

WINSTAR Display Co.,Ltd.
華凌光電股份有限公司

Represented by:

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Winstar Display Co., LTD

SPECIFICATION

CUSTOMER : _____

MODULE NO.: **WO2004-85HC#FC**

APPROVED BY: (FOR CUSTOMER USE ONLY)	PCB VERSION: DATA:

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2022/09/21		First issue

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Winstar Display Co.,	MODLE NO：
RECORDS OF REVISION	**DOC. FIRST ISSUE**

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Precautions in use of LCD Modules

(1)Avoid applying excessive shocks to the module or making any alterations or modifications to it.

(2)Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.

(3)Don't disassemble the LCM.

(4)Don't operate it above the absolute maximum rating.

(5)Don't drop, bend or twist LCM.

(6)Soldering: only to the I/O terminals.

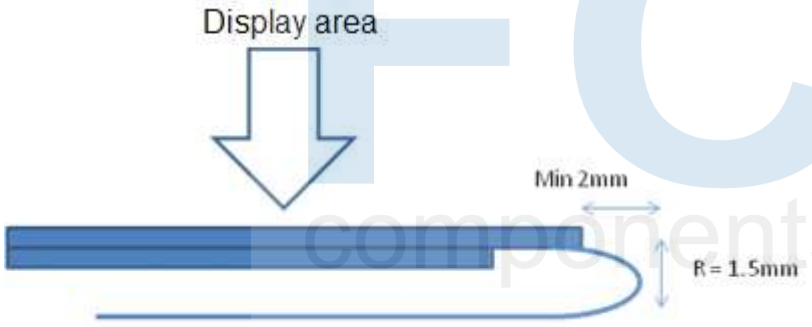
(7)Storage: please storage in anti-static electricity container and clean environment.

(8) Winstar have the right to change the passive components, including R3,R6 & backlight adjust resistors. (Resistors,capacitors and other passive components will have different appearance and color caused by the different supplier.)

(9)Winstar have the right to change the PCB Rev. (In order to satisfy the supplying stability, management optimization and the best product performance...etc, under the premise of not affecting the electrical characteristics and external dimensions, Winstar have the right to modify the version.)

(10) To ensure the stability of the display screen, please apply screen saver after showing 30 mins of fixed display content.

(11) The limitation of FPC bending



(12)Please heat up a little the tape sticking on the components when removing it; otherwise the components might be damaged.

General Specification

Item	Dimension	Unit
Module dimension	68.3 x 36.4 x 6.0	mm
View area	60.5 x 22.18	mm
Active area	58.5 x 20.18	mm
Dot size	0.45x 0.54	mm
Dot pitch	0.50 x 0.59	mm
Character size	2.45 x 4.67	mm
Character pitch	2.95 x 5.17	mm
LCD type	FSTN Positive Transflective (In LCD production, It will occur slightly color difference. We can only guarantee the same color in the same batch.)	
Duty	1/33DUTY,1/6BIAS	
View direction	6 o'clock	
Backlight Type	LED, White	
IC	IST3602	
Interface	I2C	

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Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	TOP	-20	—	+70	℃
Storage Temperature	TST	-30	—	+80	℃
Input Voltage	VIN	-0.3	—	V_{DD}+0.3	V
Power Supply Voltage	V_{DD}	-0.3	—	4.0	V
LCD Driver Voltage	VLCD	-0.3	—	18.0	V

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Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	V_{DD}	–	2.7	3.0	3.3	V
Supply Voltage For LCD	V_O-V_{SS}	Ta=-20℃	–	–	–	V
		Ta=25℃	7.6	7.8	8.0	V
		Ta=70℃	–	–	–	V
Input High Volt.	V_{IH}	–	0.8 V_{DDIO}	–	V_{DD}	V
Input Low Volt.	V_{IL}	–	V_{SS}	–	0.2 V_{DD}	V
Output High Volt.	V_{OH}	–	0.8 V_{DDIO}	–	V_{DD}	V
Output Low Volt.	V_{OL}	–	–	–	0.2 V_{DD}	V
Supply LCM current	IDD	VDD=3.0V	–	0.5	–	mA

