LCM Specification

☑Preliminary specification

☐Final Specification

Project No. 项目编号	TFT-H045C1FWTNT4N40
Customer 客户名称	
Module No. 客户型号	
Product type 产品内容	TFT LCD Module 480 x 3RGB x 854 Dots 4.5”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
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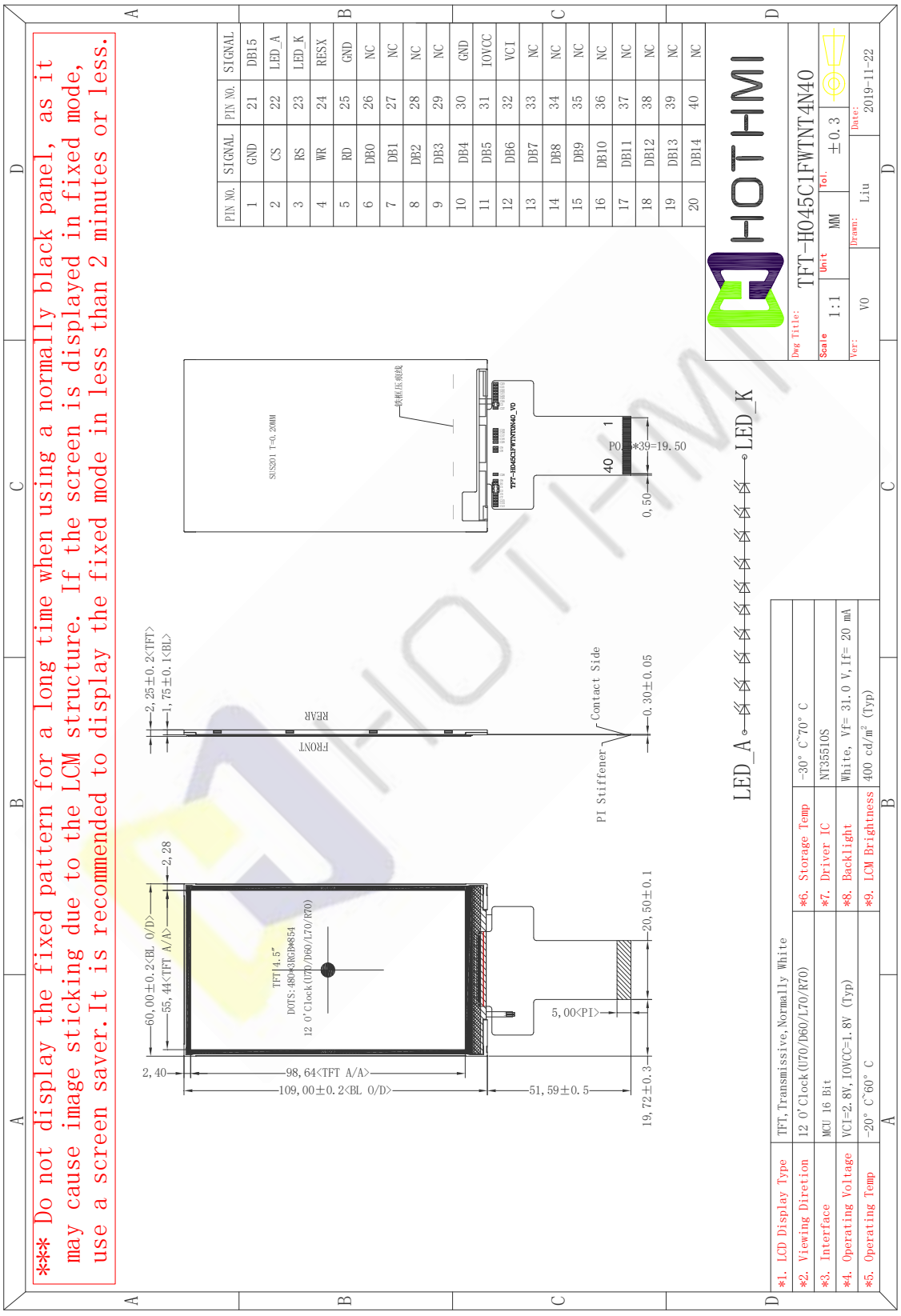
1 Document revision history :

DOCUMENT REVISION	DATE	DESCRIPTION	PREPARED BY	APPROVED BY
0	2019-12-11	First Release.	YL.Liu	

1. General Feature:

Item	Standard Value	Unit
Display Size	4.5”	--
Number of Pixels	480(H)x3(RGB)*854(V)	--
Active Area	55.44(H) *98.64(V)	mm
LCM Outline Dimension	60.00(H) ×109.00(V)×2.25(D)	mm
Viewing Direction	12 O’Clock	-
LCM Interface	*Parallel 8080-series MCU Interface (16-bit)	-
LCM Driver IC	NT35510S	-
LCM Driver Voltage	IOVCC=1.8V,VCI=2.8V (Max 3.3V)	V
Backlight	White, 10 LEDs in series	-
Touch Panel	Whitout Touch Panel	-
CTP Driver IC	T.B.D	-
CTP Driver Voltage	T.B.D	V
CTP I/O Digital Voltage	T.B.D	V
Operation Temperature	-20~70	℃
Storage Temperature	-30~80	℃

