B3_3.95 480×480 家居医疗- QV040Z6M-T80-DHP0 Product Specification Rev.P0

SUPPLIER	HEFEI BOE Optoelectronics Technology CO., LTD
FG-Code	QV040Z6M-T80-DHP0

ITEM	BUYER SIGNATURE	DATE

ITEM	SUPPLIER SIGNATURE	DATE
Prepared		
Reviewed		
Approved		

REVISION HISTORY

REV.	ECN NO.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0	-	Initial Release	2021.06.15	Guiyang Liu

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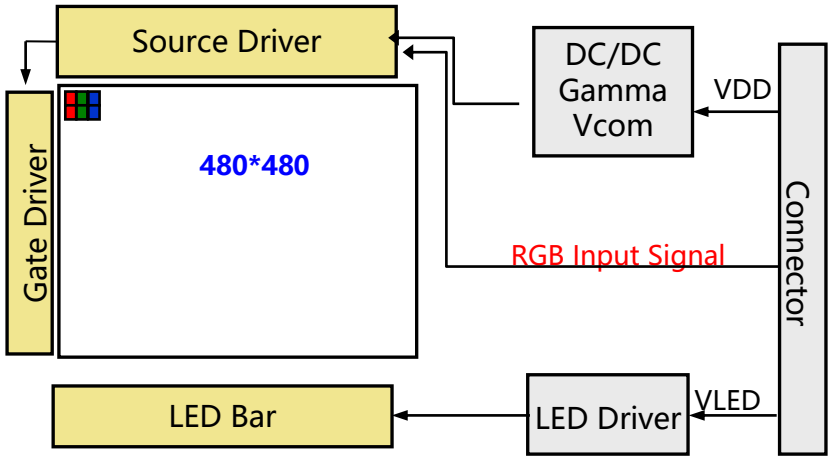
1.0 GENERAL DESCRIPTION

1.0.1 Introduction

B3_3.95 480×480 家居医疗- QV040Z6M-T80-DHP0 is a color active matrix TFT LCD module using amorphous silicon TFT's (Thin Film Transistors) as an active switching devices. This module has a 3.95 inch diagonally measured active area with XGA resolutions (1024 horizontal by 768 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors.



1.0.2 Features （根据产品特性填写关键描述）

- LED back-light
- LED light bar replaceable
- RGB interface
- RoHS Compliant

1.0.3 Application（确认产品的适用场景）

- Refrigerator and Air conditioning etc. white goods

1.0.4 General Specification

< Table 1. General Specifications >

Parameter	Specification	Unit	Remarks
Active area	71.856 (H) × 70.176(V)	mm	
Number of pixels	480(H) × 480(V)	Pixels	
Pixel pitch	0.1497(H) × 0.1462(V)	mm	
Pixel arrangement	RGB Vertical stripe		
Display colors	16.7M	Colors	8bit
Display mode	Normally black		
Dimensional outline	74.83 (H) × 78.98(V) × 2.0(D) typ.	mm	W/O FPC
Weight	TBD	g	
Surface treatment	HC		
Back-light	Edge side, 1-LED Lighting Bar Type		16*LED

2.0 ABSOLUTE MAXIMUM RATINGS

The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table 2.

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
Power Supply Input Voltage	V_{DD}	3.0	3.3	3.6	V	Note 1
Power Supply Current	I_{DD}	-	TBD	TBD	mA	
Positive-going Input Threshold Voltage	V_{IT+}	-		+100	mV	Vcom = TBD typ.
Negative-going Input Threshold Voltage	V_{IT-}	-100		-	mV	
Differential input common mode voltage	V_{com}		TBD		V	V_{IH}=100mV, V_{IL}=-100mV

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for 3.3V at 25 ℃
Max value at Black Pattern

2. Calculated value for reference $I_{LED} \times V_{LED} \div 0.85 = P_{LED}$

3.0 ELECTRICAL SPECIFICATIONS

3.0.1 TFT LCD Module

< Table 3. LCD Module Electrical Specifications > [Ta =25±2℃]

Parameter		Min.	Typ.	Max.	Unit	Remarks
Power supply voltage for Back light	V_{LED}	-	24	-	V	
Power supply Current for Back light	I_{LED}	-	24	-	mA	

Notes : 1. Calculator Value for reference $I_{LED} \times V_{LED} = P_{LED}$

2. The LED Life-time define as the estimated time to 50% degradation of initial luminous under the condition of the ambient temperature of 25℃.