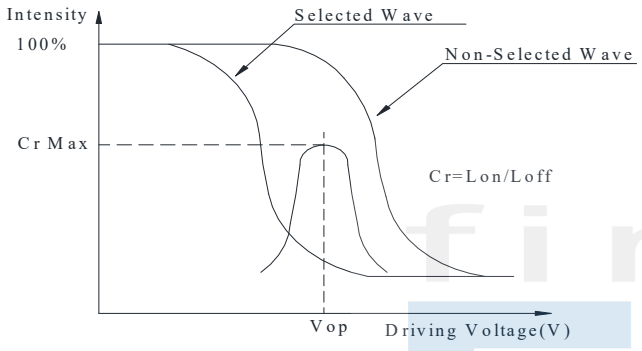
Please kindly consider to design the Vop to be adjustable while programing the software to match LCD contrast tolerance.

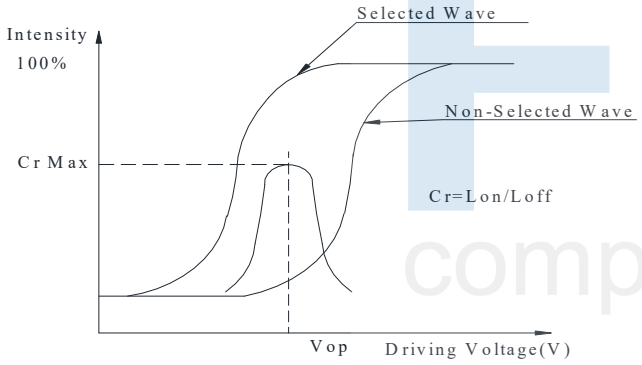
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Optical Characteristics

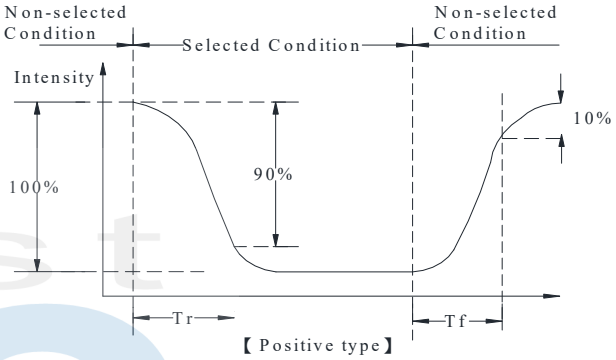
Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	θ	CR≧2	0	—	30	$\phi = 180^\circ$
	θ	CR≧2	0	—	60	$\phi = 0^\circ$
	θ	CR≧2	0	—	45	$\phi = 90^\circ$
	θ	CR≧2	0	—	45	$\phi = 270^\circ$
Contrast Ratio	CR	—	—	5	—	—
Response Time	T rise	—	—	150	200	ms
	T fall	—	—	150	200	ms

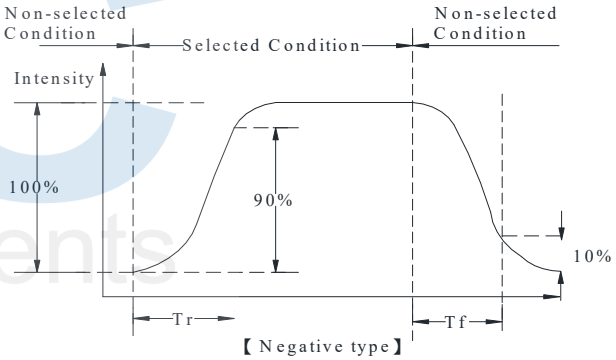
Definition of Operation Voltage (Vop)





Definition of Response Time (Tr , Tf)



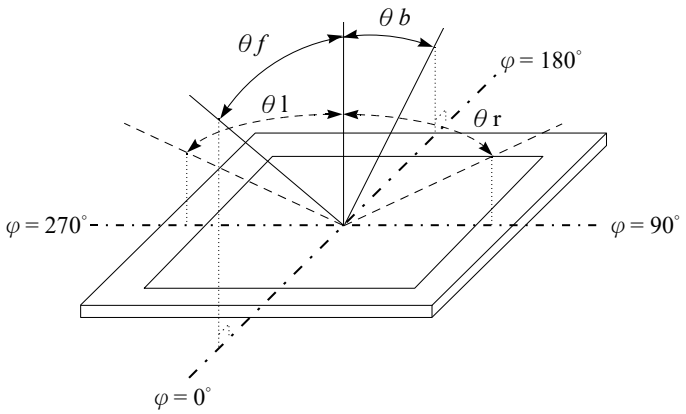


Conditions :