2. Outline Dimensions

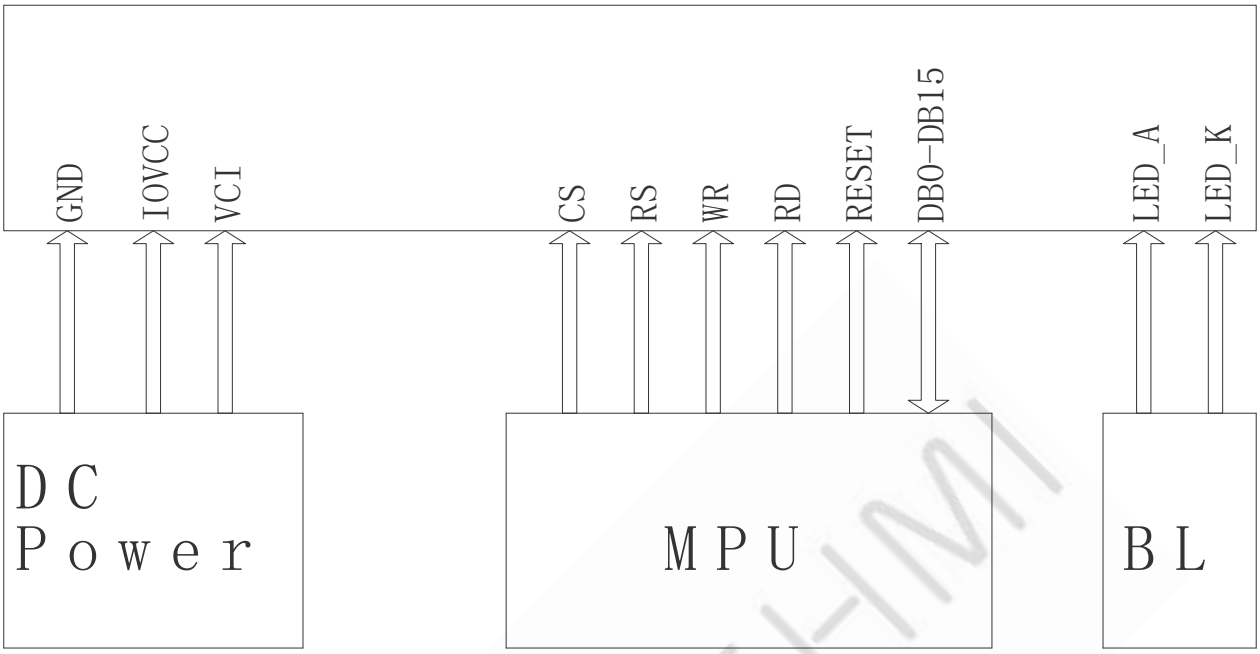


3. Pin Description

3.1 Pin Description

Pin NO.	Symbol	Description
1	GND	Ground
2	CS	Chip select input pin (“Low” enable).
3	RS	Display data/command selection pin in parallel IF.
4	WR	Write enable in MCU parallel interface
5	RD	Read enable in 8080 MCU parallel IF.
6	DB0	Data Bus
7	DB1	Data Bus
8	DB2	Data Bus
9	DB3	Data Bus
10	DB4	Data Bus
11	DB5	Data Bus
12	DB6	Data Bus
13	DB7	Data Bus
14	DB8	Data Bus
15	DB9	Data Bus
16	DB10	Data Bus
17	DB11	Data Bus
18	DB12	Data Bus
19	DB13	Data Bus
20	DB14	Data Bus
21	DB15	Data Bus
22	LED_A	LED Anode
23	LED_K	LED Cathode
24	RESX	LCM Reset Pin
25	GND	Ground
26-29	NC	No Connect
30	GND	Ground
31	IOVCC	Analog Power(1.65 ~ 3.3 V)
32	VCI	Analog Power(2.65 ~ 3.3 V)
33-40	NC	No Connect

3.2 Wiring Diagram



4. Electrical Characteristics

4-1 TFT LCD Module Operating Conditions

Item	Symbol	Condition	Min	Type	Max	Uint
Interface logic circuits	IOVCC	-	1.65	1.80	3.30	V
Analog Power supply	VCI	-	2.50	2.80	3.30	V
TFT Gate on voltage	VGH	-	10.0	-	16.0	V
TFT Gate off voltage	VGL	-	-16.0	-	-10.0	V

4-2 LED back light specification (pera chip)

Item	Symbol	Condition	Min	Type	Max	Uint
Forward voltage	Vt	If=20mA	29.0	31.0	33.0	V
Forward current	Ipn	/1-chip	-	20	-	mA
Luminance(With LCD)	Lv	If= mA	-	400	-	cd/㎡
Luminous color	White					

5. OPTICAL SPECIFICATION

4.1 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.

