



WINSTAR Display Co.,Ltd.
華凌光電股份有限公司



Winstar Display Co., LTD

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

SPECIFICATION

CUSTOMER : _____

MODULE NO.: WF52CTLBSDBN0#

<p>APPROVED BY:</p> <p>(FOR CUSTOMER USE ONLY)</p>	<p>PCB VERSION: _____</p> <p>DATA: _____</p>
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SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
			葉虹蘭
ISSUED DATE: 2023/04/26			

TFT Display Inspection Specification: <https://www.winstar.com.tw/technology/download.html>

Precaution in use of TFT module: <https://www.winstar.com.tw/technology/download/declaration.html>



RECORDS OF REVISION

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2023/04/26		First issue

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1.Module Classification Information

W F 52 C T L B S D B N 0 #
 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 : 5.2" 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									

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2.Summary

TFT 5.2” is a TN transmissive type color active matrix TFT liquid crystal display that use amorphous silicon TFT as switching devices. This module is a composed of a TFT_LCD module, It is usually designed for industrial application and this module follows RoHs.

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3. General Specifications

Item	Dimension	Unit
Size	5.2	inch
Dot Matrix	480 x RGBx128	dots
Module dimension	180.0 x 65.0 x 11.1	mm
Active area	127.152 x 33.9072	mm
Dot pitch	0.0883 x 0.2649	mm
LCD type	TFT, Normally White, Transmissive	
View Direction	6 o'clock	
Gray Scale Inversion Direction	12 o'clock	
Aspect Ratio	Bar Type	
Backlight Type	LED, Normally White	
Driver IC	MR6566	
Interface	Digital 8080 family MPU 8bit	
With /Without TP	Without TP	
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

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5. Electrical Characteristics

5.1. Operating condition

Item	Symbol	Min	Typ	Max	Unit	Remark
Supply Voltage For LCM	VDD5V	4.5	5.0	5.5	V	-
Supply Current For LCM	IDD	-	500	750	mA	Note1
LED Life Time		-	50,000	-	Hr	Note 2,3,4

