



WINSTAR Display Co.,Ltd.
華凌光電股份有限公司



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WEB: <https://www.winstar.com.tw> E-mail: sales@winstar.com.tw

SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF50FTYFGDBGA#

APPROVED BY: (FOR CUSTOMER USE ONLY)	PCB VERSION:	DATA:
	<input type="checkbox"/> TFT Display Inspection Specification: https://www.winstar.com.tw/technology/download.html	<input type="checkbox"/> Precaution in use of TFT module: https://www.winstar.com.tw/technology/download/declaration.html

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			周园园
ISSUED DATE:	2025/01/13		

RECORDS OF REVISION

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2022/10/09		First issue
A	2023/06/07		Modify touchpanel
B	2024/04/02		Modify Static electricity test
C	2025/01/13		Modify Reliability

Contents

- 1.Module Classification Information
- 2.Summary
- 3.General Specifications
- 4.Absolute Maximum Ratings
- 5.Electrical Characteristics
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- 9.Interface
- 10.Block Diagram
- 11.Reliability
- 12.Touch Panel Information
- 13.Contour Drawing
- 14.Initial Code For Reference

1. Module Classification Information

W F 50 F T Y F G D B G A #
 ① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫ ⑬

①	Brand : WINSTAR DISPLAY CORPORATION											
②	Display Type : F→TFT Type, J→Custom TFT											
③	Display Size : 5.0" TFT											
④	Model serials no.											
⑤	Backlight Type :	F→CCFL, White S→LED, High Light White					T→LED, White Z→Nichia LED, White					
⑥	LCD Polarize Type/ Temperature range/ Gray Scale Inversion Direction	A→Transmissive, N.T, IPS TFT C→Transmissive, N. T, 6:00 ; F→Transmissive, N.T,12:00 ; I→Transmissive, W. T, 6:00 K→Transflective, W.T,12:00 L→Transmissive, W.T,12:00 N→Transmissive, Super W.T, 6:00					Q→Transmissive, Super W.T, 12:00 R→Transmissive, Super W.T, O-TFT V→Transmissive, Super W.T, VA TFT W→Transmissive, Super W.T, IPS TFT X→Transmissive, W.T, VA TFT Y→Transmissive, W.T, IPS TFT Z→Transmissive, W.T, O-TFT					
⑦	A : TFT LCD B : TFT+SCREW HOLES+CONTROL BOARD C : TFT+ SCREW HOLES +A/D BOARD D : TFT+ SCREW HOLES +A/D BOARD+CONTROL BOARD E : TFT+ SCREW HOLES +POWER BOARD					F : TFT+CONTROL BOARD G : TFT+ SCREW HOLES H : TFT+D/V BOARD I : TFT+ SCREW HOLES +D/V BOARD J : TFT+POWER BD						
⑧	Resolution:											
	A	128160	B	320234	C	320240	D	480234	E	480272	F	640480
	G	800480	H	1024600	I	320480	J	240320	K	800600	L	240400
	M	1024768	N	128128	P	1280800	Q	480800	R	640320	S	480128
	T	800320	U	8001280	V	176220	W	1280398	X	1024250	Y	1920720
	Z	800200	2	1024324	3	7201280	4	19201200	5	1366768	6	1280320
⑨	D: Digital L : LVDS M:MIPI											
⑩	Interface:											
	N	Without control board			A	8Bit		B	16Bit		H	HDMI
	I	I2C Interface			R	RS232		S	SPI Interface		U	USB
⑪	TS:											
	N	Without TS			T	Resistive touch panel			C	Capacitive touch panel (G-F-F)		
	G	Capacitive touch panel (G-G)					C1	Capacitive touch panel (G-F-F)+OCA				
	C2	Capacitive touch panel (G-F-F)+OCR					G1	Capacitive touch panel (G-G)+OCA				
	G2	Capacitive touch panel (G-G)+OCR					B	CTP+GG+USB				
⑫	Version: X:Raspberry pi											
⑬	Special Code	#:Fit in with ROHS directive regulations										

2.Summary

TFT 5.0" is a is a color active matrix thin film transistor (TFT) liquid crystal display (LCD) that uses amorphous silicon TFT as a switching device. This TFT LCD has a 5.0 inch diagonally measured active display area with 800x480 (800 horizontal by 480 vertical pixel) resolution.

3. General Specifications

Item	Dimension	Unit
Size	5.0	inch
Dot Matrix	800 × 3(RGB) × 480	dots
Module dimension	120.7 x 75.8 x 8.78 (Max)	mm
Active area	108.0 x 64.8	mm
Pixel pitch	0.135 x 0.135	mm
LCD type	TFT, Normally Black, Transmissive	
View Direction	80/80/80/80	
Aspect Ratio	5:3	
Backlight Type	LED, Normally White	
Controller IC	SSD1963	
TFT Interface	Digital 8080 family MPU 8bit/16bit	
CTP IC	ILI2130 or equivalent	
CTP Interface	I2C	
CTP FW Version	0x07.0x00.0x00.0x00.0xA1.0x25.0x50.0x00	
CTP Resolution	16384*16384	
With /Without TP	With CTP	
Surface	Glare	

*Color tone slight changed by temperature and driving voltage.

4. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	°C
Storage Temperature	TST	-30	—	+80	°C

Note: Device is subject to be damaged permanently if stresses beyond those absolute maximum ratings listed above

1. Temp. $\leq 60^{\circ}\text{C}$, 90% RH MAX. Temp. $> 60^{\circ}\text{C}$, Absolute humidity shall be less than 90% RH at 60°C

5. Electrical Characteristics

5.1. Operating conditions: (CON3.Pin1=GND, Pin2=VDD)

Item	Symbol	Min	Typ	Max	Unit	Remark
Supply Voltage For LCM	VDD	3.1	3.3	3.6	V	—
Supply Current For LCM	IDD	—	76	114	mA	Note1

Note 1 : This value is test for VDD =3.3V , Ta=25°C only

5.2. Backlight driving conditions (CON3.Pin33,34=VLED-, Pin35,36=VLED+)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
Operation Current For LED Driver	VLED=5V	200	—	300	mA	Note 1,2
Supply Voltage For LED Driver	VLED+	—	5	—	V	—
LED Life Time	—	—	50,000	-	Hr	Note 2,3,4