4.2 Optical Specifications

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle Range	Horizontal	Θ L	CR>10	60	70	-	Deg.	Note 1
		Θ R		60	70	-	Deg.	
	Vertical	Θ U		60	70	-	Deg.	
		Θ D		50	60	-	Deg.	
Contrast ratio		CR	Θ = 0°	640	800	-		Note2
Color Gamut		CG		-	60	-	%	
White Chromaticity		Wx	Θ = 0°	-0.02	0.311	+0.02		
		Wy			0.341			
Reproduction of color	Red	Rx			0.645			Note4 (Based on C Light)
		Ry			0.330			
	Green	Gx			0.324			
		Gy			0.565			
	Blue	Bx			0.134			
		By			0.125			
Response Time (Rising + Falling)		Tr+Tf	Θ = 0° Ta= 25℃	-	35	-	ms	Note5
Transmittance		Tr		-	4.54		%	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)

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

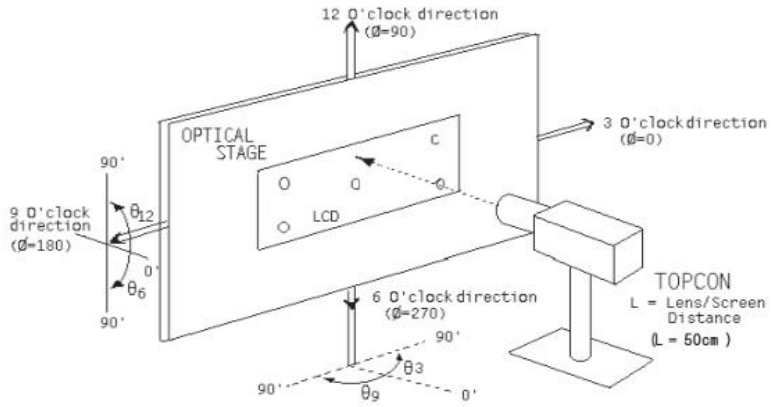
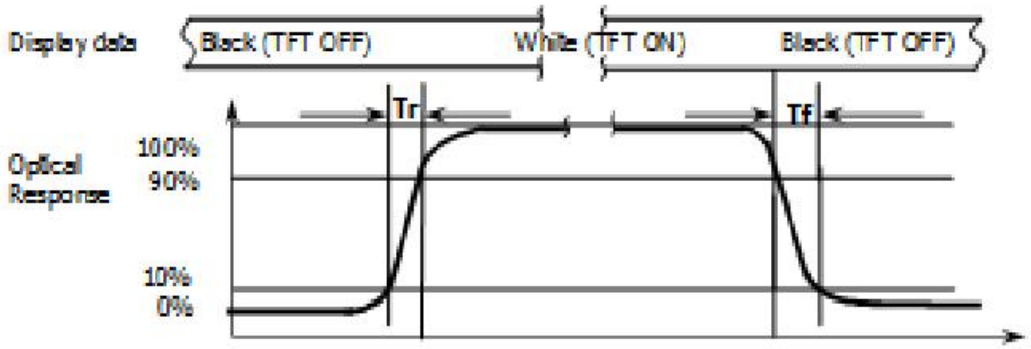
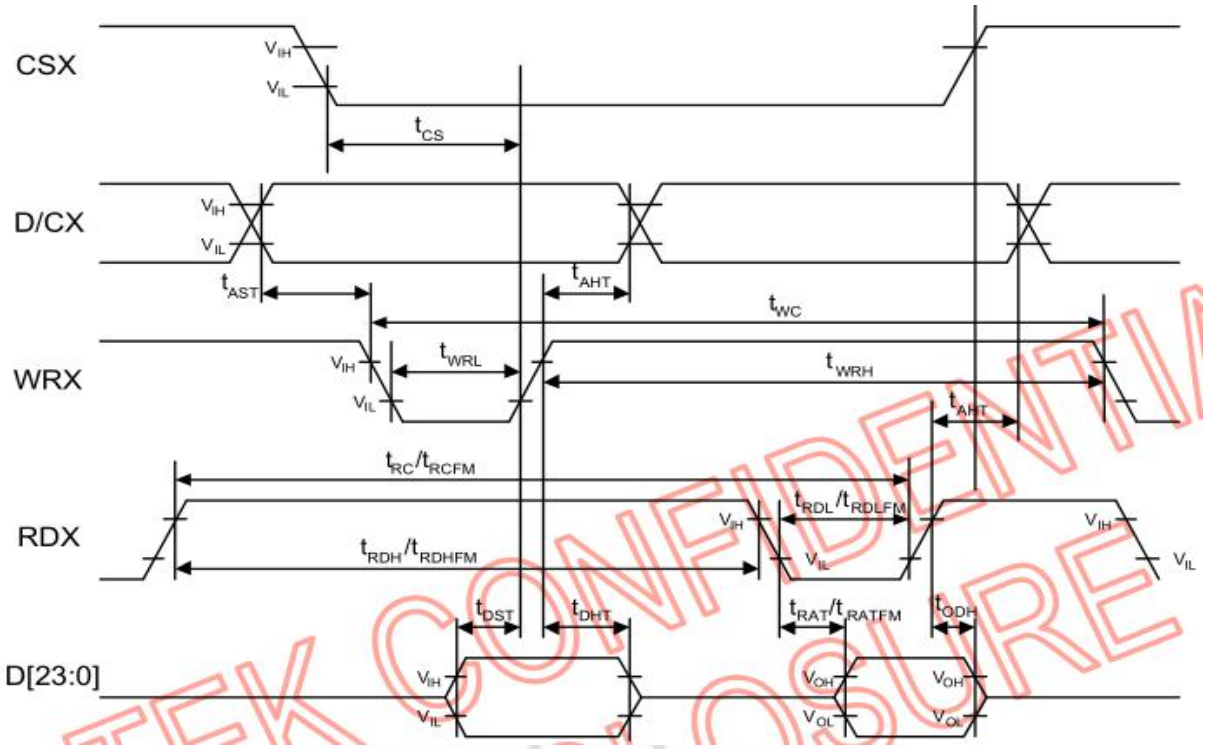


