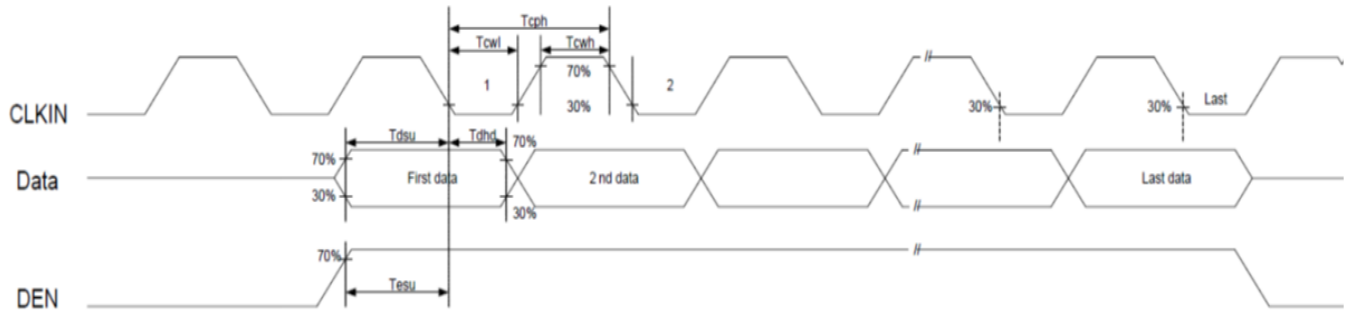
Figure 5.2 Timing diagram

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**5.3 AC input characteristics**

(VCC=3.3V, GND=0V, Ta=25°C)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
CLK pulse duty	Tcwh	40%	50%	60%	Tclk	
Data setup time	Tdsu	8	-	-	ns	Rn, Gn, Bn to Dotclk
Data hold time	Tdhd	8	-	-	ns	Rn, Gn, Bn to Dotclk
ENAB setup time	Tesu	8			ns	