Note 1 : Base on VLED=5.0V for the back light driver IC specification

Note 2 : Ta = 25 °C

Note 3 : Brightness to be decreased to 50% of the initial value

Note 4 : The single LED lamp case

6.DC CHARATERISTICS

Parameter	Symbol	Rating			Unit	Condition
		Min	Typ	Max		
Low level input voltage	V_{IL}	0	-	0.3VDD	V	
High level input voltage	V_{IH}	0.7VDD	-	VDD	V	

7. Interface timing

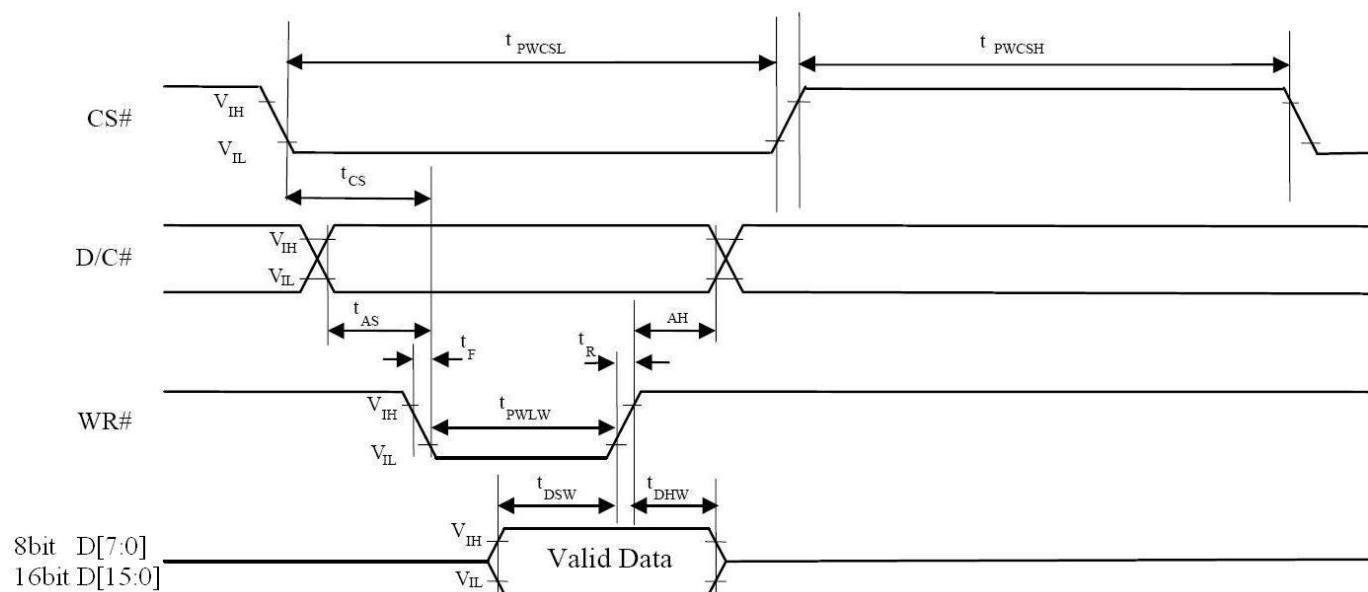
7.1. 8080 Mode 8bit/16bit

The 8080 mode MCU interface consist of CS#, D/C#, RD#, WR#, Data Bus signals. This interface use WR# to define a write cycle and RD# for read cycle. If the WR# goes low when the CS# signal is low, the data or command will be latched into the system at the rising edge of WR#. Similarly, the read cycle will start when RD# goes low and end at the rising edge of RD#.