Figure2 Response Time Testing



6. Timing Characteristics of Input Signals

6-1 LCM 8080 Series MCU Parallel Interface Characteristics



(VSS=VSSI=DVSS=0V, VDDI=1.65V to 3.3V, VDD=2.5V to 3.6V,Ta = -30 to 70°C)

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
WRX	tWC	Write cycle	33	-	ns	
	tWRH	Control pulse "H" duration	15	-	ns	
	tWRL	Control pulse "L" duration	15	-	ns	
RDX(ID)	tRC	Read cycle (ID)	160	-	ns	When read ID data
	tRDH	Control pulse "H" duration (ID)	90	-	ns	
	tRDL	Control pulse "L" duration (ID)	45	-	ns	
RDX(FM)	tRCFM	Read cycle (FM)	400	-	ns	When read from frame memory
	tRDHFM	Control pulse "H" duration (FM)	250	-	ns	
	tRDLFM	Control pulse "L" duration (FM)	150	-	ns	
D/CX	tAST	Address setup time (Write)	0	-	ns	
		Address setup time (Read)	10	-	ns	
	tAHT	Address hole time	2	-	ns	
D[17:0]	tDST	Data setup time	15	-	ns	
	tDHT	Data hold time	10	-	ns	
	tRAT	Read access time (ID)	-	40	ns	
	tRATFM	Read access time (FM)	-	150	ns	
	tODH	Output disable time	5	-	ns	

Note 1) VDDI=1.65 to 3.3V, VDD=2.5 to 3.6V, VSS=VSSI=DVSS=0V, Ta=-30 to 70 ºC (to +85 ºC no damage)
VDD means VDDA, VDDR, VDDB and VSS means VSSA, VSSR, VSSB
Note 2) The input signal rise time and fall time (tr, tf) is specified at 15 ns or less.
Logic high and low levels are specified as 20% and 80% of VDDI for Input signals.

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.

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

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 when using a normally black panel, as it may cause image sticking due to the LCM structure. If the screen is displayed in fixed mode, use a screen saver.It is recommended to display the fixed mode in less 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)
{
        //---------------------Reset sequence----------//
        LCD_RESET=1;
        Delayms(1); //Delay 1ms
        LCD_RESET=0;
        Delayms(10); //Delay 10ms
        LCD_RESET=1;
        Delayms(120);    //Delay 120ms
        //-----------------------------------------------------------------//
                //PAGE2
                 WriteComm(0xF000);      WriteData(0x0055);
                 WriteComm(0xF001);      WriteData(0x00AA);
                 WriteComm(0xF002);      WriteData(0x0052);
                 WriteComm(0xF003);      WriteData(0x0008);
                 WriteComm(0xF004);      WriteData(0x0002);