4.0 INTERFACE CONNECTION.

4.0.1 Electrical Interface Connection

The electronics interface connector is F05039.

The Touch connector is FH34SRJ-6S-0.5SH(50)

The connector interface pin assignments are listed in Table 6 and 7.

<Table 6. Pin Assignments for the Interface Connector>

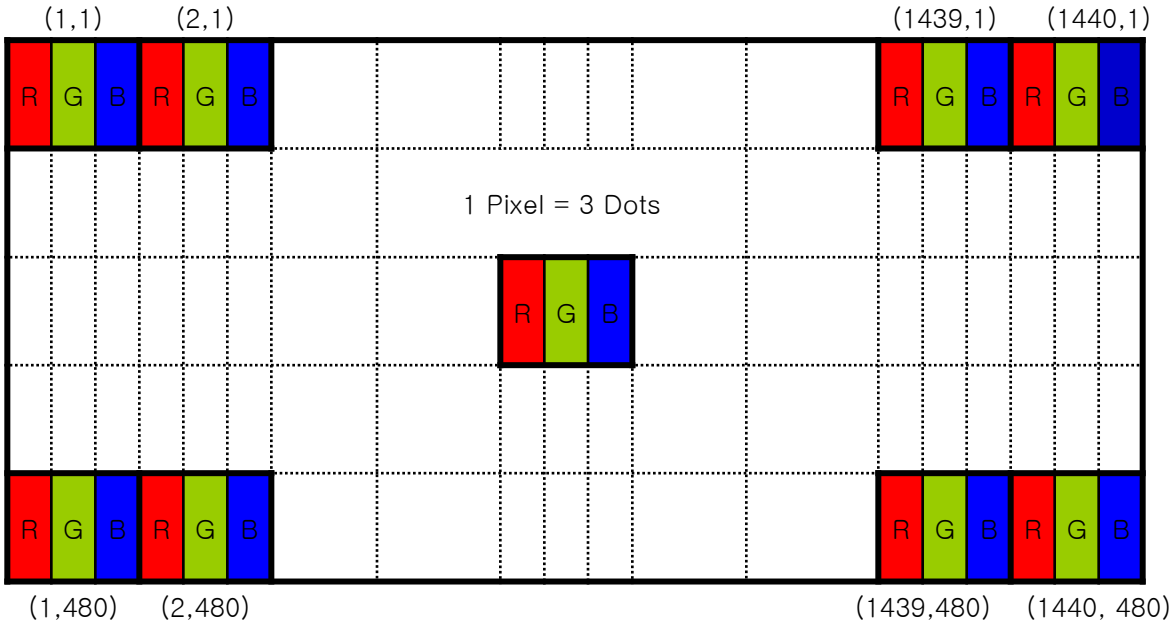
No.	Symbol		No.	Symbol	
1	GND	Ground	23~30	DB15~DB8	Green date
2	NC	Not Connected	31~38	DB7~DB0	Blue date
3	NC	Not Connected	39	GND	Ground
4	NC	Not Connected	40	DE	Date enable
5	NC	Not Connected	41	DCLK	Dot clock single
6	GND	Ground	42	HSYNC	Horizontal sync input.Negative polarity
7	SDA	SPI interface	43	VSYNC	Vertical sync input.Negative polarity
8	SCL	SPI interface	44	GND	Ground
9	CS	SPI interface	45	LEDA	LED Anode
10	REST	L：0~0.7V ;H:1.8~2.5V	46	LEDA	LED Anode
11	GND	Ground	47	LEDK	LEDK LED Cathode
12	GND	Ground	48	LEDK	LEDK LED Cathode
13	VDD	Input Voltage+3.3V (1.65V~3.3V)	49	GND	Ground
14	VDD	Input Voltage+3.3V (1.65V~3.3V)	50	GND	Ground
15~22	DB23~DB16	Red date			

