WINSTAR Display

OLED SPECIFICATION

Model No:

WEO160128W#BP3N00000-FC

first FC components

Represented by:

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SPECIFICATION Version: B

CUSTOMER :
MODULE NO. : WEO160128W#BP3N00000-FC

APPROVED BY: (FOR CUSTOMER USE ONLY)	

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY
RELEASE DATE:			

■APPROVAL FOR SPECIFICATIONS ONLY

□APPROVAL FOR SPECIFICATIONS AND SAMPLE

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MODEL NO：

RECORDS OF REVISION			DOC. FIRST ISSUE
VERSION	DATE	REVISED PAGE NO.	SUMMARY
0	2023/03/27		Preliminary SPEC. First release
A	2023/05/02		1.Modify Application recommendations 2.Modify Initial code 3.Add Gray Scale description
B	2023/05/15		1.Modify IPP 2. Modify the inspection criteria name of the inspection specification.

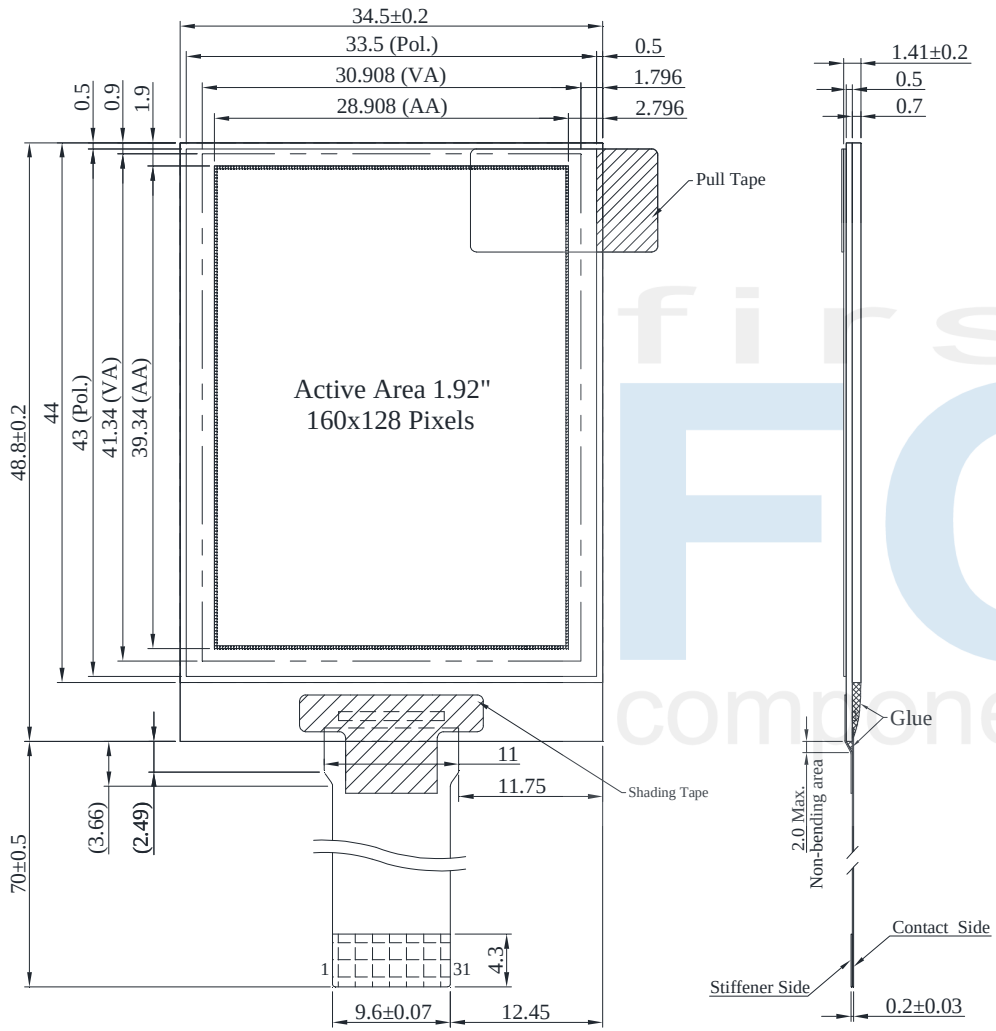
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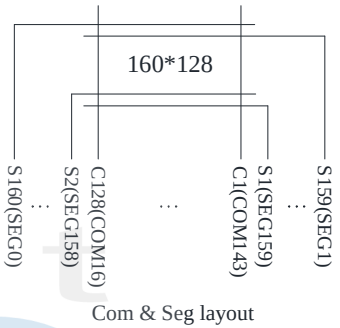
General Specification