Note 1 : This value is test for VDD =5.0V , Ta=25°C only

Note 2 : Ta = 25 °C

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

Note 4 : The single LED lamp case

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6. Interface timing

6.1. 8080 Mode 8bit

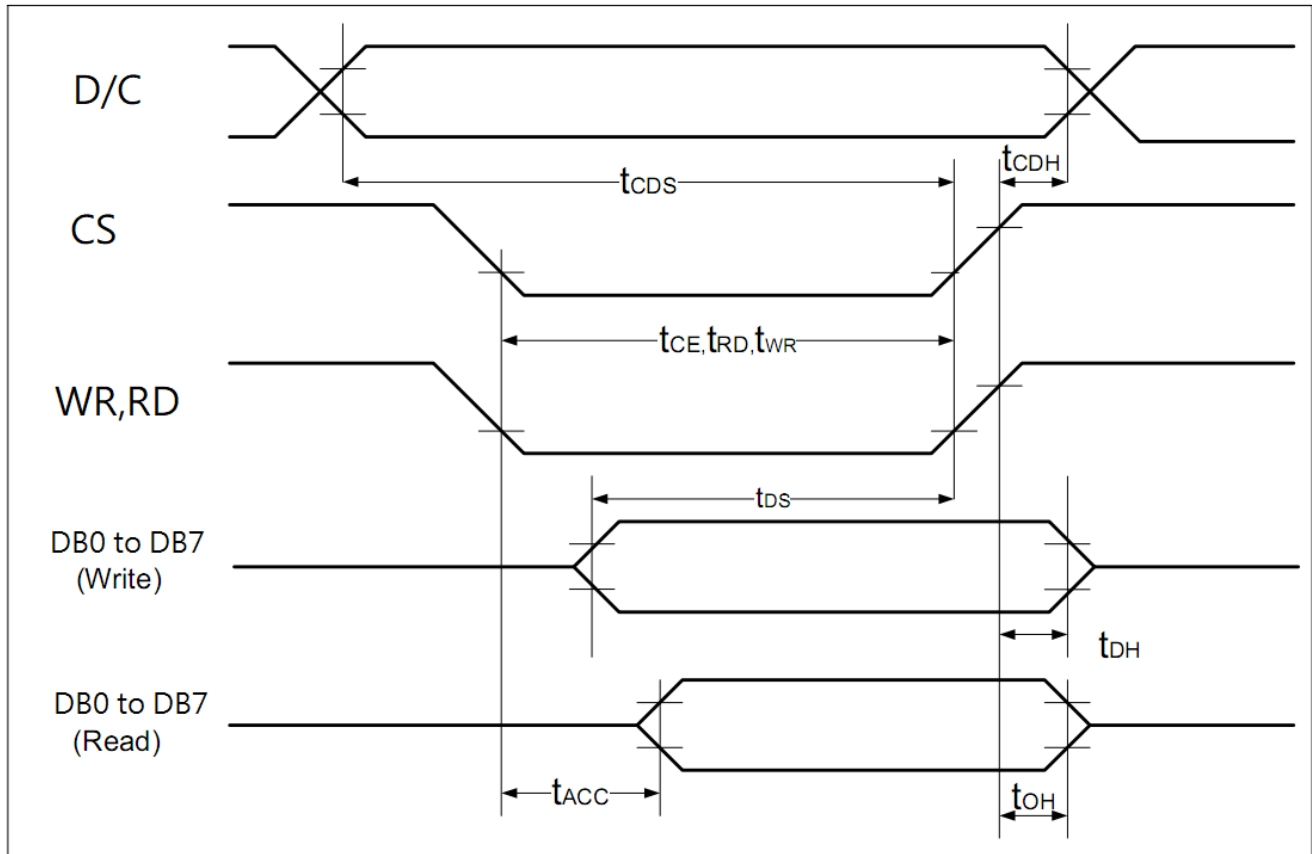


Figure 1

6.2. 8080 Mode Write Cycle

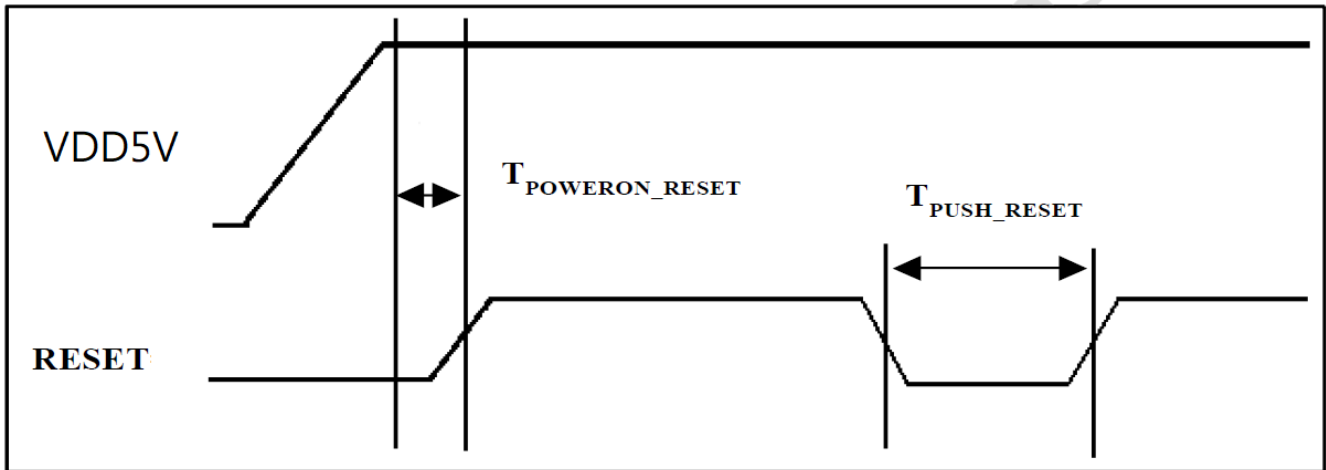
Item	Symbol	Test Conditions	Min.	Max.	Unit
D/C Set Up Time	t_{CDS}	--	100	--	ns
D/C Hold Time	t_{CDH}	--	10	--	ns
CS , RD ,WR Pulse Width	t_{CE}, t_{RD}, t_{WR}	--	80	--	ns
Data Set Up Time	t_{DS}	--	80	--	ns
Data Hold Time	t_{DH}	--	40	--	ns
Access Time	t_{ACC}	--	--	150	ns
Output Hold Time	t_{OH}	--	10	50	ns

Table 1

6.3. RESET Timing

Table 2 Reset Timing Spec.