<Table 7. Pin Assignments for the Touch Connector>

No.	Symbol	
1	VDD	Input Voltage+3.3V（2.8V~3.3V）
2	SCL	clock signal
3	SDA	data signal
4	GND	Ground
5	REST	L：0~0.7V ;H:1.8~2.5V
6	INT	Sleep in /wake out

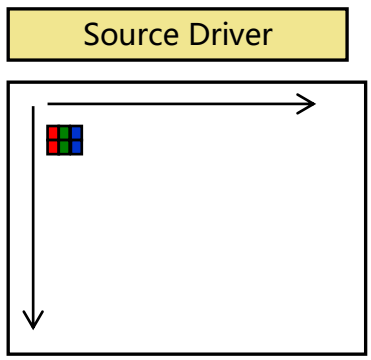
4.2 Data Input Format

Figure 5. Pixel Format



Display Position of Input Data (V-H)

Figure 6. Scan direction



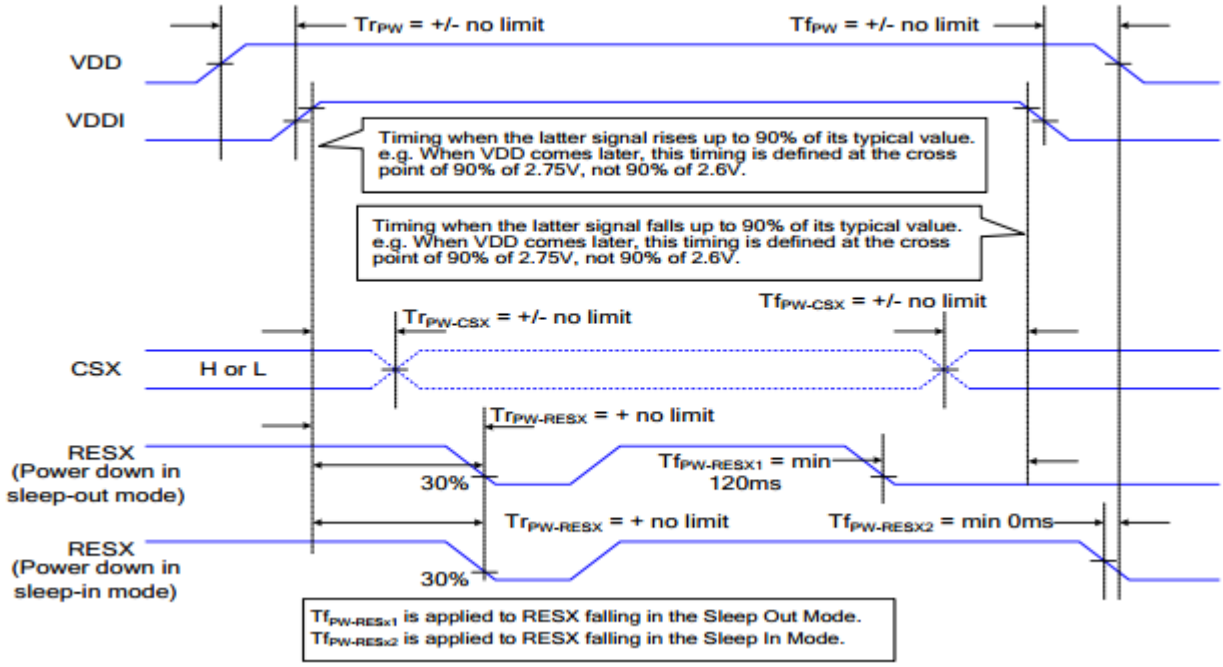
5.0 SIGNAL TIMING SPECIFICATION

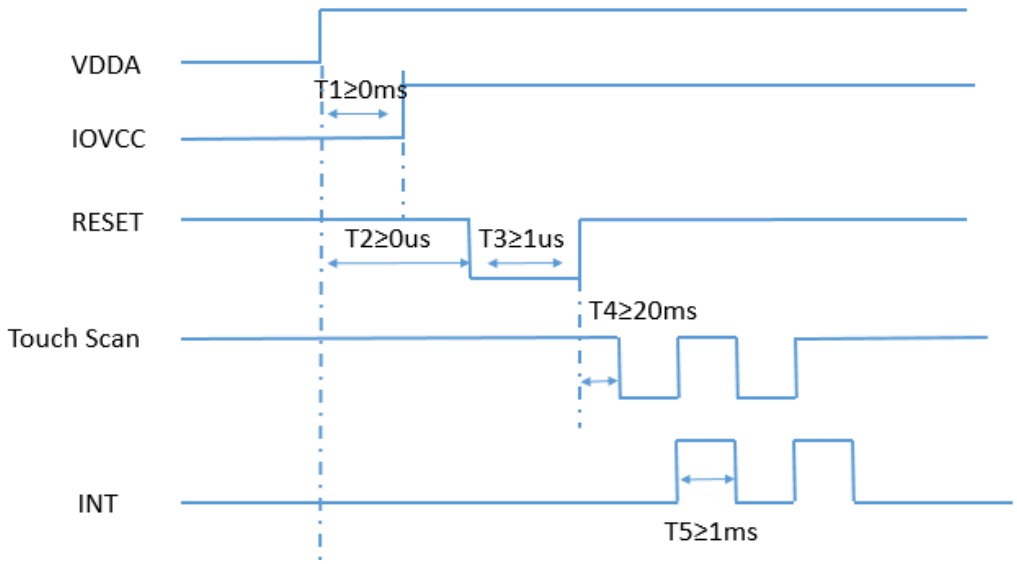
5.0.1 The QV040Z6M-T80-DHP0 is operated by the DE only.

Item		Symbols	Min	Typ	Max	Unit
Frequency		1/Tc	15.9	16.5	17.0	MHz
Vertical	Frame Rate	F	-	60	-	Hz
	Total	T_V	TBD	508	TBD	T_H
	Display	T_{VD}	480			T_H
	Blank(VS+V_{BP}+V_{FP})	T_{VB}	TBD	28	TBD	T_H
Horizontal	Total	T_H	TBD	590	TBD	T_{CLK}
	Display	T_{HD}	480			T_{CLK}
	Blank(HS+H_{BP}+H_{FP})	T_{HB}	TBD	110	TBD	T_{CLK}

6.0 POWER SEQUENCE

To prevent a latch-up or DC operation of the LCD module, the power on/off sequence shall be as shown in below





7.0 OPTICAL SPECIFICATION

7.0.1 Overview

The test of view angle range shall be measured in a dark room (ambient luminance ≤ 1lux and temperature = 25±2℃) with the equipment of Luminance meter system (Goniometer system and TOPCON CS2000/CA310) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0°. We refer to θØ=0 (=θ3) as the 3 o'clock direction (the "right"), θ Ø=90 (= θ12) as the 12 o'clock