Operating Voltage : Vop　　Viewing Angle(θ ， φ) : 0°， 0°

Frame Frequency : 64 HZ　　Driving Waveform : 1/N duty , 1/a bias

Definition of viewing angle(CR≧2)



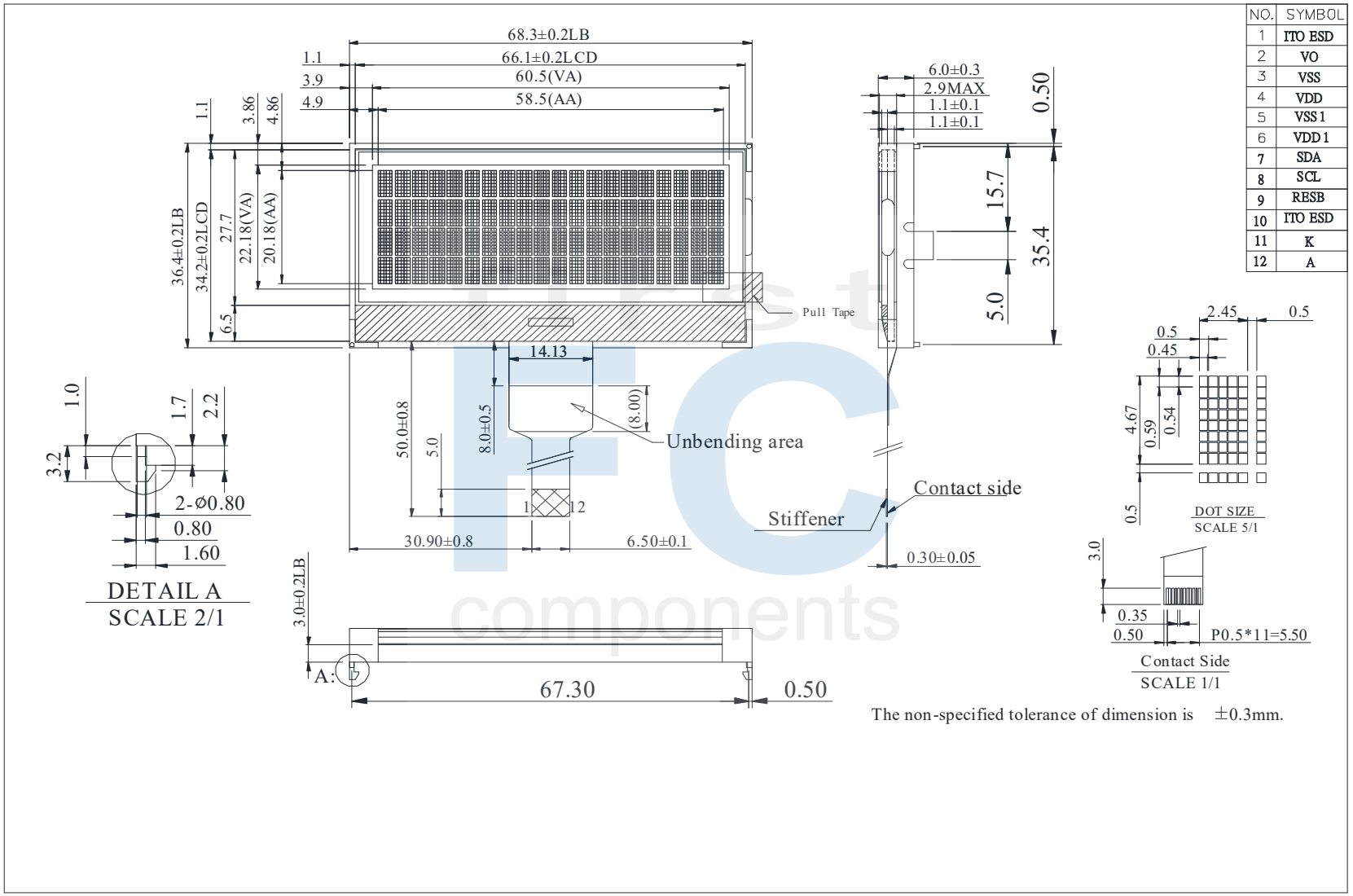
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Interface Pin Function