Parameters	Symbol	Min	Typ	Max	Unit
Minimum time required to hold the RESET at logic 0 state after stable power	TPOWERON_RESET		100		ms
Minimum time required to hold the RESET at logic 0	TPUSH_ESET (RESET = 3.3V or 5V)		100		ms



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7. Optical Characteristics

Item	Symbol	Condition.	Min	Typ.	Max.	Unit	Remark
Response time	Tr+ Tf	$\theta=0^\circ$ 、 $\Phi=0^\circ$	-	35	-	.ms	Note 3
Contrast ratio	CR	At optimized viewing angle	300	500	-	-	Note 4
Color Chromaticity	White	Wx	$\theta=0^\circ$ 、 $\Phi=0$	0.266	0.316	0.366	Note 2,6,7
		Wy		0.295	0.345	0.395	
Viewing angle (Gray Scale Inversion Direction)	Hor.	Θ_R	CR ≥ 10	55	65	-	Deg.
		Θ_L		55	65	-	
	Ver.	Φ_T		55	65	-	
		Φ_B		45	55	-	
Brightness	-	-	400	500	-	cd/m ²	Center of display
Uniformity	(U)	-	75	-	-	%	Note 5

Ta=25±2°C, VLED /ILED = 5V /250mA

Note 1: Definition of viewing angle range

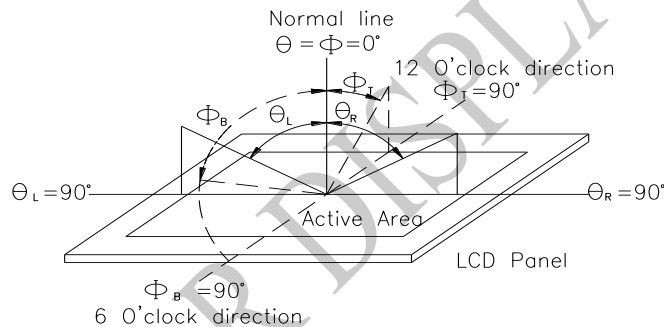


Fig 7.1. Definition of viewing angle

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-7orBM-5 luminance meter 1.0° field of view at a distance of 50cm and normal direction.

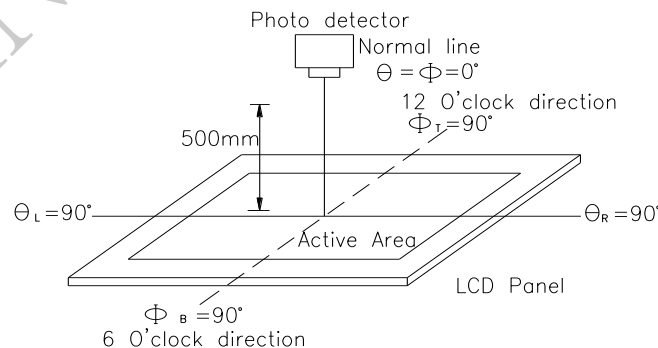
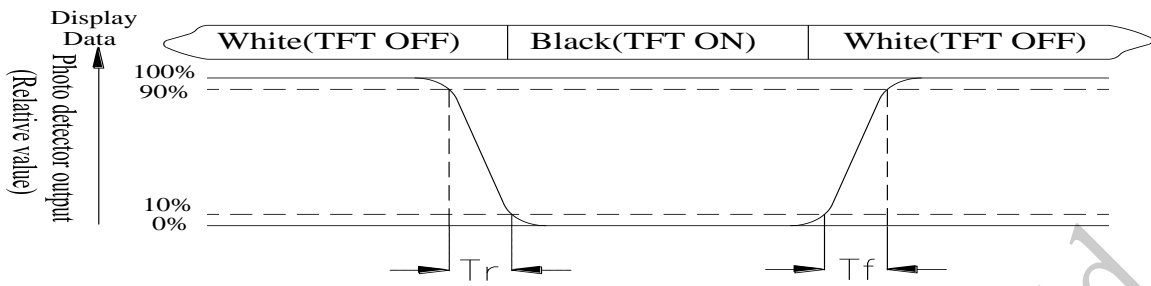