**Table 5.3 AC input characteristics**

**Figure 5.3 AC input characteristics**

**5.4 Power ON/OFF Sequence**

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

Table 5.4 Power on/off sequence

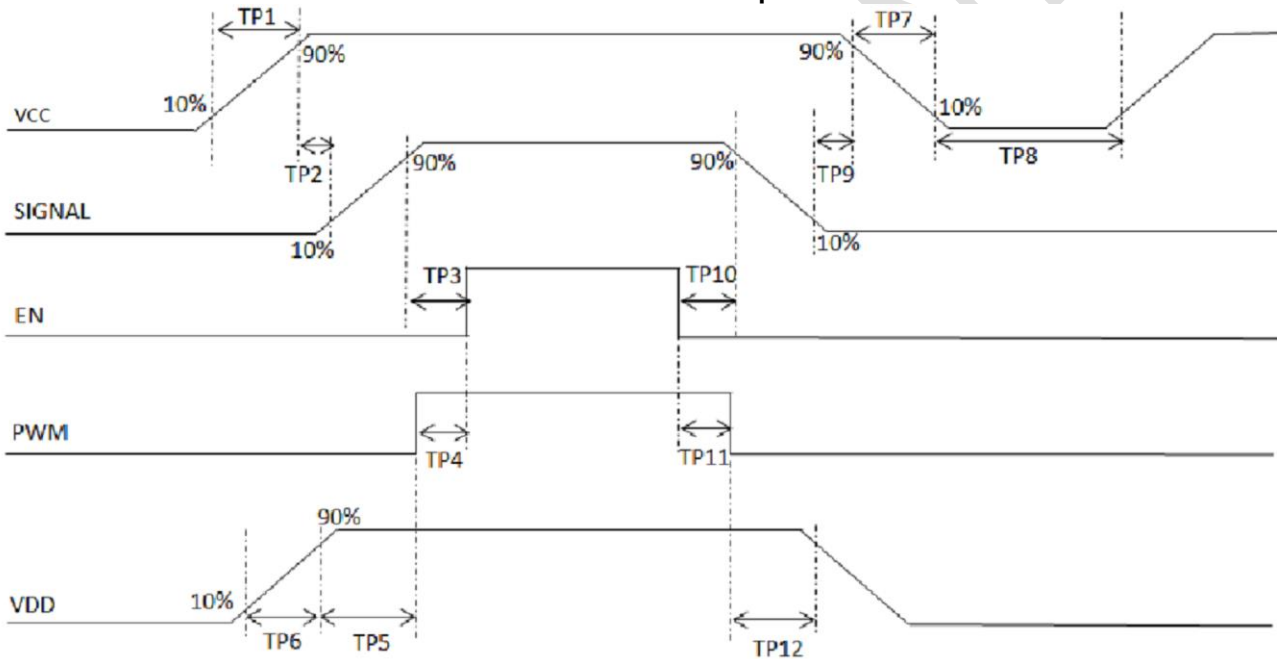


Figure 5.4 Power on/off sequence

**6. Optical Characteristics**

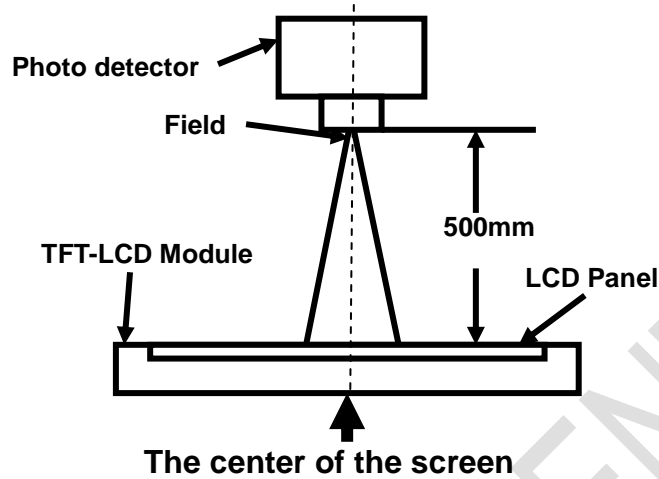
Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	$\theta T$	$CR \geq 10$	60	70	--	Degree	Note 2
	$\theta B$		50	60	--		
	$\theta L$		60	70	--		
	$\theta R$		60	70	--		
Contrast Ratio	CR	$\theta=0^\circ$	600	800	--		Note1、 Note3
Response Time	$T_{ON}$	25°C	--	20	30	ms	Note1 Note4
	$T_{OFF}$						
Chromaticity	White	Backlight is on	x	0.248	0.298	0.348	Note5 Note1
			y	0.262	0.312	0.362	
	Red		x	0.548	0.598	0.648	
			y	0.282	0.332	0.382	
	Green		x	0.277	0.327	0.377	
			y	0.510	0.560	0.610	
	Blue		x	0.102	0.152	0.202	
			y	0.047	0.097	0.147	
Uniformity	U		75	80	--	%	Note1、 Note6
NTSC			45	50	--	%	Note 5
Luminance	L		800	1000	--	cd/m <sup>2</sup>	Note1、 Note7

Test Conditions:

1. The ambient temperature is 25°C.
2. The test systems refer to Note 1 and Note 2.

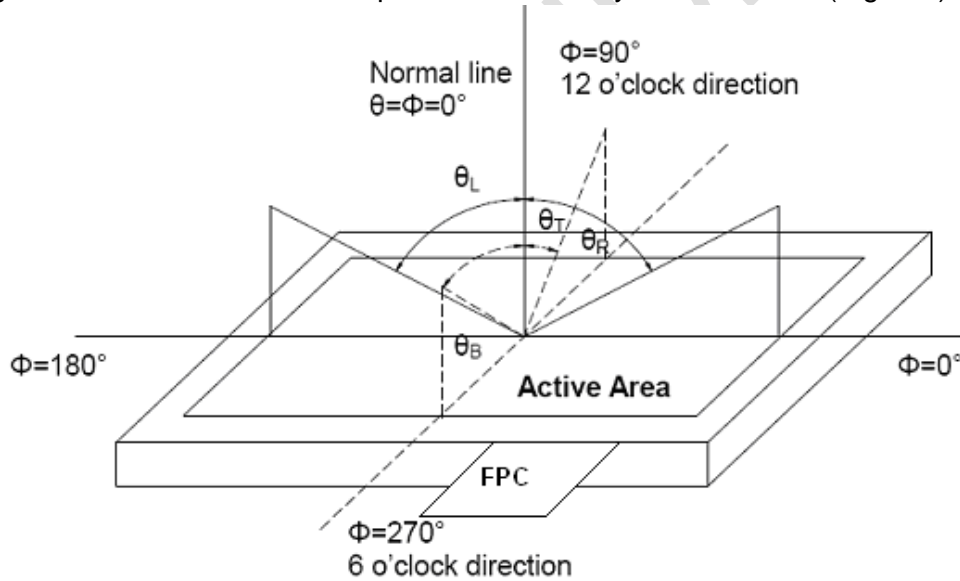
**Note 1:** Definition of optical measurement system.