Pin	Symbol	Function Description
1	ITO ESD	Ground
2	V0	LCD Power Supply
3	VSS	Ground(VSS2&VSS3)
4	VDD	Power Supply(VDD2&VDD3)
5	VSS1	Ground(VSS1)
6	VDD1	Power Supply(VDD1)
7	SDA	Serial input data
8	SCL	Serial input clock
9	RESB	Hardware Reset input pin
10	ITO ESD	Ground
11	K	LED-
12	A	LED+

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Contour Drawing



NO.	SYMBOL
1	ITO ESD
2	VO
3	VSS
4	VDD
5	VSS1
6	VDD1
7	SDA
8	SCL
9	RESB
10	ITO ESD
11	K
12	A

Initial code

```
void Initial(void)
{
      RST = 1;
      delay_ms(10);
      RST = 0;
      delay_ms(10);
      RST = 1;
      delay_ms(10);

      Start();                //i2c_start
      Write_byte(0x78);// salve address
=============================================================
      // IS Instruction Table 0
      WriteIns(0x20);    //Function Set
      WriteIns(0x01);    //Clear Display
      delay_ms(20);

      WriteIns(0x90);    //Set DDRAM address
      WriteIns(0x00);    //Set DDRAM address

      WriteIns(0x06);     //Set Entry Mode
      WriteIns(0x0C);     //Display Control
// ============================================================
    // IS Instruction Table 1
      WriteIns(0x21);     //Function Set    : 0 0 1 0 0 0 IS2 IS1
      WriteIns(0x12);     //Follows Control   :0 0 0 1 0 0 BS2 BS1       Bias select:1/6B
      WriteIns(0x40);     //Set ICON RAM Address
      WriteIns(0x30);     //Power Control 1     :0 0 1 1 0 0 0 SLEEP
      WriteIns(0x6F);     //ICON/Power Control2
      WriteIns(0x70);     //Set booster ;V0 Control 2
      delay_ms(100);
// ============================================================
      // IS Instruction Table 3
      WriteIns(0x23);      //Function Set    : 0 0 1 0 0 0 IS2 IS1
      WriteIns(0x81);      //Contrast: VOP SET
      WriteIns(0x27);      // VOP SET

      WriteIns(0x82);      //start line setting
      WriteIns(0x00);      //start line setting    : 0 0 ST[5:0]

      WriteIns(0xA7);      //Rgain set :1 0 1 0 RR[3:0]
// ============================================================
      // IS Instruction Table 2
      WriteIns(0x22);    //Function Set    : 0 0 1 0 0 0 IS2 IS1
      WriteIns(0x60);    //Set Display pattern    : 0 1 1 0 0 0 INV AP
      WriteIns(0x13);    //Set Display Mode      :0 0 0 1 DH1 DH0 N2 N1       1/33D
      WriteIns(0x44);    //Select CGRAM & COM/SEG direction

// ============================================================
      // IS Instruction Table 3
      WriteIns(0x23);          //Function Set    : 0 0 1 0 0 0 IS2 IS1
      WriteIns(0x88);          // Set 88H 4 times to entry IST test command mode
      WriteIns(0x88);
```

```
        WriteIns(0x88);
        WriteIns(0x88);

        WriteIns(0x28);         //Frame rate adjusting enable

        WriteIns(0xB2);         //1st Frame rate control
        WriteIns(0xEF);         //2nd LN[7:0]
        WriteIns(0x00);         //3rd LN[15:8]      95Hz


        WriteIns(0x93);         //OSC Clock Select    :Fosc/1
        WriteIns(0x99);         //OSC Divide Select   :750KHz

        WriteIns(0xE3);         //Exit IST test command
// ============================================================
        Stop();                 //i2c_stop
}
```

*NOTE:

This Initial code is a suggested value, and customers can change the parameters according to a ctual needs.

APPLICATION EXAMPLES