Fig 7.2. Optical measurement system setup

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.

$$\text{Luminance Uniformity (U)} = \text{Lmin/Lmax} \times 100\%$$

L = Active area length

W = Active area width

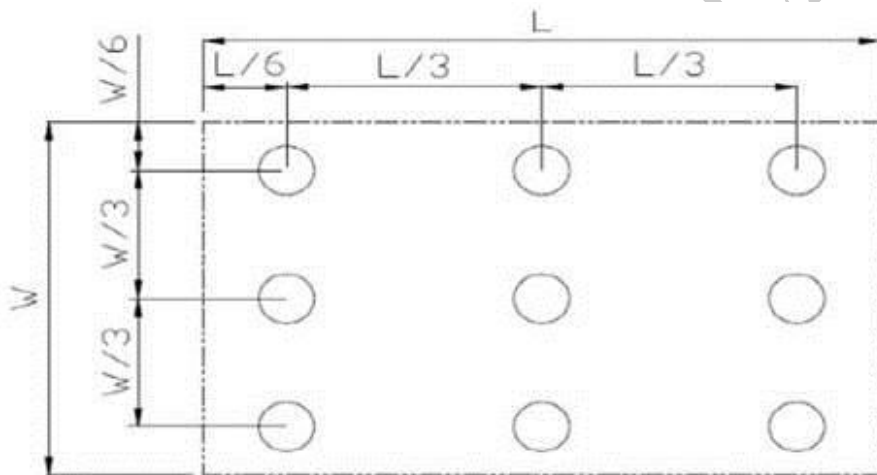


Fig 7.3. Definition of uniformity

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.

8.Interface

8.1. LCM PIN Definition (CON4)

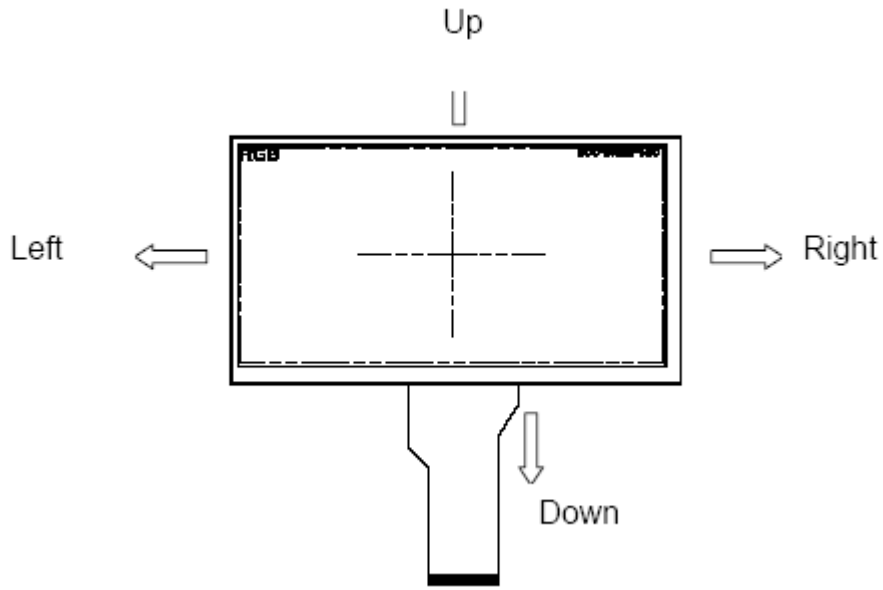
Pin	Symbol	Function	Remark
1	GND	Ground.	
2	NC	No connect	
3	NC	No connect	
4	D/C	Data/Command select	
5	WR	Write control	
6	RD	Read control	
7	DB0	Data bus	
8	DB1	Data bus	
9	DB2	Data bus	
10	DB3	Data bus	
11	DB4	Data bus	
12	DB5	Data bus	
13	DB6	Data bus	
14	DB7	Data bus	
15-24	NC	No connect	
25	CS	Chip select	
26	RESET	Reset	
27	LR	Right /Left selection; Default R/L is Pull High	Note1,2
28	UD	Up/down selection; Default U/D is Pull High	Note1,2
29-32	NC	No connection	
33-34	GND	Ground.	
35-36	VDD5V	Power Supply (+5V)	