Item	Dimension	Unit
Dot Matrix	160 × 128 Dots	–
Module dimension	34.5 × 48.8 × 1.41	mm
Active Area	28.908 × 39.34	mm
Pixel Size	0.206 × 0.226	mm
Pixel Pitch	0.226 × 0.246	mm
Display Mode	Passive Matrix	
Display Color	White	
Drive Duty	1/128 Duty	
Gray Scale	4 bits	
IC	CH1120	
Interface	6800, 8080, SPI, I2C	
Size	1.92 inch	

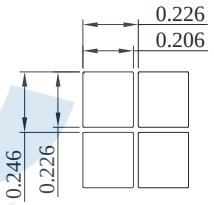
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Contour Drawing & Block Diagram

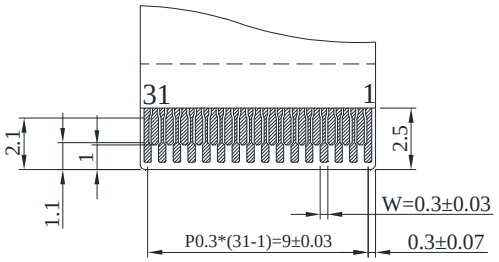




Com & Seg layout



Dots Size
Scale 20/1



FPC Contact Side
Scale 2/1

PIN NO.	SYMBOL	PIN NO.	SYMBOL
1	NC	16	IM2
2	VPP	17	CSB
3	VSEGH	18	RESB
4	VCOMH	19	A0
5	VSL	20	WRB
6	NC	21	RDB
7	IREF	22	D0
8	VPP	23	D1
9	NC	24	D2
10	VSS	25	D3
11	VCL	26	D4
12	VDD	27	D5
13	IM0	28	D6
14	IM1	29	D7
15	VDD	30	NC
		31	VPP

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

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Interface Pin Function

<table>
<tr><th>No.</th><th>Symbol</th><th>Function</th></tr>
<tr><td>1</td><td>NC</td><td>No connection</td></tr>
<tr><td>2</td><td>VPP</td><td>This is the most positive voltage supply pad of the chip.
It should be supplied externally.</td></tr>
<tr><td>3</td><td>VSEGH</td><td>This is a segment pre-charge voltage.
A capacitor can be connected between this pad and VSS if necessary. When external capacitor Is not used, this pin should be kept NC.</td></tr>
<tr><td>4</td><td>VCOMH</td><td>This is a pad for the voltage output high level for common signals.
A capacitor should be connected between this pad and VSS.</td></tr>
<tr><td>5</td><td>VSL</td><td>Discharge voltage level pad.
This pad should be connected to resistor and diode externally.</td></tr>
<tr><td>6</td><td>NC</td><td>No connection</td></tr>
<tr><td>7</td><td>IREF</td><td>This is a segment current reference pad.
A resistor should be connected between this pad and VSS.</td></tr>
<tr><td>8</td><td>VPP</td><td>This is the most positive voltage supply pad of the chip.
It should be supplied externally.</td></tr>
<tr><td>9</td><td>NC</td><td>No connection</td></tr>
<tr><td>10</td><td>VSS</td><td>Ground for logic and analog. This pad should be connected to GND externally.</td></tr>
<tr><td>11</td><td>VCL</td><td>This is a common voltage reference pad.
This pad should be connected to VSS externally.</td></tr>
<tr><td>12</td><td>VDD</td><td>Power supply for logic and input/output</td></tr>
<tr><td>13</td><td>IM0</td><td rowspan="3">These are the MPU interface mode select pads.
<table>
<tr><th></th><th>8080</th><th>3-Wire SPI</th><th>4-Wire SPI</th><th>6800</th><th>I2C</th></tr>
<tr><td>IM0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td></tr>
<tr><td>IM1</td><td>1</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>IM2</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
</table></td></tr>
<tr><td>14</td><td>IM1</td></tr>
<tr><td>16</td><td>IM2</td></tr>
<tr><td>15</td><td>VDD</td><td>Power supply for logic and input/output</td></tr>
<tr><td>17</td><td>CSB</td><td>This pad is the chip select input. When CSB = “L”, then the chip select becomes active, and data command I/O is enabled.
When in I2C interface, this pin is not used, so it must be connected to “L”.</td></tr>
<tr><td>18</td><td>RESB</td><td>This is a reset signal input pad. When RESB is set to “L”, the settings are initialized. The reset operation is performed by the RESB signal level. This pin internal pull high.</td></tr>
</table>