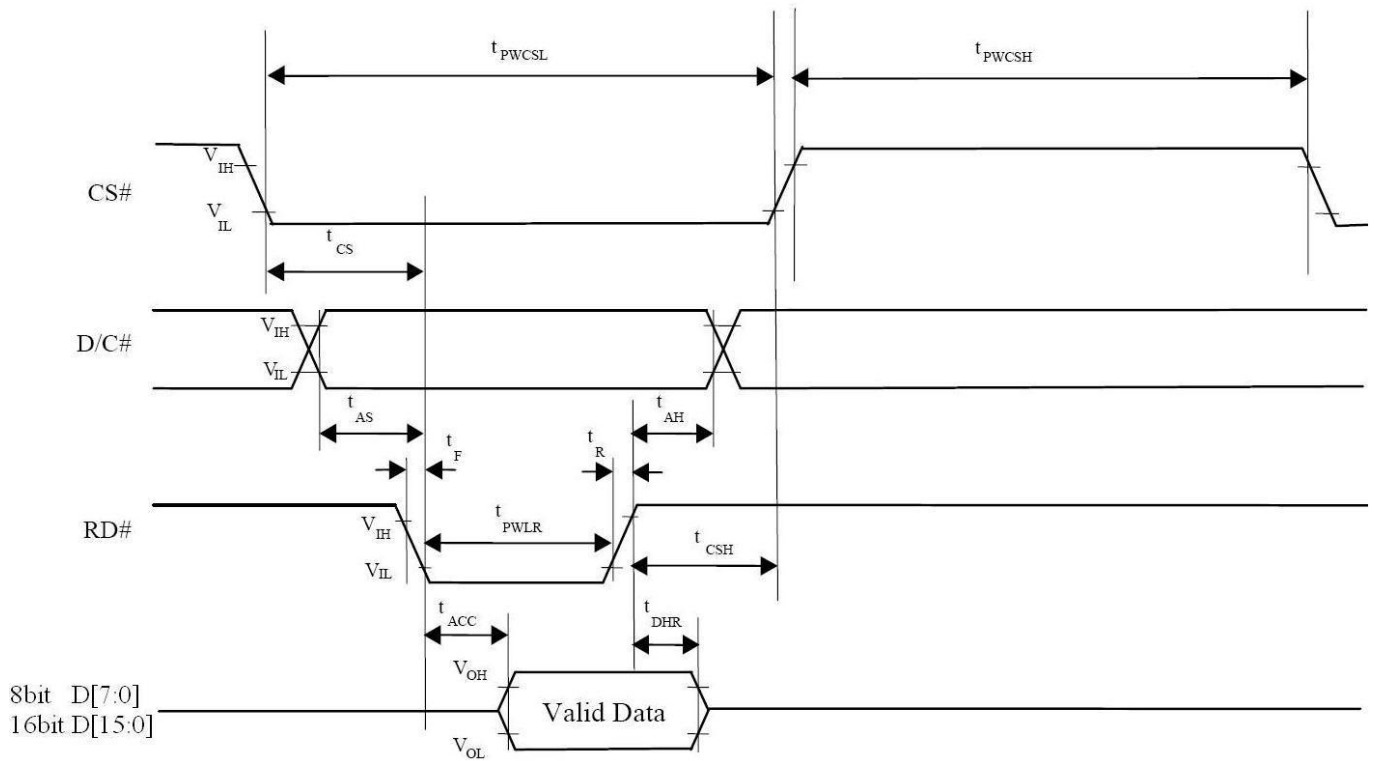
7.2. 8080 Mode Write Cycle

Symbol	Parameter	Min	Typ	Max	Unit
fMCLK	System Clock Frequency	1	-	110	MHz
tMCLK	System Clock Period	1/ fMCLK	-	-	ns
tPWCSH	Control Pulse High Width Write Read	13 30	1.5* tMCLK 3.5* tMCLK	-	ns
tPWCSL	Control Pulse Low Width Write (next write cycle) Write (next read cycle) Read	13 80 80	1.5* tMCLK 9* tMCLK 9* tMCLK	-	ns
tAS	Address Setup Time	1	-	-	ns
tAH	Address Hold Time	2	-	-	ns
tDSW	Write Data Setup Time	4	-	-	ns
tDHW	Write Data Hold Time	1	-	-	ns
tPWLW	Write Low Time	12	-	-	ns
tDHR	Read Data Hold Time	1	-	-	ns
tACC	Access Time	32	-	-	ns
tPWLW	Read Low Time	36	-	-	ns
tR	Rise Time	-	-	0.5	ns
tF	Fall Time	-	-	0.5	ns
tCS	Chip select setup time	2	-	-	ns
tCSH	Chip select hold time to read signal	3	-	-	ns

7.3. Parallel 8080-series Interface Timing Diagram(Write Cycle)



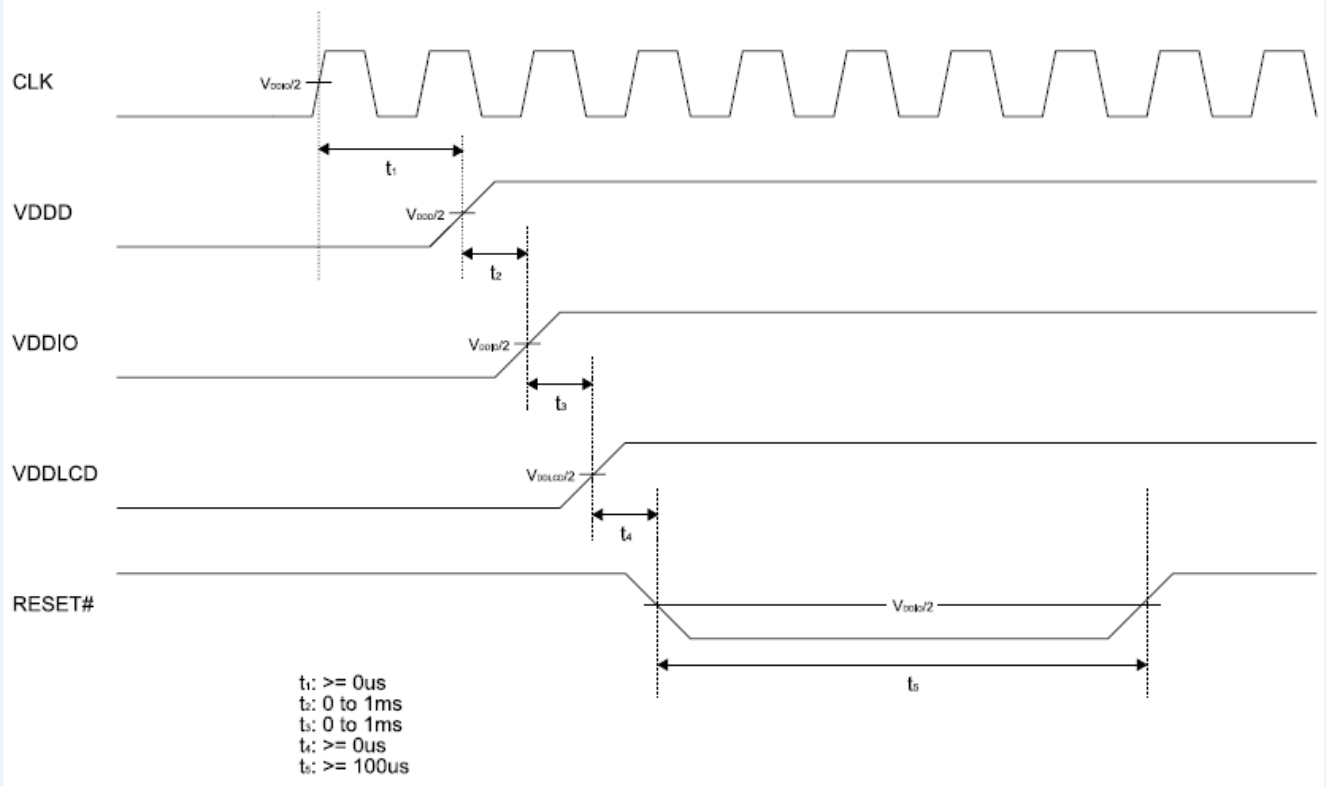
7.4. Parallel 8080-series Interface Timing Diagram(Read Cycle)



7.5. Pixel Data Format

Interface	Cycle	D[15]	D[14]	D[13]	D[12]	D[11]	D[10]	D[9]	D[8]	D[7]	D[6]	D[5]	D[4]	D[3]	D[2]	D[1]	D[0]
16 bits (565 format)	1 st	R5	R4	R3	R2	R1	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1
16 bits	1 st	R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0
	2 nd	B7	B6	B5	B4	B3	B2	B1	B0	R7	R6	R5	R4	R3	R2	R1	R0
	3 rd	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
8 bits	1 st									R7	R6	R5	R4	R3	R2	R1	R0
	2 nd									G7	G6	G5	G4	G3	G2	G1	G0
	3 rd									B7	B6	B5	B4	B3	B2	B1	B0

7.6. Power-up Sequence



8. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark	
Response time	Tr+Tf	$\theta=0^\circ$ 、 $\phi=0^\circ$	-	30	40	.ms	Note 3	
Contrast ratio	CR	At optimized viewing angle	800	1000	-	-	Note 4	
Color Chromaticity	White	Wx	$\theta=0^\circ$ 、 $\phi=0^\circ$	0.27	0.32	0.37	Note 2,6,7	
		Wy		0.295	0.345	0.395		
Viewing angle	Hor.	θ_R	$CR \geq 10$	70	80	-	Deg.	Note 1
		θ_L		70	80	-		
	Ver.	ϕ_T		70	80	-		
		ϕ_B		70	80	-		
Brightness	-	-	300	400	-	cd/m ²	Center of display	
Uniformity	(U)	-	75	-	-	%	Note5	

