LCM Specification

☐Preliminary specification

☑Final Specification

Project No. 项目编号	TFT-T350MTVH-06
Customer 客户名称	
Module No. 客户型号	
Product type 产品内容	TFT LCD Module 480 x 3RGB x 640 Dots 3.5"TFT LCD
Signature by customer: 客户确认签章： ☐Trial production ☐Mass production	

编　　制	电子审核	结构审核	批　　准
Y.L			

深圳市鑫洪泰电子科技有限公司

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1 Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
0	2019-4-20	First Release.	Y.L	

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1. General Feature:

Item	Standard Value	Unit
Display Size	3.5"	--
Number of Pixels	480(H)x3(RGB)*640(V)	--
Active Area	53.28(H) *71.04(V)	mm
Outline Dimension	64.00(H) ×85.00× 3.0(V)	mm
Viewing Direction	9 O'clock	-
Interface	MIPI Video Mode - 1 lane	-
LCM Driver IC	HX8363-A03&ICN6211	-
LCM Driver Condition	IOVCC=1.8V,VCI=3.3V (Typ)	V
Backlight	White LED	-
Touch Panel	Without Touch Panel	-
CTP Driver IC	- - -	
CTP Driver Condition	- - -	
Operation Temperature	-20~70	℃
Storage Temperature	-30~80	℃

HOTHMI

2.Outline Dimensions

*** Do not display the fixed pattern for a long time because it may develop image sticking due to the LCM structure. If the screen is displayed with fixed pattern, use a screen saver. It is recommended to display the fixed mode for no more than 2 minutes or less.

PIN NO.	SIGNAL	PIN NO.	SIGNAL
1	NC	11	NC
2	LEDK	12	NC
3	NC	13	GND
4	LEDA	14	CLKP
5	NC	15	CLKN
6	VCI	16	GND
7	IOVCC	17	DOP
8	TE	18	DON
9	RESX	19	GND
10	GND	20	GND

10.50±0.1
P0.5*19=9.50
5.70±0.5
0.50
23.01±0.5
BENDING AREA

1.00±0.5
6.00±0.5
33.00±0.5
CONDUCTIVE TAPE T=0.2mm
COMPONENTS HEIGHT 2.0MM MAX. (INCLUDE TAPE)
DST=0.05MM
SOLDER 0.5mm MAX. (INSULATE TAPE&TIN)
25.70±0.5

3.00±0.2
9.00±0.5

85.00±0.3(LCM O.D)
74.32(BEZEL OPENING)
71.04(LCD A.A)
40.30
3.14
4.78
32.00
64.00±0.3(LCM O.D)
56.44(BEZEL OPENING)
53.28(LCD A.A)
480*3RGB*640
VIEW DIRECTION 9 O'CLOCK
REMOVE TAPE
3.78
5.36
6.00±0.3
PI STIFFENER
0.30±0.05

LED_K
LED_A
BL CIRCUIT DIAGRAM:
Vf=19.2V, If=40mA

TFT-T350MTVH-06
HOTHMI
Dwg Title:
Scale 1:1
Ver: A/0
Unit mm
Tol. ±0.3
Drawn: Liu
Date: 2019-03-26

*1.	LCD Display Type	TFT,Transmissive,Normally White	*6.	Storage Temp	−30°C~80°C
*2.	Viewing Direction	9 O'Clock	*7.	Driver IC	HX8363-A03&ICN6211
*3.	Interface	MIPI video mode −1 Lane	*8.	Backlight	WHITE Vf=19.2V If=40mA(Typ)
*4.	Operating Voltage	VCI=2.8V, IOVCC=1.8V(Typ)	*9.	LCM Brightness	1000cd/m² (Typ)
*5.	Operating Temp	−20°C~70°C			

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3. Pin Description

3.1 Pin Description

Pin NO.	Symbol	Description
1	NC	No Connect
2	LED_K	LED Cathode
3	NC	No Connect
4	LED_A	LED Anode
5	NC	No Connect
6	VCI	Analog Power
7	IOVCC	Power supply for I/O system.
8	TE	- Tearing effect output. - If not used, leave this pin open.
9	RESET	Reset Pin
10	GND	Ground
11	NC	No Connect
12	NC	No Connect
13	GND	Ground
14	DCLK_P	Positive polarity of low voltage differential clock signal.
15	DCLK_N	Negative polarity of low voltage differential clock signal.
16	GND	Ground
17	D0_P	Positive polarity of low voltage differential data signal.
18	D0_N	Negative polarity of low voltage differential data signal.
19	GND	Ground
20	GND	Ground
---END---		