direction ("upward"), θ Ø=180 (= θ9) as the 9 o'clock direction ("left") and θ Ø=270(= θ6) as the 6 o'clock direction ("bottom"). While scanning θ and/or Ø, the center of the measuring spot on the Display surface shall stay fixed. The luminance, color and uniformity (etc) should be tested by CS2000/CA310. The backlight should be operating for 10 minutes prior to measurement. VDD shall be 3.3 ± 0.3V at 25°C. Optimum viewing angle direction is 6 'clock

<Table 5. Optical Specifications>

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	80	85	-	Deg.	Note 1
		Θ_9		80	85	-	Deg.	
	Vertical	Θ_{12}		80	85	-	Deg.	
		Θ_6		80	85	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	800	1200	-		Note 2
Luminance of White	Center	Y_w	Θ = 0°	200	250	-	cd/m^2	Note 3
White Luminance uniformity	5 Points	ΔY5		70	75	-	%	Note 4
Color Gamut	NTSC	CIE1931	Θ = 0°	67%	72%	-	%	Note 5
Reproduction of color	White	Wx	Θ = 0°	Typ -0.03	0.313	Typ +0.03		
		Wy			0.329			
Response Time		Tr+Td	Ta= 25° C Θ = 0°	-	30	35	ms	Note 6

Notes : 1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.

$$CR = \frac{\text{Luminance when displaying a white raster}}{\text{Luminance when displaying a black raster}}$$

3. Luminance of white is defined as luminance values of center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display. The luminance is measured by CS2000/CA310 when the LED current is set at 60mA.