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).



**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  $V_{white}$ .

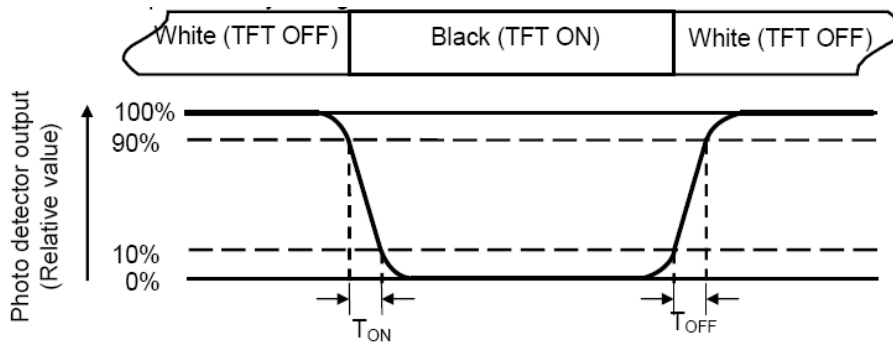
“Black state“: The state is that the LCD should drive by  $V_{black}$ .

$V_{white}$ : 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%.



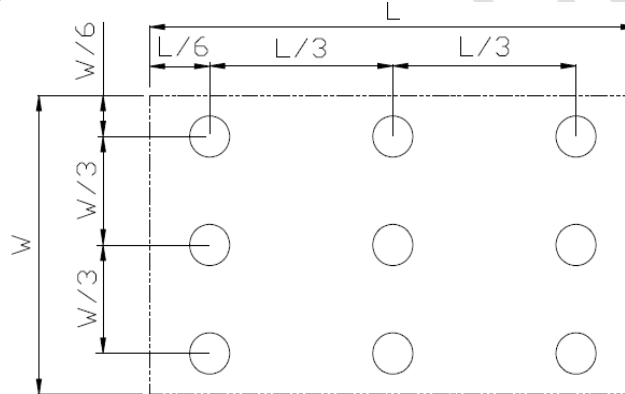
**Note 5:** Definition of color chromaticity (CIE1931)  
Color coordinates measured at center point of LCD.

**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.

$$\text{Luminance Uniformity (U)} = \text{Lmin} / \text{Lmax}$$

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.