                 WriteComm(0xB700);      WriteData(0x0001);
                 WriteComm(0xB701);      WriteData(0x0001);
                 WriteComm(0xB702);      WriteData(0x0001);
                 WriteComm(0xB800);      WriteData(0x0007);
                 WriteComm(0xB801);      WriteData(0x0007);
                 WriteComm(0xB802);      WriteData(0x0007);
                 //PAGE1
                 WriteComm(0xF000);      WriteData(0x0055);
                 WriteComm(0xF001);      WriteData(0x00AA);
                 WriteComm(0xF002);      WriteData(0x0052);
                 WriteComm(0xF003);      WriteData(0x0008);
                 WriteComm(0xF004);      WriteData(0x0001);

                 WriteComm(0xB000);      WriteData(0x000D);
                 WriteComm(0xB001);      WriteData(0x000D);
                 WriteComm(0xB002);      WriteData(0x000D);

                 WriteComm(0xB600);      WriteData(0x0044);
                 WriteComm(0xB601);      WriteData(0x0044);
                 WriteComm(0xB602);      WriteData(0x0044);
```

```
WriteComm(0xB700);      WriteData(0x0034);
WriteComm(0xB701);      WriteData(0x0034);
WriteComm(0xB702);      WriteData(0x0034);

WriteComm(0xB100);      WriteData(0x000D);
WriteComm(0xB101);      WriteData(0x000D);
WriteComm(0xB102);      WriteData(0x000D);

WriteComm(0xB700);      WriteData(0x0034);
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WriteComm(0xB702);      WriteData(0x0034);

WriteComm(0xB200);      WriteData(0x0000);
WriteComm(0xB201);      WriteData(0x0000);
WriteComm(0xB202);      WriteData(0x0000);

WriteComm(0xB800);      WriteData(0x0024);
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WriteComm(0xB802);      WriteData(0x0024);

WriteComm(0xBF00);      WriteData(0x0001);

WriteComm(0xB300);      WriteData(0x000F);
WriteComm(0xB301);      WriteData(0x000F);
WriteComm(0xB302);      WriteData(0x000F);

WriteComm(0xB900);      WriteData(0x0034);
WriteComm(0xB901);      WriteData(0x0034);
WriteComm(0xB902);      WriteData(0x0034);

WriteComm(0xB500);      WriteData(0x0008);
WriteComm(0xB501);      WriteData(0x0008);
WriteComm(0xB502);      WriteData(0x0008);

WriteComm(0xC200);      WriteData(0x0003);

WriteComm(0xBA00);      WriteData(0x0034);
WriteComm(0xBA01);      WriteData(0x0034);
WriteComm(0xBA02);      WriteData(0x0034);
```

```
WriteComm(0xBC00);      WriteData(0x0000);
WriteComm(0xBC01);      WriteData(0x0078);
WriteComm(0xBC02);      WriteData(0x0000);

WriteComm(0xBD00);      WriteData(0x0000);
WriteComm(0xBD01);      WriteData(0x0078);
WriteComm(0xBD02);      WriteData(0x0000);

WriteComm(0xBE00);      WriteData(0x0000);
WriteComm(0xBE01);      WriteData(0x0071);