19	A0	This is the Data/Command control pad that determines whether the data bits are data or a command. A0 = “H”: the inputs at D0 to D7 are treated as display data. A0 = “L”: the inputs at D0 to D7 are transferred to the command registers. In I2C interface, this pad serves as SA0 to distinguish the different address of OLED driver. When in 3-wire interface, this pin is not used, so it must be connected to “L”.
20	WRB	This is a MPU interface input pad. When connected to an 8080 MPU, this is active LOW. This pad connects to the 8080 MPU WR signal. The signals on the data bus are latched at the rising edge of the WR signal. When connected to a 6800 Series MPU: This is the read/write control signal input terminal. When R/W = “H”: Read. When R/W = “L”: Write. When in 3-wire.4-wire & I2C interface, this pin is not used, so it must be connected to “L”.
21	RDB	This is a MPU interface input pad. When connected to an 8080 series MPU, it is active LOW. This pad is connected to the RD signal of the 8080 series MPU, and the data bus is in an output status when this signal is “L”. When connected to a 6800 series MPU, this is active HIGH. This is used as an enable clock input of the 6800 series MPU. When in 3-wire.4-wire & I2C interface, this pin is not used, so it must be connected to “L”.
22	D0	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus. When the serial interface(SPI) and I2C is selected, then D0 serves as the serial clock input pad (SCL) and D1 serves as the serial data input pad (SI). At this time, D2 to D7 are set to high impedance. D7~D2 is recommended to connect the VDD or GND. It is also allowed to leave D7~D2 unconnected.
23	D1	
24	D2	
25	D3	
26	D4	
27	D5	
28	D6	
29	D7	
30	NC	No connection
31	VPP	This is the most positive voltage supply pad of the chip. It should be supplied externally.

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Supply Voltage for Logic	VDD	-0.3	3.5	V	1, 2
Supply Voltage for Display	VPP	-0.3	15.0	V	1, 2
Operating Temperature	TOP	-40	+80	°C	-
Storage Temperature	TSTG	-40	+85	°C	-

Note ：

1. All the above voltages are on the basis of “VSS = 0V”.
2. When this module is used beyond the above absolute maximum ratings, permanent breakage of the module may occur. Also, for normal operations, it is desirable to use this module under the conditions according to Section 6 ‘’Electrical Characteristics’’. If this module is used beyond these conditions, malfunctioning of the module can occur and the reliability of the module may deteriorate.
3. The absolute limit temperature was verified according to the test conditions of reliability test (See section 9. Reliability) , and module was met all criteria.
4. The defined temperature ranges do not include the polarizer. The maximum withstood temperature of the polarizer should be 80 °C.

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Electrical Characteristics

DC Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage for Logic	VDD	—	1.65	3.0	3.5	V
Supply Voltage for Display	VPP	—	8.0	12.0	12.5	V
Input High Volt.	VIH	—	0.8xVDD	—	VDD	V
Input Low Volt.	VIL	—	VSS	—	0.2xVDD	V
Output High Volt.	VOH	IOH=-0.5mA	0.8xVDD	—	VDD	V
Output Low Volt.	VOL	IOL=0.5mA	VSS	—	0.2xVDD	V
Display 50% Pixel on	IPP	VPP=12V	—	25	37.5	mA

Note: The VCC (VPP) value can be adjusted according to the demand brightness. When VCC (VPP) is lowered, the brightness decreases or when VCC (VPP) is increased, the brightness increases. The VCC (VPP) value is set within the recommended range. The life time of OLED is directly related to the set brightness, and lower brightness helps to improve the life time.