Ta=25±2°C

Note 1: Definition of viewing angle range

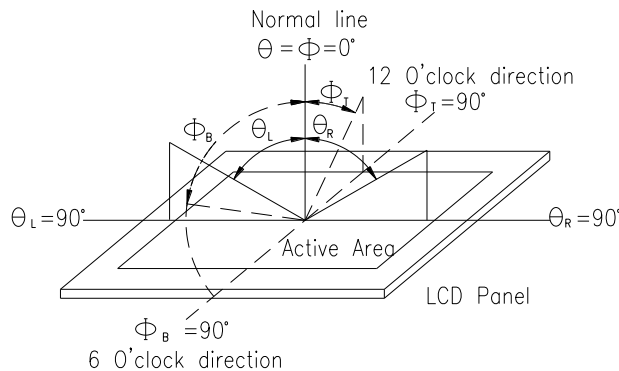


Fig. 8.1. Definition of viewing angle

Note 2: Test equipment setup:

After stabilizing and leaving the panel alone at a driven temperature for 10 minutes, the measurement should be executed. Measurement should be executed in a stable, windless, and dark room. Optical specifications are measured by Topcon BM-7or BM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

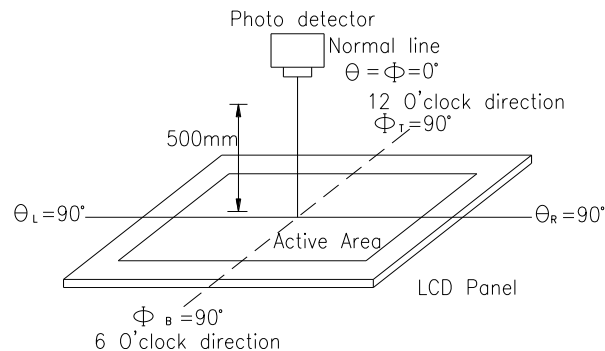
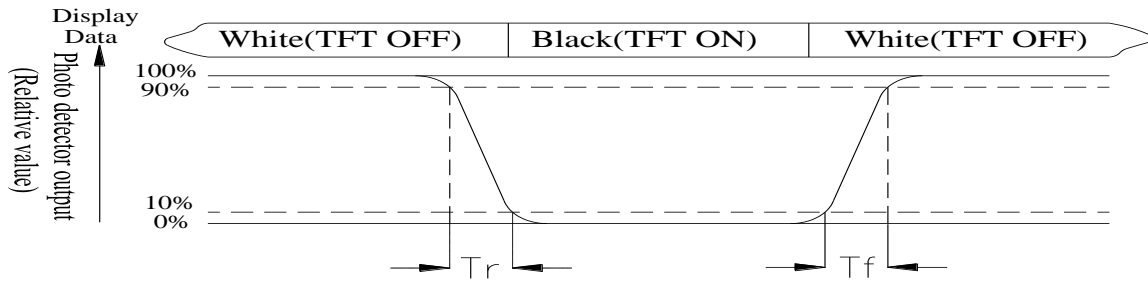


Fig. 8.2. Optical measurement system setup

Note 3: 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_r , is the time between photo detector output intensity changed from 90% to 10%. And fall time, T_f , is the time between photo detector output intensity changed from 10% to 90%



Note 4: Definition of contrast ratio:

The contrast ratio is defined as the following expression.

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD on the "White" state}}{\text{Luminance measured when LCD on the "Black" state}}$$

Note 5: Definition of Luminance Uniformity

Active area is divided into 9 measuring areas (reference the picture in below). Every measuring point is placed at the center of each measuring area.

Luminance Uniformity (U) = $L_{\min}/L_{\max} \times 100\%$

L = Active area length

W = Active area width

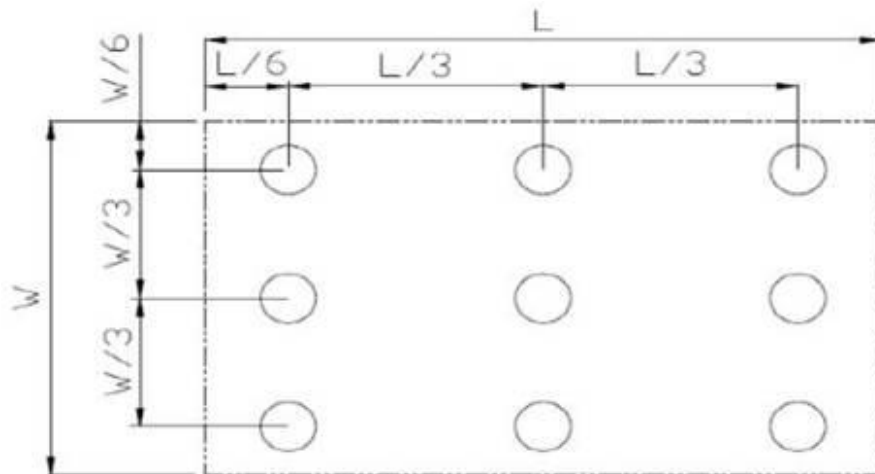


Fig8.3. . Definition of uniformity

Note 6: Definition of color chromaticity (CIE 1931)

Color coordinates measured at the center point of LCD

Note 7: Measured at the center area of the panel when all the input terminals of LCD panel are electrically opened.