//Gamma (R+)
WriteComm(0xD100);      WriteData(0x0000);
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WriteComm(0xD102);      WriteData(0x0000);
WriteComm(0xD103);      WriteData(0x003E);
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WriteComm(0xD105);      WriteData(0x0044);
WriteComm(0xD106);      WriteData(0x0000);
WriteComm(0xD107);      WriteData(0x0052);
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WriteComm(0xD109);      WriteData(0x0078);
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WriteComm(0xD10C);      WriteData(0x0000);
WriteComm(0xD10D);      WriteData(0x00CD);
WriteComm(0xD10E);      WriteData(0x0001);
WriteComm(0xD10F);      WriteData(0x0009);
WriteComm(0xD110);      WriteData(0x0001);
WriteComm(0xD111);      WriteData(0x0037);
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WriteComm(0xD113);      WriteData(0x0072);
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```

```
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WriteComm(0xD121);      WriteData(0x0083);
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WriteComm(0xD125);      WriteData(0x00AE);
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WriteComm(0xD12C);      WriteData(0x0002);
WriteComm(0xD12D);      WriteData(0x00FA);
WriteComm(0xD12E);      WriteData(0x0003);
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//Gamma (G+)
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```
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```

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WriteComm(0xD329);      WriteData(0x00D4);
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WriteComm(0xD32B);      WriteData(0x00E9);
WriteComm(0xD32C);      WriteData(0x0002);
WriteComm(0xD32D);      WriteData(0x00FA);
WriteComm(0xD32E);      WriteData(0x0003);
WriteComm(0xD32F);      WriteData(0x0015);
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WriteComm(0xD331);      WriteData(0x003C);
WriteComm(0xD332);      WriteData(0x0003);
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WriteComm(0xD400);      WriteData(0x0000);
WriteComm(0xD401);      WriteData(0x003D);
WriteComm(0xD402);      WriteData(0x0000);
WriteComm(0xD403);      WriteData(0x003E);
WriteComm(0xD404);      WriteData(0x0000);
WriteComm(0xD405);      WriteData(0x0044);
WriteComm(0xD406);      WriteData(0x0000);
WriteComm(0xD407);      WriteData(0x0052);
WriteComm(0xD408);      WriteData(0x0000);
WriteComm(0xD409);      WriteData(0x0078);
WriteComm(0xD40A);      WriteData(0x0000);
WriteComm(0xD40B);      WriteData(0x00A3);
WriteComm(0xD40C);      WriteData(0x0000);
WriteComm(0xD40D);      WriteData(0x00CD);
WriteComm(0xD40E);      WriteData(0x0001);
WriteComm(0xD40F);      WriteData(0x0009);
WriteComm(0xD410);      WriteData(0x0001);
WriteComm(0xD411);      WriteData(0x0037);
WriteComm(0xD412);      WriteData(0x0001);
WriteComm(0xD413);      WriteData(0x0072);
WriteComm(0xD414);      WriteData(0x0001);
WriteComm(0xD415);      WriteData(0x00A0);
WriteComm(0xD416);      WriteData(0x0001);
WriteComm(0xD417);      WriteData(0x00E3);
WriteComm(0xD418);      WriteData(0x0002);
```

```
WriteComm(0xD419);      WriteData(0x0015);
WriteComm(0xD41A);      WriteData(0x0002);
WriteComm(0xD41B);      WriteData(0x0016);
WriteComm(0xD41C);      WriteData(0x0002);
WriteComm(0xD41D);      WriteData(0x0041);
WriteComm(0xD41E);      WriteData(0x0002);
WriteComm(0xD41F);      WriteData(0x006B);
WriteComm(0xD420);      WriteData(0x0002);
WriteComm(0xD421);      WriteData(0x0083);
WriteComm(0xD422);      WriteData(0x0002);
WriteComm(0xD423);      WriteData(0x009E);
WriteComm(0xD424);      WriteData(0x0002);
WriteComm(0xD425);      WriteData(0x00AE);
WriteComm(0xD426);      WriteData(0x0002);
WriteComm(0xD427);      WriteData(0x00C5);
WriteComm(0xD428);      WriteData(0x0002);
WriteComm(0xD429);      WriteData(0x00D4);
WriteComm(0xD42A);      WriteData(0x0002);
WriteComm(0xD42B);      WriteData(0x00E9);
WriteComm(0xD42C);      WriteData(0x0002);
WriteComm(0xD42D);      WriteData(0x00FA);
WriteComm(0xD42E);      WriteData(0x0003);
WriteComm(0xD42F);      WriteData(0x0015);
WriteComm(0xD430);      WriteData(0x0003);
WriteComm(0xD431);      WriteData(0x003C);
WriteComm(0xD432);      WriteData(0x0003);
WriteComm(0xD433);      WriteData(0x008E);

//Gamma (G-)
WriteComm(0xD500);      WriteData(0x0000);
WriteComm(0xD501);      WriteData(0x003D);
WriteComm(0xD502);      WriteData(0x0000);
WriteComm(0xD503);      WriteData(0x003E);
WriteComm(0xD504);      WriteData(0x0000);
WriteComm(0xD505);      WriteData(0x0044);
WriteComm(0xD506);      WriteData(0x0000);
WriteComm(0xD507);      WriteData(0x0052);
WriteComm(0xD508);      WriteData(0x0000);
WriteComm(0xD509);      WriteData(0x0078);
WriteComm(0xD50A);      WriteData(0x0000);
```

```
WriteComm(0xD50B);      WriteData(0x00A3);
WriteComm(0xD50C);      WriteData(0x0000);
WriteComm(0xD50D);      WriteData(0x00CD);
WriteComm(0xD50E);      WriteData(0x0001);
WriteComm(0xD50F);      WriteData(0x0009);
WriteComm(0xD510);      WriteData(0x0001);
WriteComm(0xD511);      WriteData(0x0037);
WriteComm(0xD512);      WriteData(0x0001);
WriteComm(0xD513);      WriteData(0x0072);
WriteComm(0xD514);      WriteData(0x0001);
WriteComm(0xD515);      WriteData(0x00A0);
WriteComm(0xD516);      WriteData(0x0001);
WriteComm(0xD517);      WriteData(0x00E3);
WriteComm(0xD518);      WriteData(0x0002);
WriteComm(0xD519);      WriteData(0x0015);
WriteComm(0xD51A);      WriteData(0x0002);
WriteComm(0xD51B);      WriteData(0x0016);
WriteComm(0xD51C);      WriteData(0x0002);
WriteComm(0xD51D);      WriteData(0x0041);
WriteComm(0xD51E);      WriteData(0x0002);
WriteComm(0xD51F);      WriteData(0x006B);
WriteComm(0xD520);      WriteData(0x0002);
WriteComm(0xD521);      WriteData(0x0083);
WriteComm(0xD522);      WriteData(0x0002);
WriteComm(0xD523);      WriteData(0x009E);
WriteComm(0xD524);      WriteData(0x0002);
WriteComm(0xD525);      WriteData(0x00AE);
WriteComm(0xD526);      WriteData(0x0002);
WriteComm(0xD527);      WriteData(0x00C5);
WriteComm(0xD528);      WriteData(0x0002);
WriteComm(0xD529);      WriteData(0x00D4);
WriteComm(0xD52A);      WriteData(0x0002);
WriteComm(0xD52B);      WriteData(0x00E9);
WriteComm(0xD52C);      WriteData(0x0002);
WriteComm(0xD52D);      WriteData(0x00FA);
WriteComm(0xD52E);      WriteData(0x0003);
WriteComm(0xD52F);      WriteData(0x0015);
WriteComm(0xD530);      WriteData(0x0003);
WriteComm(0xD531);      WriteData(0x003C);
WriteComm(0xD532);      WriteData(0x0003);
```