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Initial code

```
void Initial_ic(void){
    WriteCommand(0xAE);      // Display OFF

    WriteCommand(0x21);      // Set Column Start/End Address of Display RAM
    WriteCommand(0x00);
    //WriteCommand(0x1F);    // for Mono mode
    WriteCommand(0x3F);      // for Grayscale mode

    WriteCommand(0x22);      // Set Row Start/End Address of Display RAM
    WriteCommand(0x00);
    //WriteCommand(0x4F);    // for Mono mode
    WriteCommand(0x9F);      // for Grayscale mode

    WriteCommand(0xA2);      // Set Display Start Line
    WriteCommand(0x00);

    WriteCommand(0x81);      // The Contrast Control Mode Set
    WriteCommand(0x8F);

    WriteCommand(0xAC);      // Set Grayscale/Mono display mode
    WriteCommand(0x00);      // Grayscale mode
    //WriteCommand(0x01);    // Mono mode

    WriteCommand(0x20);      // Set Memory addressing mode
    WriteCommand(0x00);      // Horizontal Addressing Mode

    WriteCommand(0xA0);      // Set Segment Re-map

    WriteCommand(0xC8);      // Set Common Output Scan Direction

    WriteCommand(0xA3);      // Set Display Rotation
    WriteCommand(0x01);      // Display rotates 90 degrees

    WriteCommand(0xA4);      // Disable Entire Display OFF/ON

    WriteCommand(0xA6);      // Set Normal/Reverse Display

    WriteCommand(0xA8);      // Set Multiplex Ratio
    WriteCommand(0x7F);

    WriteCommand(0xD3);      // Set Display Offset
    WriteCommand(0x10);

    WriteCommand(0xD5);      // Set Display Divide Ratio/Oscillator Frequency Mode Set
    WriteCommand(0x1F);

    WriteCommand(0x48);      //Dis-charge Period
    WriteCommand(0x02);
    WriteCommand(0x93);
    WriteCommand(0x02);
    WriteCommand(0xD8);
    WriteCommand(0x01);

    WriteCommand(0x49);      //Pre-charge Period
    WriteCommand(0x06);
    WriteCommand(0xD9);
```

```
    WriteCommand(0x0F);
    WriteCommand(0x94);
    WriteCommand(0x1F);

    WriteCommand(0x4B);      //Pre-charge strength
    WriteCommand(0x04);

    WriteCommand(0xDA);      // Set SEG pads hardware configuration
    WriteCommand(0x00);

    WriteCommand(0xDB);      // VCOM Deselect Level
    WriteCommand(0x40);

    WriteCommand(0xAD);      // External or internal IREF Set
    WriteCommand(0x02);

    WriteCommand(0xAF);      // Display ON
}
```

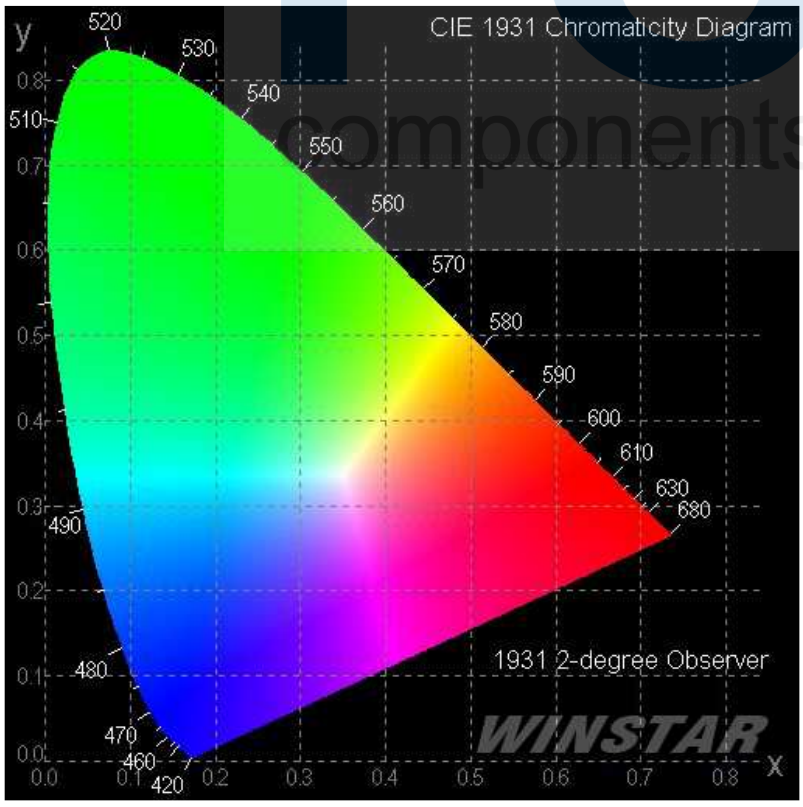
Note 1: Initial code is for reference only. Please make the best adjustment with the OLED module.
Note 2: Command: Set Contrast Control (0x81) , This command sets the Contrast Setting of the display. The chip has 256 contrast steps from 00h to FFh. The segment output current increases as the contrast step value increases. The segment current increases, the OLED brightness increases.

Optical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	(V)θ	–	160	–	–	deg
	(H)φ	–	160	–	–	deg
Contrast Ratio	CR	Dark	10,000:1	–	–	–
Response Time	T rise	–	–	10	–	μs
	T fall	–	–	10	–	μs
Display with 50% checkerboard Brightness			80	100	–	cd/m^2
CIEx(White)		(CIE1931)	0.24	0.28	0.32	–
CIEy(White)		(CIE1931)	0.28	0.32	0.36	–

Note：

1. The brightness value is based on the setting of VCC(VPP) equal to the Typical value.
2. 50% checkerboard means half of the display area turn on & half area turn off, shown as a checkerboard.



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