9.Interface

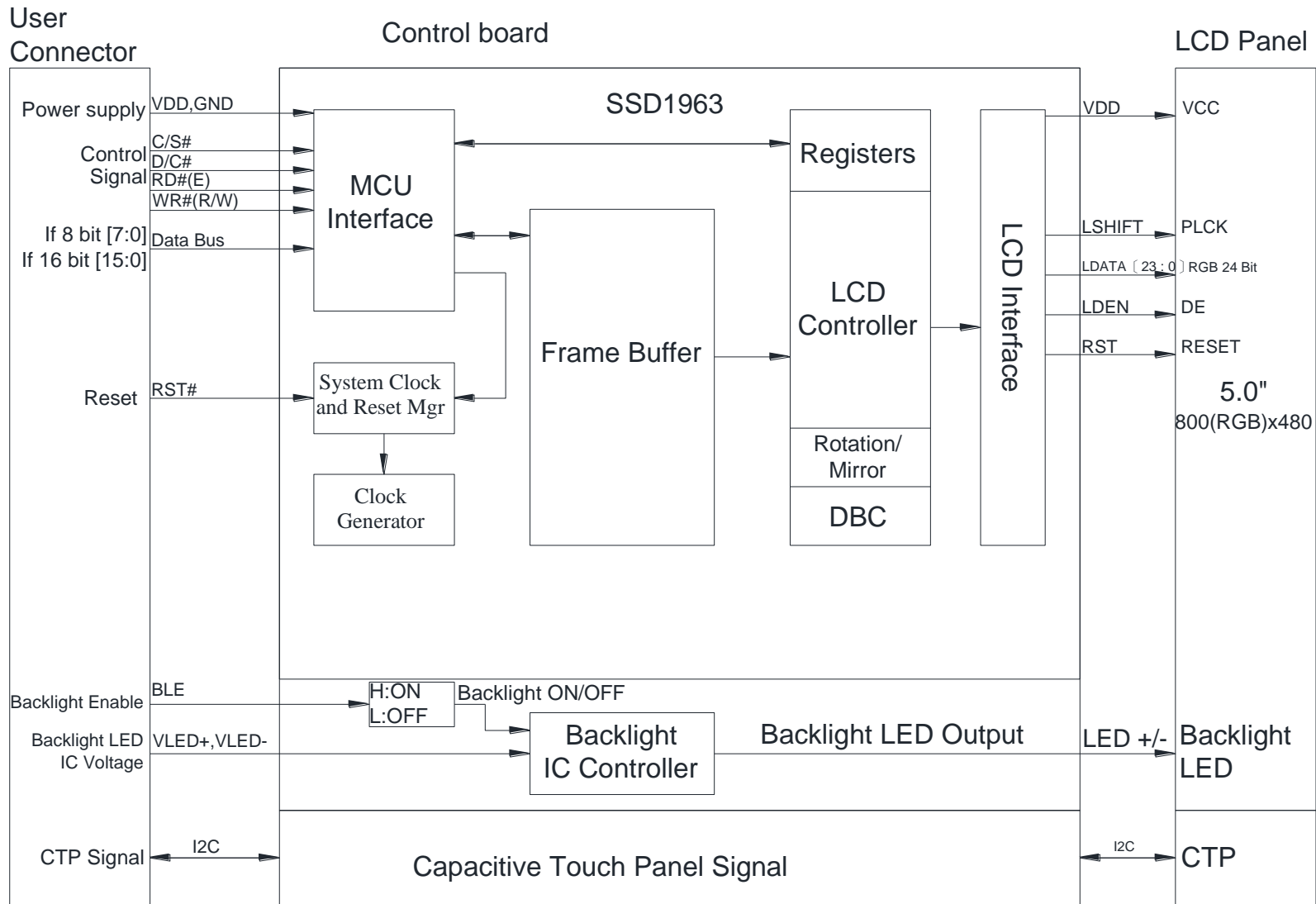
9.1. LCM PIN Definition (CON3)

Pin	Symbol	Function	Remark
1	GND	System round pin of the IC. Connect to system ground.	
2	VDD	Power Supply : +3.3V	
3	BL_E	Backlight control signal , H: On \ L: Off	
4	D/C	Data/Command select	
5	WR	Write strobe signal	
6	RD	Read strobe signal	
7	DB0	Data bus	
8	DB1	Data bus	
9	DB2	Data bus	
10	DB3	Data bus	
11	DB4	Data bus	
12	DB5	Data bus	
13	DB6	Data bus	
14	DB7	Data bus	
15	DB8	Data bus (When select 8bits mode, this pin is NC)	Note1
16	DB9	Data bus (When select 8bits mode, this pin is NC)	Note1
17	DB10	Data bus (When select 8bits mode, this pin is NC)	Note1
18	DB11	Data bus (When select 8bits mode, this pin is NC)	Note1
19	DB12	Data bus (When select 8bits mode, this pin is NC)	Note1
20	DB13	Data bus (When select 8bits mode, this pin is NC)	Note1
21	DB14	Data bus (When select 8bits mode, this pin is NC)	Note1
22	DB15	Data bus (When select 8bits mode, this pin is NC)	Note1
23	NC	No connection	
24	CTP_INT	CTP_ External interrupt to the host	
25	CS	Chip select	
26	RST	Hardware reset	
27	NC	No connection	
28	NC	No connection	
29	CTP_SCL	I2C clock input	
30	CTP_SDA	I2C data input and output	

31	CTP_RST	CTP_ External Reset, Low is active	
32	NC	No connection	
33	VLED-	VLED- for B/L LED inverter (GND)	
34	VLED-	VLED- for B/L LED inverter (GND)	
35	VLED+	VLED+ for B/L LED inverter	
36	VLED+	VLED+ for B/L LED inverter	

Note1: When select 8bit mode, DB0~DB7 be used, DB8~DB15 no connect
When select 16bit mode, DB0~DB15 be used

10. Block Diagram



11. Reliability

Content of Reliability Test (Wide temperature, -20°C~70°C)

Environmental Test			
Test Item	Content of Test	Test Condition	Note
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80°C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	2
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1,2
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max	60°C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation <div style="text-align: center;"> <p style="margin: 0;">-20°C 25°C 70°C</p> <p style="margin: 0;">30min 5min 30min</p> <p style="margin: 0;">1 cycle</p> </div>	-20°C/70°C 10 cycles	2
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=±4KV(contact), ±8KV(air) RS=330Ω CS=150pF 10 times	4

