GRAPHIC OLED SERIES DISPLAY

Product Specification

(Preliminary)

Part Name: OEL Display Module

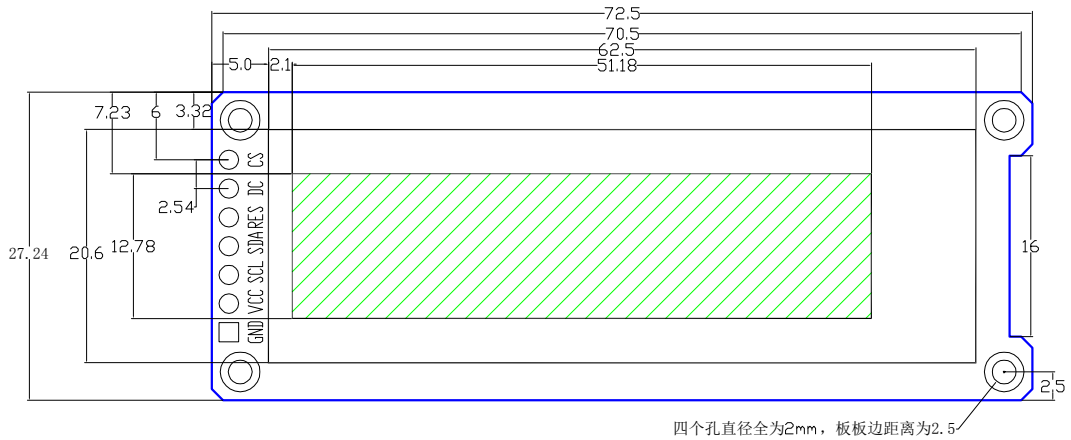
SOG25664D_M208

Graphic OLED Display Selection Guide

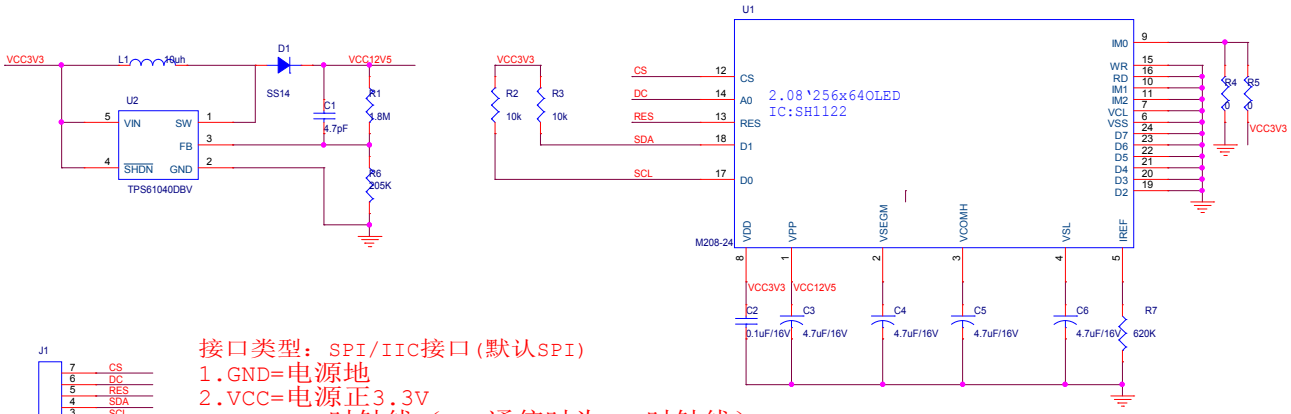
CONTENT

2.08" 25664 OLED Module

Structure of SOG25664D



Schematic Diagram of SOG25664D



接口类型：SPI/IIC接口(默认SPI)
1.GND=电源地
2.VCC=电源正3.3V
3.SCL=SPI时钟线（IIC通信时为IIC时钟线）
4.SDA=SPI数据线（IIC通信时为IIC数据线）
5.RES=OLED复位管脚
6.DC=OLED SPI数据/命令控制管脚
(IIC通信时为IIC地址控制线)
7.CS=OLED SPI片选(IIC通信时CS需要接地)

SPI/IIC接口跳线：
SPI:R4焊接，R5不焊接
IIC:R5焊接，R4不焊接

2.08" 25664 OLED Panel

1 Overview

SOG25664D_P208 is a monochrome OLED display module with 256×64 dot matrix. The characteristics of this display module are high brightness, self-emission, high contrast ratio, slim/thin outline, wide viewing angle, wide temperature range, and low power consumption.