3.2 Wiring Diagram

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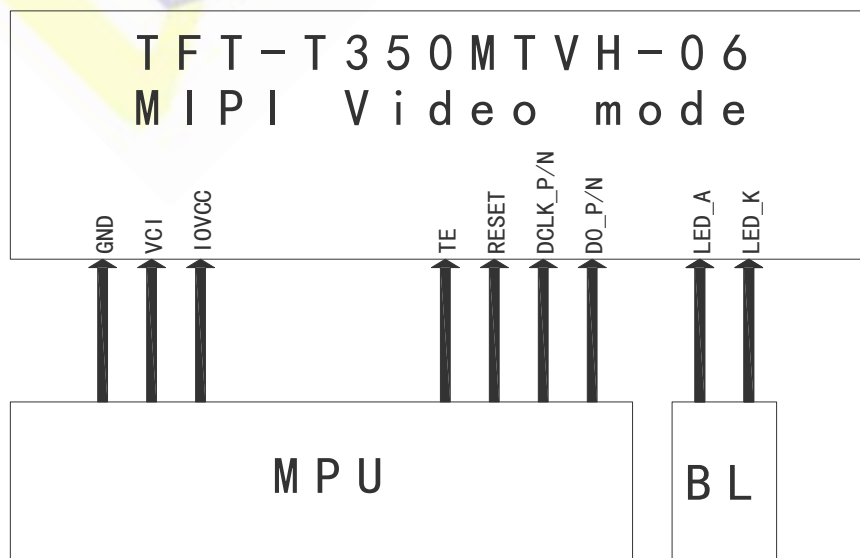
4. Electrical Characteristics

4-1 TFT LCD Module Operating Conditions

Item	Symbol	Condition	Min	Type	Max	Uint
Interface logic circuits	IOVCC	-	1.75	1.8	3.3	V
Analog Power supply	VCI	-	2.65	2.8	3.3	V
TFT Gate on voltage	VGH	-	12.0	-	15.0	V
TFT Gate off voltage	VGL	-	-8.0	-	-12.0	V

4-2 LED back light specification (pera chip)

Item	Symbol	Condition	Min	Type	Max	Uint
Forward voltage	Vt	If=20mA	17.7	19.2	20.4	V
Forward current	Ipn	/1-chip	-	40	-	mA
Luminance(With LCD)	Lv	If=40mA	700	1000	-	cd/㎡
Luminous color	White					

5. OPTICAL SPECIFICATION

5.1 Overview

The test of Optical specifications 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 BM-5) 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 . The center of the measuring spot on the Display surface shall stay fixed. The backlight should be operating for 30 minutes prior to measurement.

5.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	ΘL	CR>10	60	70	-	Deg.	Note 1
		ΘR		40	50	-	Deg.	
	Vertical	ΘU		60	70	-	Deg.	
		ΘD		60	70	-	Deg.	
Contrast ratio		CR	Θ = 0°	400	500	-		Note2
Color Gamut		CG		55	-	-	%	
White Chromaticity		Wx		-	-	-		
		Wy		-	-	-		
Reproduction of color	Red	Rx	Θ = 0°	-	-	-		Note4 (Based on C Light)
		Ry		-	-	-		
	Green	Gx		-	-	-		
		Gy		-	-	-		
	Blue	Bx		-	-	-		
		By		-	-	-		
Response Time (Rising + Falling)		Tr+Tf	Θ = 0° Ta= 25℃	-	25	35	ms	Note5
Transmittance(with Polarizer)		Tr		-	(4.8)	-	%	Note3

Note:

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)

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state . (see FIGUR 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.Transmittance is the Value without APF and without CG.

4.The color chromaticity coordinates specified in the above table 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.

5.The electro-optical response time measurements shall be made as FIGURE 2 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 Tf.
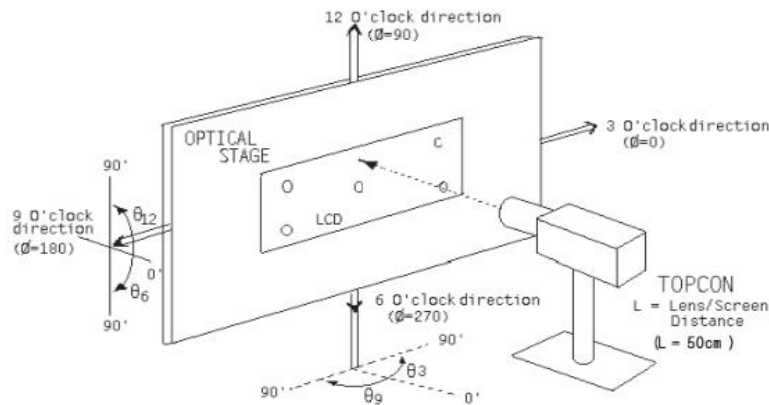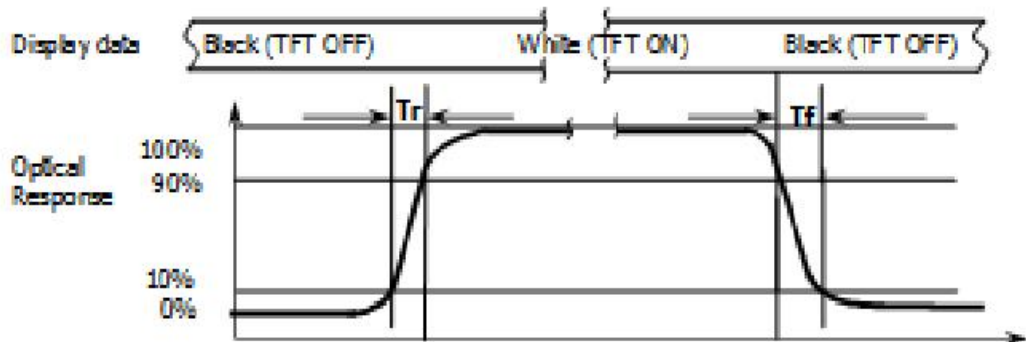
Figure1 Measurement Set Up