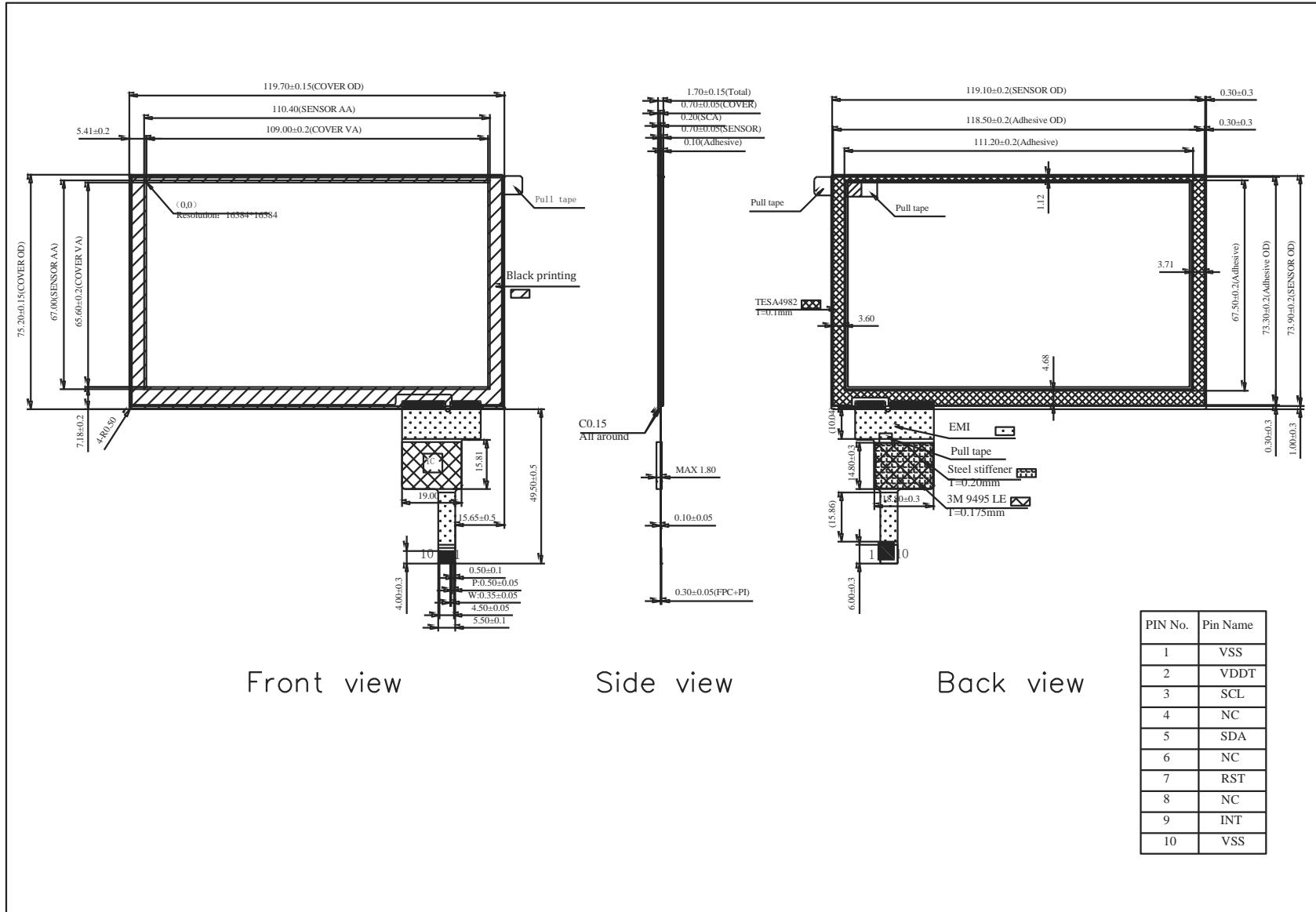
Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

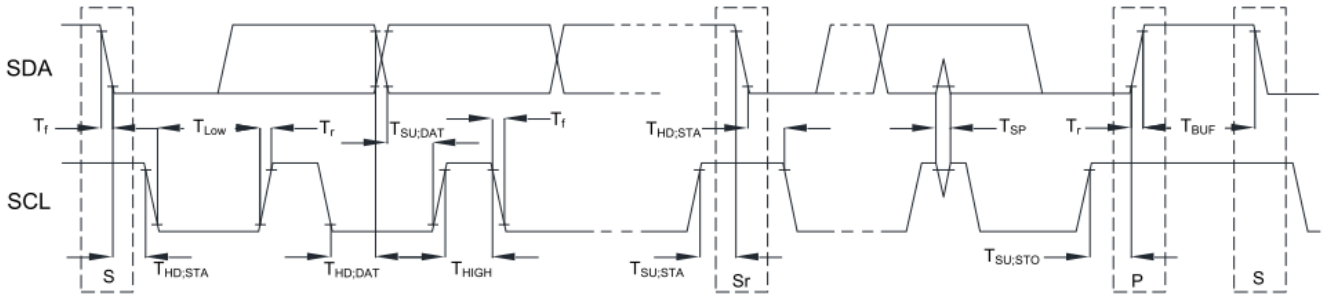
Note3: The packing have to including into the vibration testing.

Note4: Endurance test applying the electric stress to the finished product housing