Note 1: Selection of scanning mode, and LR,UD Pull High 10KΩ on FPC

Setting of scan control input		Scanning direction
UD	LR	
L	H	Down to up, left to right
H	L	Up to down, right to left
L	L	Down to up, right to left
H	H	Up to down, left to right

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Note 2: Definition of scanning direction. Refer to the figure as below:



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8.2. LCM PIN Definition CON1

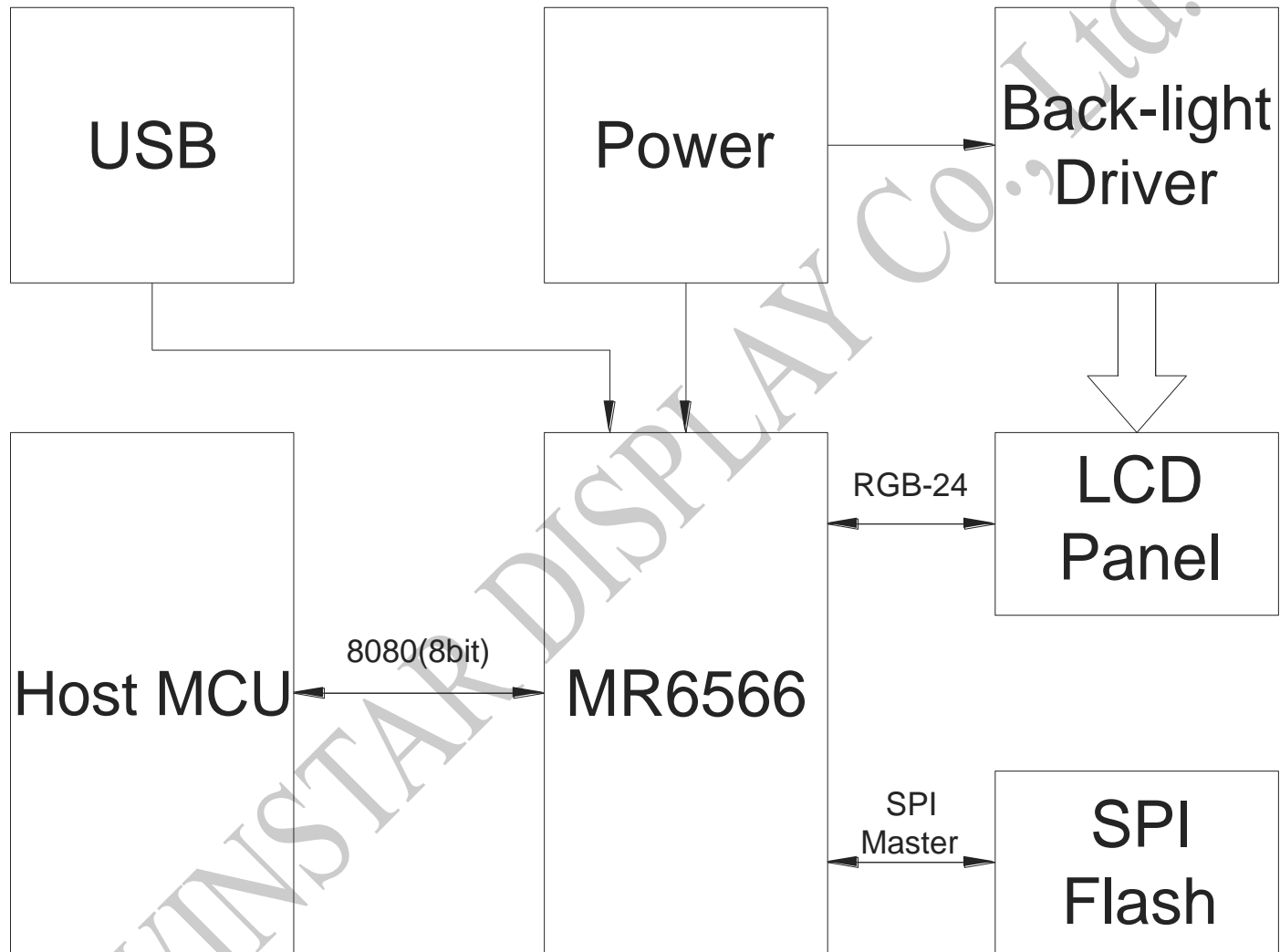
(MCU8080 the same with the WG24064A for RA6963 serial)