Figure2 Response Time Testing

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6. MIPI Interface Characteristics

6-1 Timing Characteristics

Timing table	DATA
H Active pixel	480
HFP	15
HBP	29
HSYNC	7
V Active pixel	640
VFP	7
VBP	7
VSYNC	3
RGB CLOCK	24MHZ

Note: The above data is just for reference,customer can change it by the display effects.

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7. RELIABILITY TEST

7-1 Temperature and Humidity

TEST ITEMS	CONDITIONS	NOTE
High Temperature Storage	Ta=+80 o C, 240hrs	
Low Temperature Storage	Ta=-30 o C, 240hrs	
High Temperature Operation	Ta=+70 o C, 240hrs	
Low Temperature Operation	Ta=-20 o C, 240hrs	
High Temperature and High Humidity (Operating)	Ta=+60 o C, 90%RH, 240hrs	

Note: (1) All tests above are practiced at module type.

(2) There is no display function NG issue occurred, all the cosmetic specification is

judged before the reliability stress.
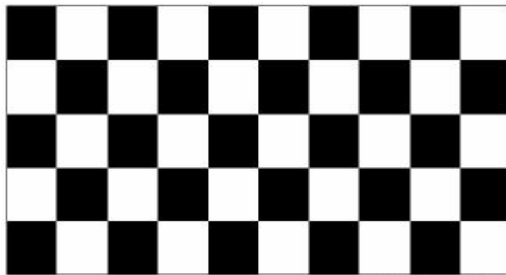
(a) Test Pattern (chess board Pattern)   (b) Gray Pattern

7-2 Shock and Vibration

ITEMS	CONDITIONS
Packing Shock (Non-Operation)	● Shock level:980m/s^2 ● Waveform:1/2 Sine wave,6msec ● ±X, ±Y ±Z,each axis 1 times
Packing Vibration (Non-Operation)	● Frequency range:8-33.3HZ ● Stoke:1.0mm ● Sweep: 10Hz-50Hz ● x,y,z 2 hours for each direction

7-3 Electrostatic Discharge

TEST ITEM	CONDITIONS
ESD (Non-operation)	150pF,330Ω，Contact±4KV,Air :±8KV.Note 1
	200pF,0Ω，±200V Contact test.Note 2

Note:Measure Point:

1.LCD glass and metal bezel

2.IF connector pins

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8. HANDDLING & CAUTIONS

8-1 Caution For Operation

♦Since the LCM is made of glass, do not apply strong mechanical impact or static load onto it.Handling with care since shock, vibration, and careless handling may seriously affect the product.If it falls from a high place or receives a strong shock, the glass maybe broken.

♦It is indispensable to drive the LCM within the specified voltage limit since the higher voltage than the limit causes LCM's life shorter. An electro-chemical reaction due to DC causes undesirable deterioration of the LCM so that the use of DC drive should avoid.

♦Do not connect or disconnect the LCM to or from the system when power is on.

♦Never use the LCM under abnormal conditions of high temperature and high humidity.

♦When expose to drastic fluctuation of temperature(hot to cold or cold to hot), the LCM may be affected; specifically, drastic temperature fluctuation from cold to hot, produces dew on the LCM's surface which may affect the operation of the polarizer on the LCM.

♦Response time will be extremely delay at lower temperature than the operating temperature range and on the other hand LCM may turn black at temperature above its operational range. However those phenomenon do not mean malfunction or out of order with the LCM. The LCM will revert to normal operation once the temperature returns to the recommended temperature range for normal operation.

♦Do not display the fixed pattern for a long time because it may develop image sticking due to the LCM structure. If the screen is displayed with fixed pattern, use a screen saver.It is recommended to display the fixed mode for no more than 2 minutes or less.

♦Do not disassemble and/or re-assemble LCM module

7-2 Caution Against Static Charge

♦The LCM use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipments to protect against static electricity.

♦Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, if possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.

♦Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

♦In handling the LCM, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary

9. LCD display initialization code

```
Void Panel_Initial_Code(void)
{
    LCD_Nreset(1);
    Delayms(1);   //Delay 1ms
    LCD_Nreset(0);
    Delayms(1);   //Delay 1ms
    LCD_Nreset(1);
    Delayms(120); //Delay 120ms


    Write(Command , 0x3a);
    Write(Parameter ,0x77);

    Write(Command , 0x11);
    Delayms(120); //Delay 120ms

    Write(Command , 0x29);
    Delayms(120); //Delay 120ms
}

Void Panel_SleepIn_Mode (void)
{
Write(Command , 0x10）;
Delayms (120);
}

Void Panel_SleepOut_Mode (void)
{
Write(Command ,0x11）;
Delayms (120);
}
```

--END--

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