12.Touch Panel Information

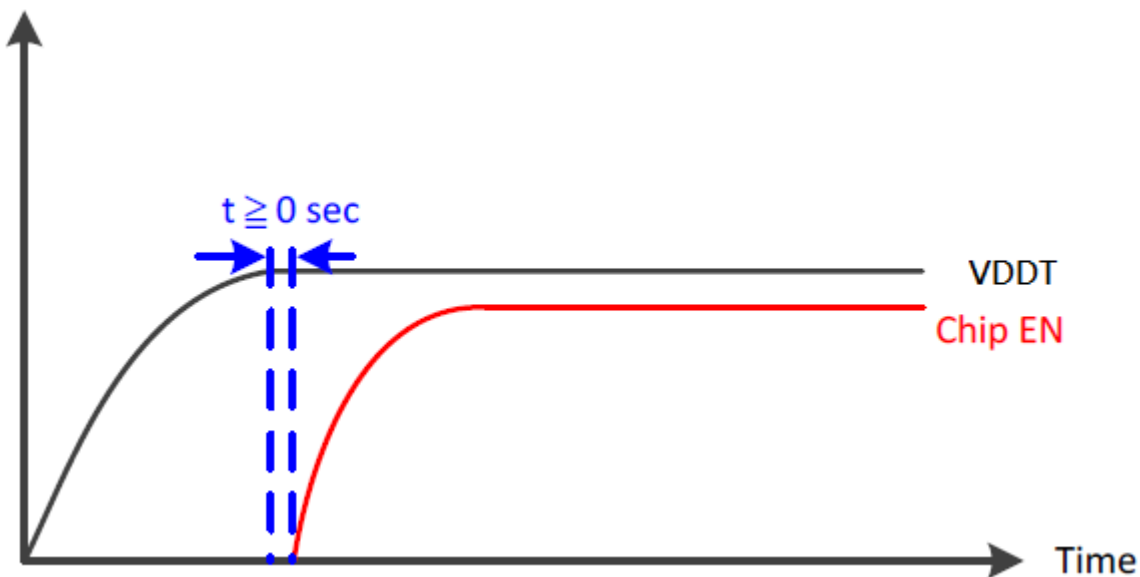


12.1. I2C AC Characteristics

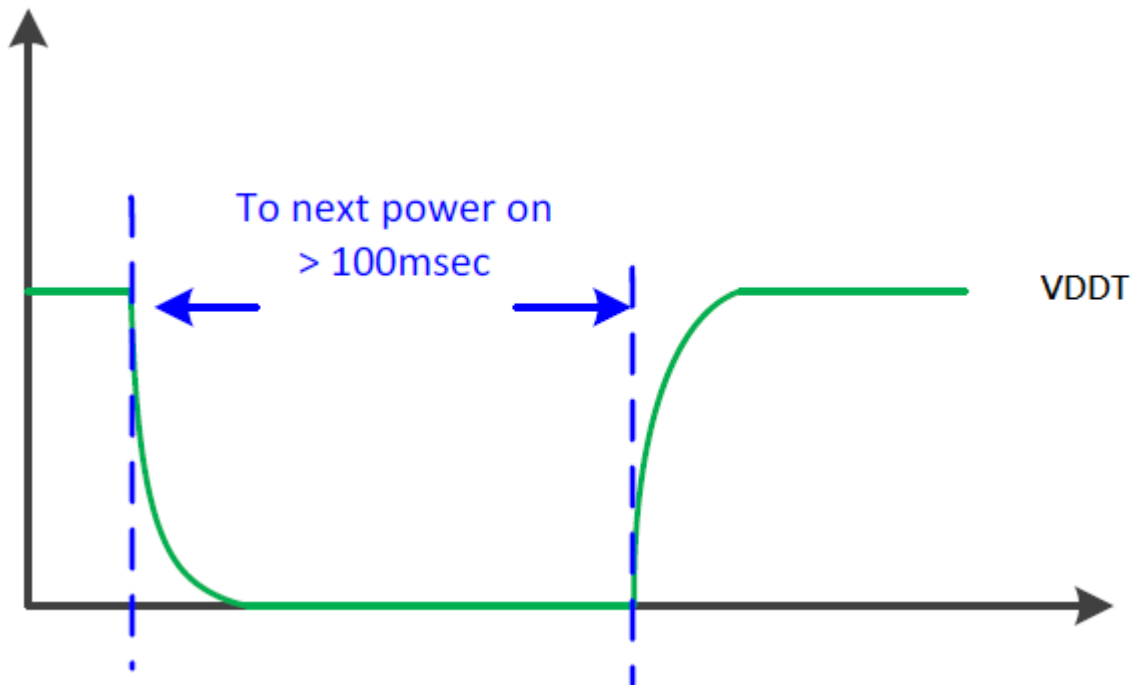


Item	Symbol	100kHz		400kHz		Unit
		Min.	Max.	Min.	Max.	
SCL standard mode clock frequency	F _{SCL}	0	100	0	400	kHz
Hold time (repeated) START condition. After this period, the first clock is generated.	T _{HD;STA}	4	--	0.6	--	us
LOW period of the SCL clock	T _{LOW}	4.7	--	1.3	--	us
HIGH period of the SCL clock	T _{HIGH}	4	--	0.6	--	us
Setup time for a repeat START condition.	T _{SU;STA}	4.7	--	0.6	--	us
Data hold time	T _{HD;DAT}	0	3.45	0	0.9	us
Data setup time	T _{SU;DAT}	250	--	100	--	ns
Rising time of both SDA and SCL signals	T _r	--	1000	--	300	ns
Falling time of both SDA and SCL signals	T _f	--	300	--	300	ns
Setup time for STOP condition.	T _{SU;STO}	4	--	0.6	--	us
Free time between STOP and START condition	T _{BUF}	4.7	--	1.3	--	us
Pulse width of spikes which must be suppressed by input filter	T _{SP}	--	--	0	50	ns