Pin	Symbol	Function	Remark
1	FG	System round pin of the IC. Connect to system ground	
2	GND	Ground.	
3	VDD5V	Power Supply (+5V)	
4	NC	No connect	
5	WR	Write control	
6	RD	Read control	
7	CS	Chip select	
8	D/C	Data/Command select	
9	NC	No connection	
10	RESET	Reset	
11	DB0	Data bus	
12	DB1	Data bus	
13	DB2	Data bus	
14	DB3	Data bus	
15	DB4	Data bus	
16	DB5	Data bus	
17	DB6	Data bus	
18	DB7	Data bus	
19-20	NC	No connection	
21	VDD5V	Power Supply (+5V)	
22	GND	Ground.	
23-25	NC	No connection	
26	GND	Ground.	

8.3. USB (USB upgrade image file)

Pin	Symbol	Function	Remark
1	5V	Power 5V	
2	D-	Data line -	
3	D+	Data line +	
4	NC	No connection	
5	GND	Power Ground	

9. Block Diagram



10. 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	—
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20°C 200hrs	1
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	—
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	—

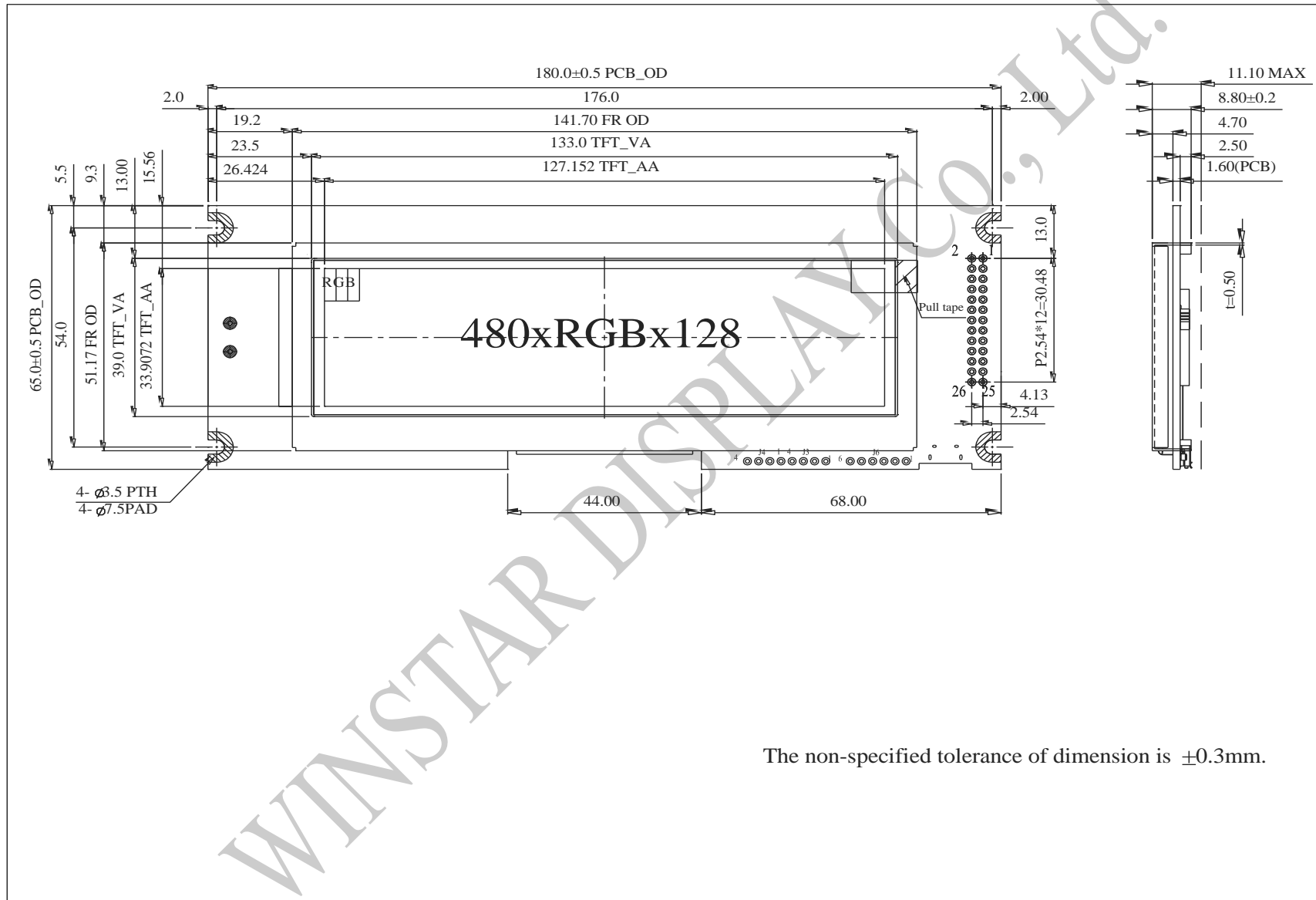
Note1: No dew condensation to be observed.

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: Temporary degradation or loss in operation or function, which is able to be recovered by self-recovery function

11. Contour Drawing

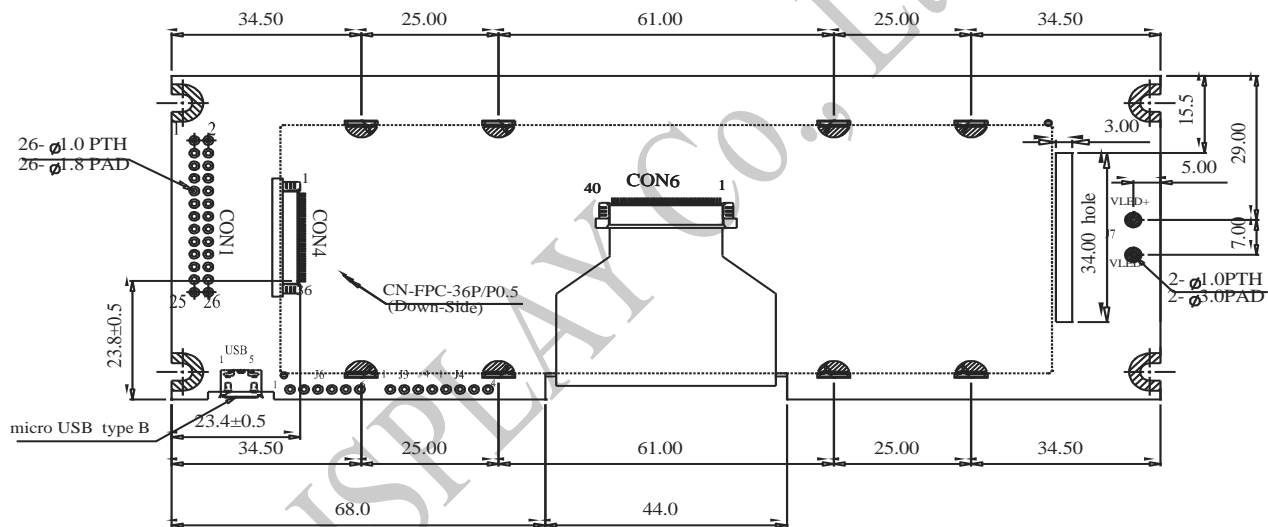


The non-specified tolerance of dimension is $\pm 0.3\text{mm}$.