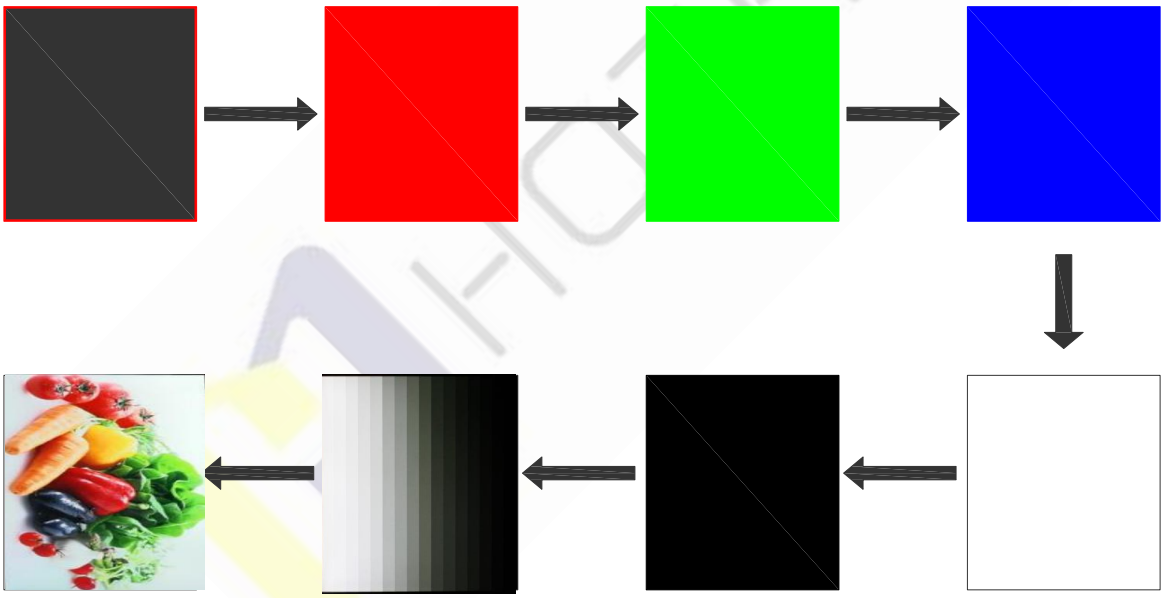
```
WriteComm(0xD533);      WriteData(0x008E);

//Gamma (B-)
WriteComm(0xD600);      WriteData(0x0000);
WriteComm(0xD601);      WriteData(0x003D);
WriteComm(0xD602);      WriteData(0x0000);
WriteComm(0xD603);      WriteData(0x003E);
WriteComm(0xD604);      WriteData(0x0000);
WriteComm(0xD605);      WriteData(0x0044);
WriteComm(0xD606);      WriteData(0x0000);
WriteComm(0xD607);      WriteData(0x0052);
WriteComm(0xD608);      WriteData(0x0000);
WriteComm(0xD609);      WriteData(0x0078);
WriteComm(0xD60A);      WriteData(0x0000);
WriteComm(0xD60B);      WriteData(0x00A3);
WriteComm(0xD60C);      WriteData(0x0000);
WriteComm(0xD60D);      WriteData(0x00CD);
WriteComm(0xD60E);      WriteData(0x0001);
WriteComm(0xD60F);      WriteData(0x0009);
WriteComm(0xD610);      WriteData(0x0001);
WriteComm(0xD611);      WriteData(0x0037);
WriteComm(0xD612);      WriteData(0x0001);
WriteComm(0xD613);      WriteData(0x0072);
WriteComm(0xD614);      WriteData(0x0001);
WriteComm(0xD615);      WriteData(0x00A0);
WriteComm(0xD616);      WriteData(0x0001);
WriteComm(0xD617);      WriteData(0x00E3);
WriteComm(0xD618);      WriteData(0x0002);
WriteComm(0xD619);      WriteData(0x0015);
WriteComm(0xD61A);      WriteData(0x0002);
WriteComm(0xD61B);      WriteData(0x0016);
WriteComm(0xD61C);      WriteData(0x0002);
WriteComm(0xD61D);      WriteData(0x0041);
WriteComm(0xD61E);      WriteData(0x0002);
WriteComm(0xD61F);      WriteData(0x006B);
WriteComm(0xD620);      WriteData(0x0002);
WriteComm(0xD621);      WriteData(0x0083);
WriteComm(0xD622);      WriteData(0x0002);
WriteComm(0xD623);      WriteData(0x009E);
WriteComm(0xD624);      WriteData(0x0002);
```

```
WriteComm(0xD625);      WriteData(0x00AE);
WriteComm(0xD626);      WriteData(0x0002);
WriteComm(0xD627);      WriteData(0x00C5);
WriteComm(0xD628);      WriteData(0x0002);
WriteComm(0xD629);      WriteData(0x00D4);
WriteComm(0xD62A);      WriteData(0x0002);
WriteComm(0xD62B);      WriteData(0x00E9);
WriteComm(0xD62C);      WriteData(0x0002);
WriteComm(0xD62D);      WriteData(0x00FA);
WriteComm(0xD62E);      WriteData(0x0003);
WriteComm(0xD62F);      WriteData(0x0015);