## 7. Environmental / Reliability Test

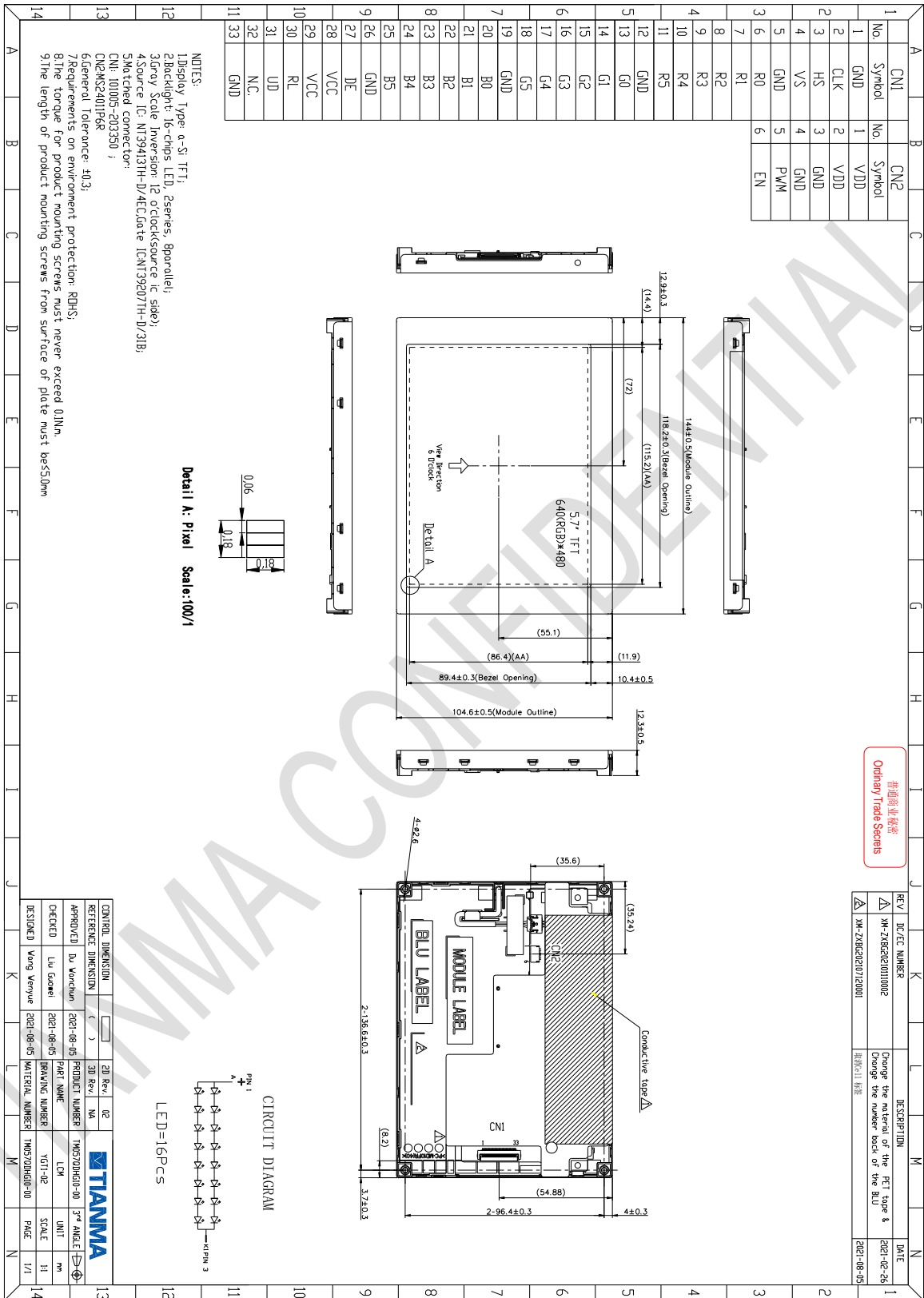
No	Test Item	Condition	Remarks
1	High Temperature Operation	Ta = +80°C, 240 hours	IEC60068-2-2:2007 GB2423.2-2008
2	Low Temperature Operation	Ta = -30°C, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
3	High Temperature Storage	Ta = +80°C, 240 hours	IEC60068-2-2:2007 GB2423.2-2008
4	Low Temperature Storage	Ta = -30°C, 240 hours	IEC60068-2-1:2007 GB2423.1-2008
5	Operation at High Temperature and Humidity	Ta = +60°C, 90% RH max, 240 hours	IEC60068-2-78 :2012 GB/T2423.3—2016
6	Thermal Shock (non-operation)	-30°C 30 min~+80°C 30 min, Change time:5min, 100 Cycle	Start with cold temperature, End with high temperature, IEC60068-2-14:2009 GB2423.22-2012
7	ESD	C=150pF,R=330Ω,5point/panel Air:±15Kv,5times; Contact:±8Kv,5times (Environment:15°C~35°C, 30%~60%.86Kpa~106Kpa)	IEC61000-4-2:2008 GB/T17626.2-2018
8	Vibration Test	Frequency range: 10~55Hz, Stroke: 1.5mm, Sweep: 10Hz~55Hz~10Hz, 2h for x, y, z (total 6h)	IEC60068-2-6:2007 GB/T2423.10—2019
9	Mechanical Shock (Non Op)	Half Sine Wave 60G ,6ms,±X,±Y,±Z 3times for each direction	IEC60068-2-27:2008 GB/T2423.5—2019
10	Package Drop Test	Height:60cm, 1corner,3edges,6surfaces	IEC60068-2-32:1990 GB/T2423.8—1995
11	Package Vibration Test	Frequency: 5-20-200HZ, PSD: 0.01-0.01-0.001 Total:0.781g <sup>2</sup> /HZ, x/y/z 30min for each)	IEC60068-2-6:1982 GB/T2423.10—1995

Note1: Ta is the ambient temperature.