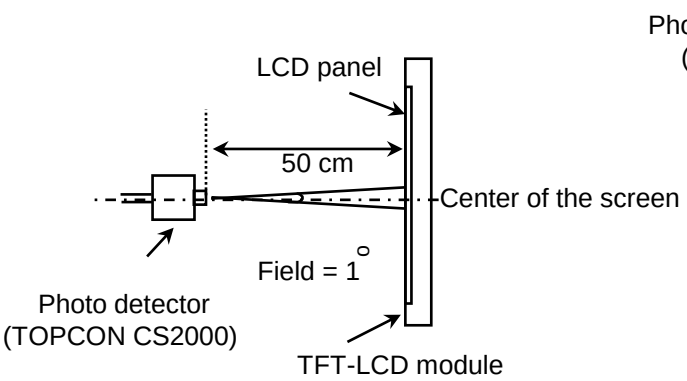
4. The White luminance uniformity on LCD surface is then expressed as : ΔY = Minimum Luminance of 9 or 5 points / Maximum Luminance of 9 or 5 points (See FIGURE 2).

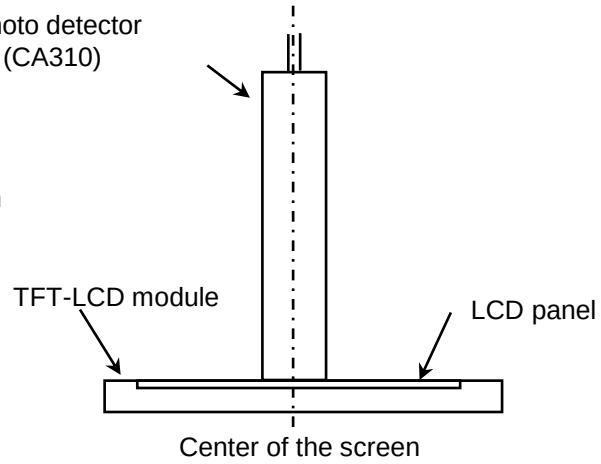
5. The color chromaticity coordinates specified in Table 5. shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.

6. The electro-optical response time measurements shall be made as FIGURE 3 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