WriteComm(0xD630);      WriteData(0x0003);
WriteComm(0xD631);      WriteData(0x003C);
WriteComm(0xD632);      WriteData(0x0003);
WriteComm(0xD633);      WriteData(0x008E);

//PAGE0
WriteComm(0xF000);      WriteData(0x0055);
WriteComm(0xF001);      WriteData(0x00AA);
WriteComm(0xF002);      WriteData(0x0052);
WriteComm(0xF003);      WriteData(0x0008);
WriteComm(0xF004);      WriteData(0x0000);

WriteComm(0xB500);      WriteData(0x006B);

WriteComm(0xB100);      WriteData(0x00FC);
WriteComm(0xB101);      WriteData(0x0000);

WriteComm(0xB600);      WriteData(0x0005);

WriteComm(0xB700);      WriteData(0x0070);
WriteComm(0xB701);      WriteData(0x0070);

WriteComm(0xB800);      WriteData(0x0001);
WriteComm(0xB801);      WriteData(0x0003);
WriteComm(0xB802);      WriteData(0x0003);
WriteComm(0xB803);      WriteData(0x0003);


//Source Driver Control (Nova non-used)
```

```
WriteComm(0xBB00);      WriteData(0x0088);
WriteComm(0xBB01);      WriteData(0x0008);
WriteComm(0xBB02);      WriteData(0x0088);

WriteComm(0xBC00);      WriteData(0x0002);
WriteComm(0xBC01);      WriteData(0x0000);
WriteComm(0xBC02);      WriteData(0x0000);

WriteComm(0xBD00);      WriteData(0x0001);
WriteComm(0xBD01);      WriteData(0x006c);
WriteComm(0xBD02);      WriteData(0x001E);
WriteComm(0xBD03);      WriteData(0x0006);
WriteComm(0xBD04);      WriteData(0x0000);

WriteComm(0xC900);      WriteData(0x00C0);
WriteComm(0xC901);      WriteData(0x003C);
WriteComm(0xC902);      WriteData(0x0050);
WriteComm(0xC903);      WriteData(0x0050);
WriteComm(0xC904);      WriteData(0x0050);

WriteComm(0x3600);      WriteData(0x0000);
WriteComm(0x3500);      WriteData(0x0000);
WriteComm(0x3A00);      WriteData(0x0005);

//Sleep out
WriteComm(0x1100);
Delay(120);
//Display on
WriteComm(0x2900);
}
```

```
Void Panel_SleepIn_Mode (void)
{
Write command 0x2800);
Delayms (120);
Write command 0x1000);
Delayms (120);
}
Void Panel_SleepOut_Mode (void)
{
Write command 0x1100);
Delayms (120);
Write command 0x2900);
Delayms (120);
}
```

10. LCD Test Pattern (In the same glass, IC test conditions)



Pattern	Red frame	Red	Green	Blue	White	Black	Gray scale	Image
Current (mA)	T.B.D	T.B.D	T.B.D	T.B.D	T.B.D	T.B.D	T.B.D	T.B.D