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

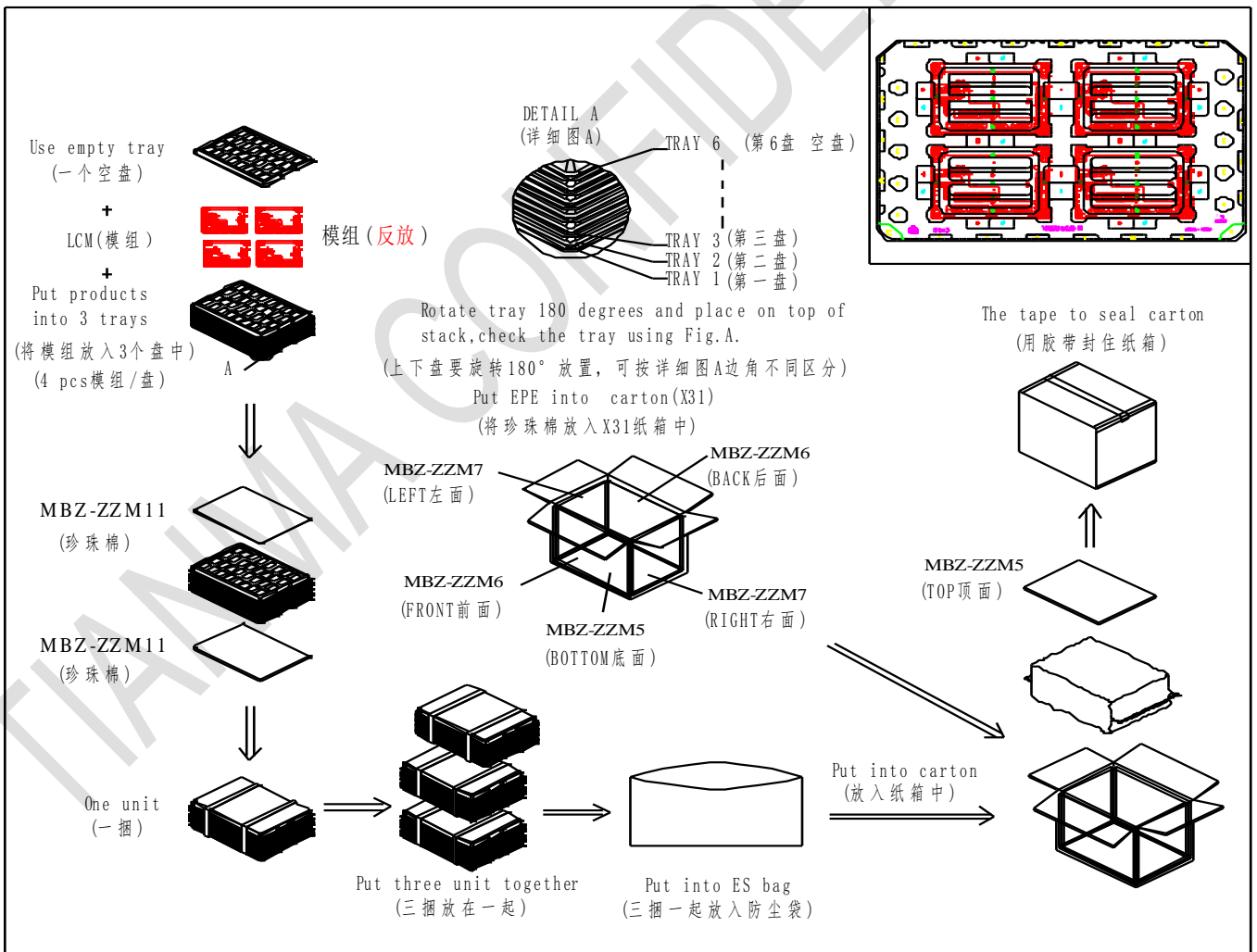


**8. Mechanical Drawing**



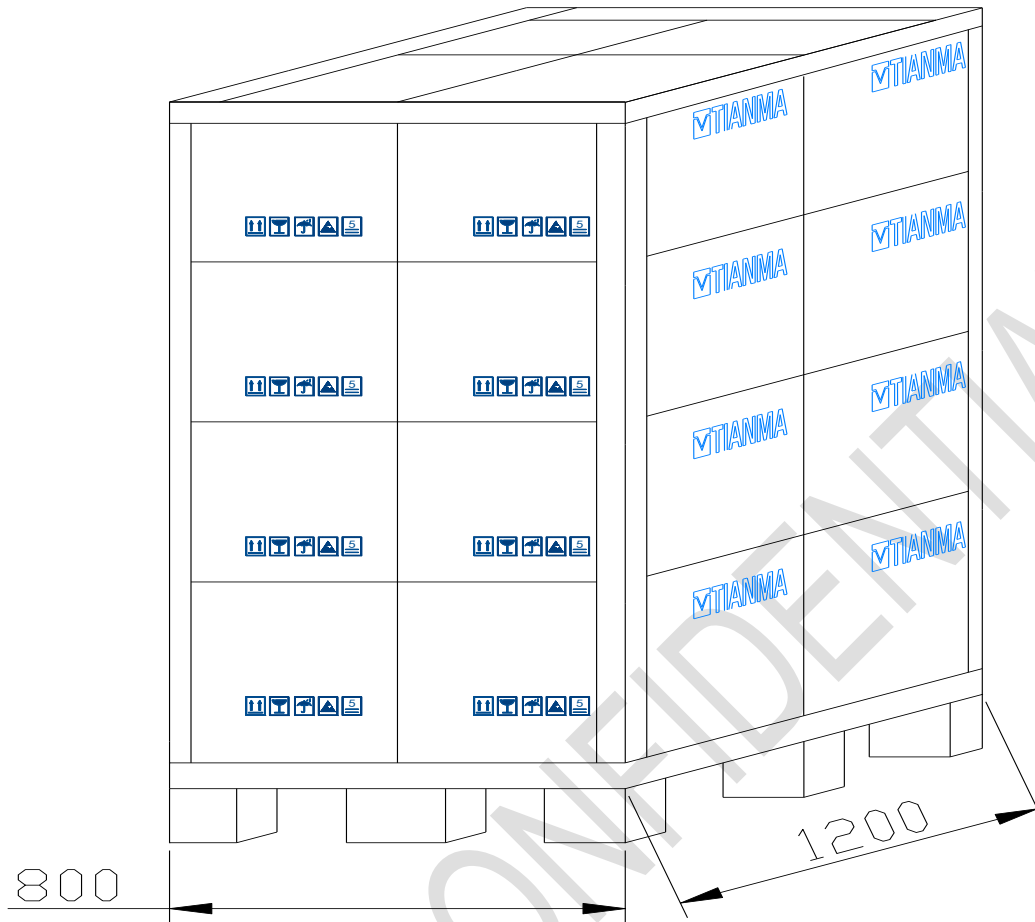
### 9. Packing Drawing

No	Item	Model(Material)	Dimensions (mm)	Unit Weight (Kg)	Quantity	Remark
1	LCM module	TM057QDHG10-00	144*104.6*12.3	0.152	36	
2	Tray	TM057QDHG10-00-YBZ1-00	460*300*15.5	0.192	12	
3	Dust proof bag	PE	700*550	0.05	1	
4	EPE foam	MBZ-ZZM5	490*330*15	0.040	2	
5	EPE foam	MBZ-ZZM6	490*300*15	0.040	2	
6	EPE foam	MBZ-ZZM7	300*300*15	0.022	2	
7	EPE foam	MBZ-ZZML11	470*310*12	0.029	6	
8	Carton	Corrugated paper	510*350*350	1.50	1	
9	Total weight	9.7Kg ± 5%				



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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.

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°C ~ 40°C      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.