7.0.2 Optical measurements

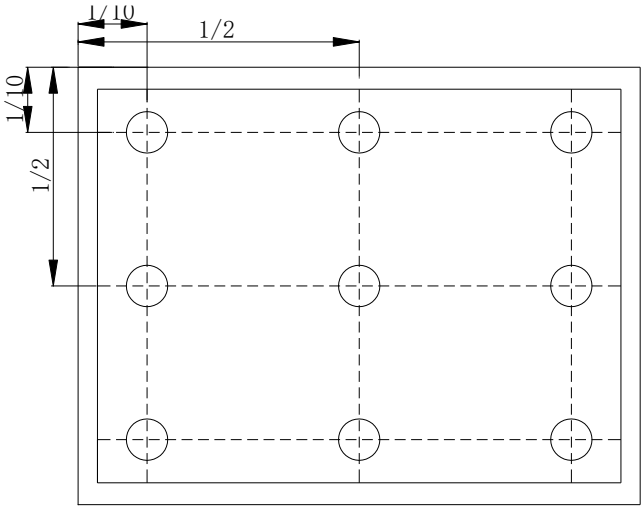
Figure 1. Measurement Set Up





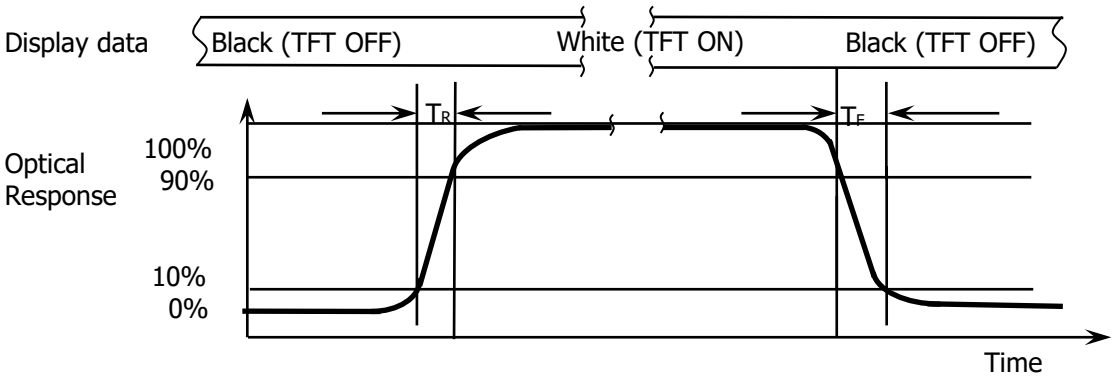
View angel range, uniformity, etc. measurement setup Flicker, measurement setup

Figure 2. White Luminance and Uniformity Measurement Locations (9 points)



Luminance of white is defined as luminance values of center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display.
The White luminance uniformity on LCD surface is then expressed as : ΔY9 = Minimum Luminance of 9 points / Maximum Luminance of 9points (see FIGURE 2).

Figure 3. Response Time Testing



The electro-optical response time measurements shall be made as shown in FIGURE 3 by switching the “data” input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr and 90% to 10% is Td.

8.0 MECHANICAL CHARACTERISTICS

8.0.1 Dimensional Requirements

<Table 8. Dimensional Parameters>

Parameter	Specification	Unit
Active Area	71.856 (H) × 70.176(V)	mm
Number of pixels	480(H) × 480(V)(1 pixel = R + G + B dots)	
Pixel pitch	0.1497(H) × 0.1462(V)	mm
Pixel arrangement	RGB Vertical stripe	
Display colors	16.7M (8Bit)	colors
Display mode	Normally Black	
Dimensional outline	74.83 (H) × 78.98(V) × 2.0(D) (Typ.)	W/O FPC
Weight	TBD	gram
Back-light	Edge side, 1-LED Lighting Bar Type	

9.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

<Table 9. Reliability test>

No	Test Items	Conditions	Remark
1	High temperature storage test	Ta = 80℃, 240 hrs	
2	Low temperature storage test	Ta = -30 ℃, 240 hrs	
3	High temperature operation test	Ta = 70℃, 240 hrs	
4	Low temperature operation test	Ta = -20 ℃, 240 hrs	
5	High temperature & high humidity operation test	Ta = 60 ℃, 90%RH, 240 hrs	
6	Thermal shock	Ta = -20 ℃ ↔ 60℃ (0.5 hr), 100 cycle	Non-operation
7	Salt test	35℃，5% NaCl，24hrs	
8	Image Sticking	5*5 Pattern, 1hr 25℃±2℃ check pattern Gray 127, after 5 mins, the mura must be disappeared completely	
9	ESD test	Air Voltage:±8KV Contact Voltage:±4KV R: 330Ω C: 150pF	
10	Vibration Test	1.47G，5~300Hz，Random，X，Y，±Z，2hr	

Note：After the reliability test, the product only guarantee function normally without any fatal defect (non-display, line defect, abormal display etc). All the cosmetic specification is judged before the reliablity test.