CON4	
PIN NO.	SYMBOL
1	GND
2	NC
3	NC(PWM)
4	D/C
5	WR
6	RD
7	DB0
8	DB1
9	DB2
10	DB3
11	DB4
12	DB5
13	DB6
14	DB7
15	NC
16	NC
17	NC
18	NC
19	NC
20	NC
21	NC
22	NC
23	NC
24	NC
25	CS
26	RESET
27	LR
28	UD
29	NC
30	NC
31	NC
32	NC
33	GND
34	GND
35	VDD5V
36	VDD5V

CON1	
PIN NO.	SYMBOL
1	FG
2	GND
3	VDD5V
4	NC(PWM)
5	WR
6	RD
7	CS
8	D/C
9	NC
10	RESET
11	DB0
12	DB1
13	DB2
14	DB3
15	DB4
16	DB5
17	DB6
18	DB7
19	NC
20	NC
21	VDD5V
22	GND
23	NC
24	NC
25	NC
26	GND

USB	
PIN NO.	SYMBOL
1	5V
2	D-
3	D+
4	NC
5	GND



The non-specified tolerance of dimension is $\pm 0.3\text{mm}$.

12.Initial Code For Reference

```
void mr6566a_init(void)
{
    mr6566a_t_rst(0);
    mr6566a_t_cd(0);
    mr6566a_t_ce(0);
    mr6566a_t_rd(0);
    mr6566a_t_wr(0);
    mr6566a_t_pwm(0);
    mr6566a_t_data(0x00);

    mr6566a_wr(1);
    mr6566a_rd(1);
    mr6566a_cd(1);
    mr6566a_ce(1);
    mr6566a_pwm(1);

    mr6566a_rst(0);

    delay_ms(1000);
    mr6566a_rst(1);
    delay_ms(1000);
    mr6566a_writeCmd2(0x40, 0x00, 0x00); // text home address
    mr6566a_writeCmd2(0x41, mr6566a_columns / 8, 0x00); // text area set
    mr6566a_writeCmd2(0x42, 0x00, 0x03); // graphic home address
    mr6566a_writeCmd2(0x43, mr6566a_columns / 8, 0x00); // graphic area set

    mr6566a_writeCmd1(1, 0x80);
    mr6566a_writeCmd1(1, 0x90);
}
```

```

void Initial_RA6963C(void)
{
    UB8    LOW_BYTE1;

    LCM_RESET=0;
    _nop_();
    _nop_();
    _nop_();
    LCM_RESET=1;
    _nop_();
    _nop_();
    _nop_();
    LCM_MD2 = 1;
    LCM_FS = 0;
    // graphic_home_address = (MaxColumn /8) *(MaxRow/8);

    /*write text home address=0000h */
    Write_data(0x00);
    Write_data(0x00);
    Write_command(0x40);

    Write_data(LOW_BYTE);
    Write_data(HI_BYTE);
    Write_command(0x42);

    /*write text area address*/
    LOW_BYTE1 = MaxColumn /8;
    Write_data(LOW_BYTE1);
    Write_data(0x00);
    Write_command(0x41);

    /*write graphic area address*/
    LOW_BYTE1 = MaxColumn /8;
    Write_data(LOW_BYTE1);
    Write_data(0x00);
    Write_command(0x43);

    /*set display mode Display mode set (Graphic only enable)*/
    Write_command(0x80);
    /*Graphic display enable*/
    Write_command(0x98);
}

```




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 , _____



Winstar Module Number : _____

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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 : / / _____