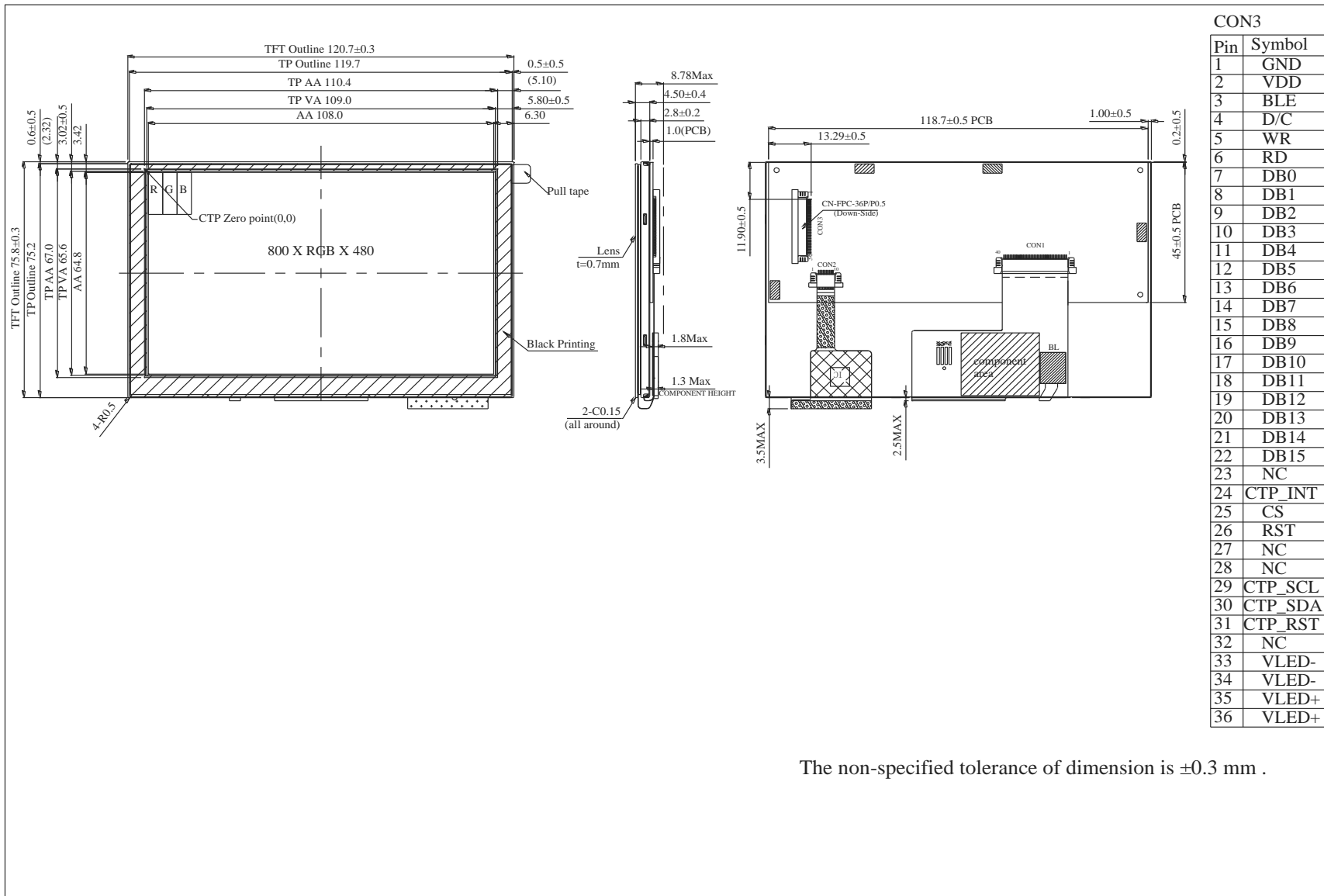
12.2. Power On Sequence



12.3. Power Off to Power On Sequence



13. Contour Drawing



CON3	
Pin	Symbol
1	GND
2	VDD
3	BLE
4	D/C
5	WR
6	RD
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	DB8
16	DB9
17	DB10
18	DB11
19	DB12
20	DB13
21	DB14
22	DB15
23	NC
24	CTP_INT
25	CS
26	RST
27	NC
28	NC
29	CTP_SCL
30	CTP_SDA
31	CTP_RST
32	NC
33	VLED-
34	VLED-
35	VLED+
36	VLED+

The non-specified tolerance of dimension is ±0.3 mm .

14.Initial Code For Reference

```
void SSD1963_50F_InitialCode(void)
{
    GATE = 480;
    SOURCE = 800;

    IC_RST = 0;
    delay(100);
    asm("nop");
    asm("nop");
    asm("nop");
    IC_RST = 1;
    asm("nop");
    asm("nop");
    asm("nop");
    delay(1000);
    Write_Command(0x01);      //Software Reset
    Write_Command(0x01);
    Write_Command(0x01);
    asm("nop");
    asm("nop");
    asm("nop");
    asm("nop");
    Write_Command(0xe2);
    Write_Data(0x1D);
    Write_Data(0x02);
    Write_Data(0x54);
    delay(100);
    Command_Write(0xe0,0x01); //START PLL
    delay(100);
    Command_Write(0xe0,0x03); //LOCK PLL
    asm("nop");
    asm("nop");
    asm("nop");
    delay(100);

    Write_Command(0xb0);
    Write_Data(0x20);
    Write_Data(0x80);
    Write_Data(0x03);
    Write_Data(0x1f);
    Write_Data(0x01);
    Write_Data(0xdf);
    Write_Data(0x00);

    Command_Write(0xf0,0x03);
    Command_Write(0x36,0x00);

    Write_Command(0xe6);
```

```
Write_Data(0x03);  
Write_Data(0xff);  
Write_Data(0xff);  
//delay(Timer);
```

```
Write_Command(0xb4);  
Write_Data(0x03);  
Write_Data(0x2F);  
Write_Data(0x00);  
Write_Data(0x0C);  
Write_Data(0x03);  
Write_Data(0x00);  
Write_Data(0x00);  
Write_Data(0x00);
```

```
Write_Command(0xb6);  
Write_Data(0x01);  
Write_Data(0xEF);  
Write_Data(0x00);  
Write_Data(0x0C);  
Write_Data(0x03);  
Write_Data(0x00);  
Write_Data(0x00);
```

```
Write_Command(0x2a);  
Write_Data(0x00);  
Write_Data(0x00);  
Write_Data(0x03);  
Write_Data(0x1f);
```

```
Write_Command(0x2b);  
Write_Data(0x00);  
Write_Data(0x00);  
Write_Data(0x01);  
Write_Data(0xdf);
```

```
Write_Command(0xb8);  
Write_Data(0x0f);  
Write_Data(0x01);  
Write_Command(0xba);  
Write_Data(0x01);
```

```
Write_Command(0x29); //SET display on  
Write_Command(0x2c);
```

```
}
```



1、Panel Specification :

- 1. Panel Type : Pass NG , _____
- 2. View Direction : Pass NG , _____
- 3. Numbers of Dots : Pass NG , _____
- 4. View Area : Pass NG , _____
- 5. Active Area : Pass NG , _____
- 6. Operating Pass NG , _____
- 7. Storage Temperature : Pass NG , _____
- 8. Others : _____

2、Mechanical

- 1. PCB Size : Pass NG , _____
- 2. Frame Size : Pass NG , _____
- 3. Material of Frame : Pass NG , _____
- 4. Connector Position : Pass NG , _____
- 5. Fix Hole Position : Pass NG , _____
- 6. Backlight Position : Pass NG , _____
- 7. Thickness of PCB : Pass NG , _____
- 8. Height of Frame to PCB : Pass NG , _____
- 9. Height of Module : Pass NG , _____
- 10. Others : Pass NG , _____

3、Relative Hole Size :

- 1. Pitch of Connector : Pass NG , _____
- 2. Hole size of Connector : Pass NG , _____
- 3. Mounting Hole size : Pass NG , _____
- 4. Mounting Hole Type : Pass NG , _____
- 5. Others : Pass NG , _____

4、Backlight Specification :

- 1. B/L Type : Pass NG , _____
- 2. B/L Color : Pass NG , _____
- 3. B/L Driving Voltage (Reference for LED) Pass NG , _____
- 4. B/L Driving Current : Pass NG , _____
- 5. Brightness of B/L : Pass NG , _____
- 6. B/L Solder Method : Pass NG , _____
- 7. Others : Pass NG , _____

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5、Electronic Characteristics of Module :

- 1. Input Voltage : Pass NG , _____
- 2. Supply Current : Pass NG , _____
- 3. Driving Voltage for LCD : Pass NG , _____
- 4. Contrast for LCD : Pass NG , _____
- 5. B/L Driving Method : Pass NG , _____
- 6. Negative Voltage Output : Pass NG , _____
- 7. Interface Function : Pass NG , _____
- 8. LCD Uniformity : Pass NG , _____
- 9. ESD test : Pass NG , _____
- 10. Others : Pass NG , _____

6、Summary :

Sales signature : _____

Customer Signature : _____

Date : / / _____