10.0 LABEL

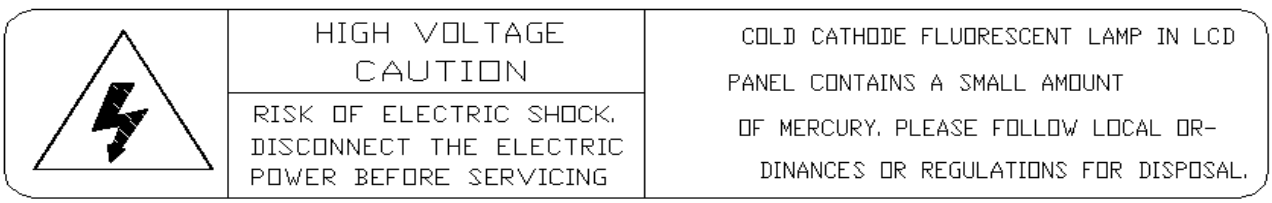
(1) Product label

喷码格式
1. FG-CODE
2. MDL ID
3. MDL ID条形码

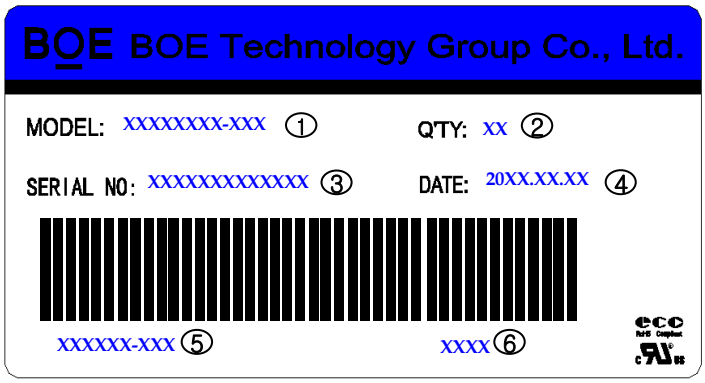
MDL ID 编码规则

序列号	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
代码	X	X	P	3	7	0	7	D	H	P	0	0	0	1	E	E	J
描述	GBN Code		等级	工厂	年	月	日	FG Code后四位				流水码 36进制(无I 和 O)					

(2) High voltage caution label



(3) Box label

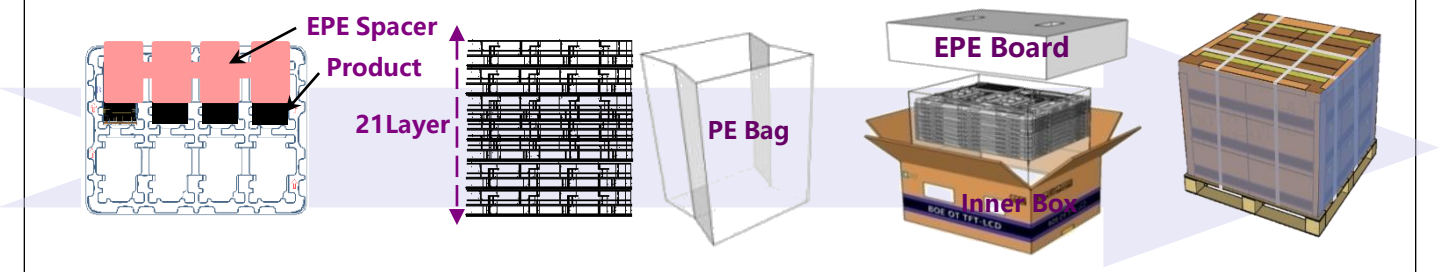


Serial number marked part needs to print, show as follows:

1. FG-CODE(Before 12 bit)
2. Product Quantity
3. Box ID
4. Date of Packing
5. The client section material number(The client)
6. FG-Code After four

Total Size:110×55mm

11.0 PACKING INFORMATION



1-. Put the Product in the Tray

-. Then put the Spacer on the Product

-. Capacity:9pcs Product/Tray

2pcs Spacer/Tray

2-. Repeat put the Tray & Product & Spacer until to 20 pcs, At last put 1pcs empty Tray

-Put the 21 pcs Tray in the PE Bag

3-. Put one EPE Board in the Inner Box

-.Put the PE Bag with 21 pcs Tray in the EPE Board

-.At last put one EPE Board

-. Capacity：160pcs Product/Box

4-. Put 18EA Box on the Pallet

-. Secure with strapping tape, wrap around film, paper protection Angle.

-.Capacity:6EA Box/Layer,3Layer,2880pcs Product/Pallet

12.0 MECHANICAL OUTLINE DIMENSION

Figure 5. TFT-LCD Module Outline Dimension (Front View)

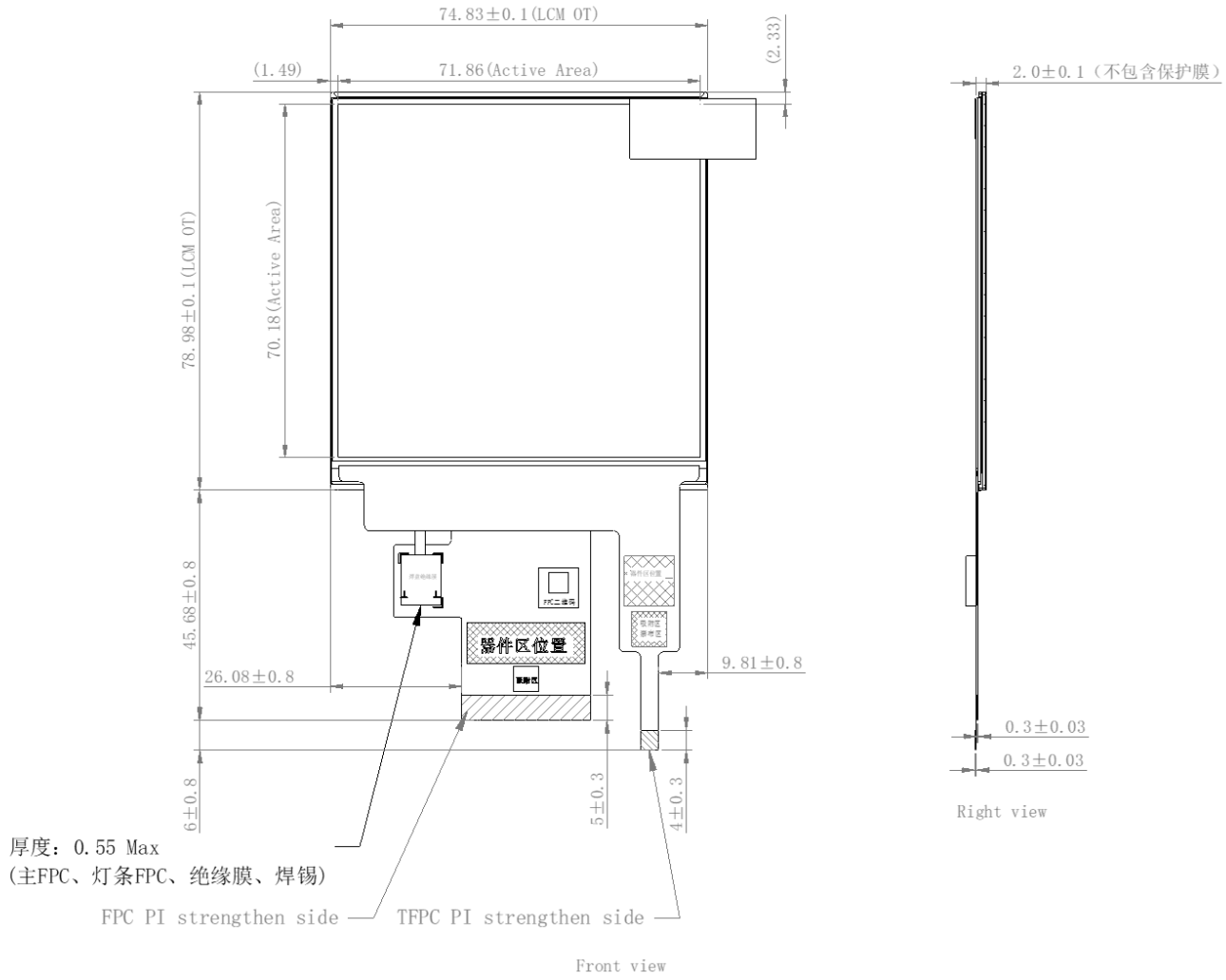


Figure 6. TFT-LCD Module Outline Dimensions (Rear view)