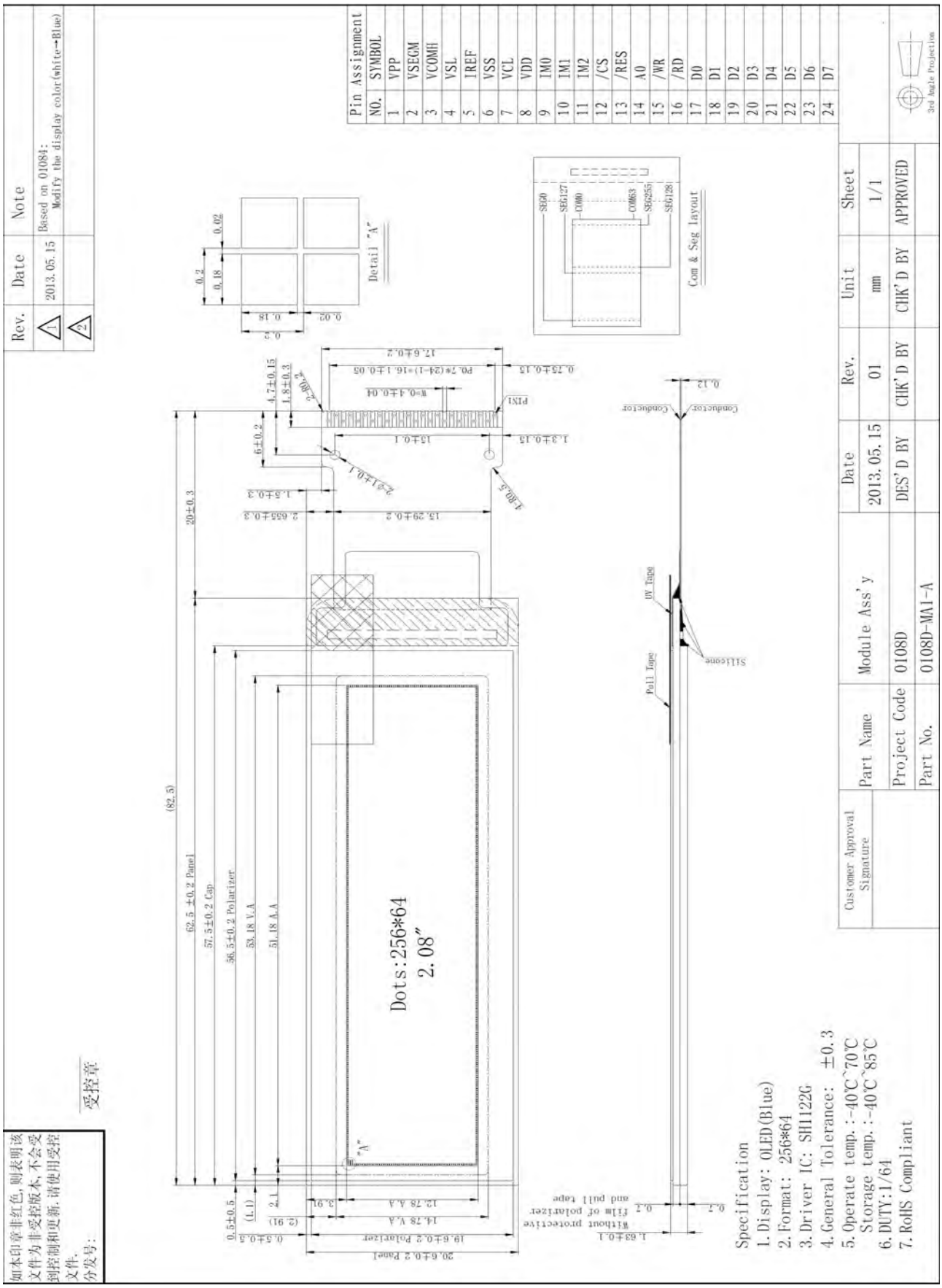
2 Features

- Display Color: Blue
- Dot Matrix:256×64
- Driver IC: SH1122G
- Interface: 8-bit 8080,8-bit 6800,4-wire SPI, 3-wire SPI, I^2C
- Wide range of operating temperature: -40℃ to 70℃

3 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	256(W)×64(H)	-
2	Dot Size	0.18(W)×0.18 (H)	mm^2
3	Dot Pitch	0.2 (W)×0.2(H)	mm^2
4	Aperture Rate	81	%
5	Active Area	51.18(W)×12.78(H)	mm^2
6	Panel Size	62.5(W)×20.6(H) ×1.4(T)	mm^3
7	Module Size	82.5(W)×20.6(H) ×1.63(T)	mm^3
8	Diagonal A/A Size	2.08	inch
9	Module Weight	4.12±10%	gram

4 Mechanical Drawing

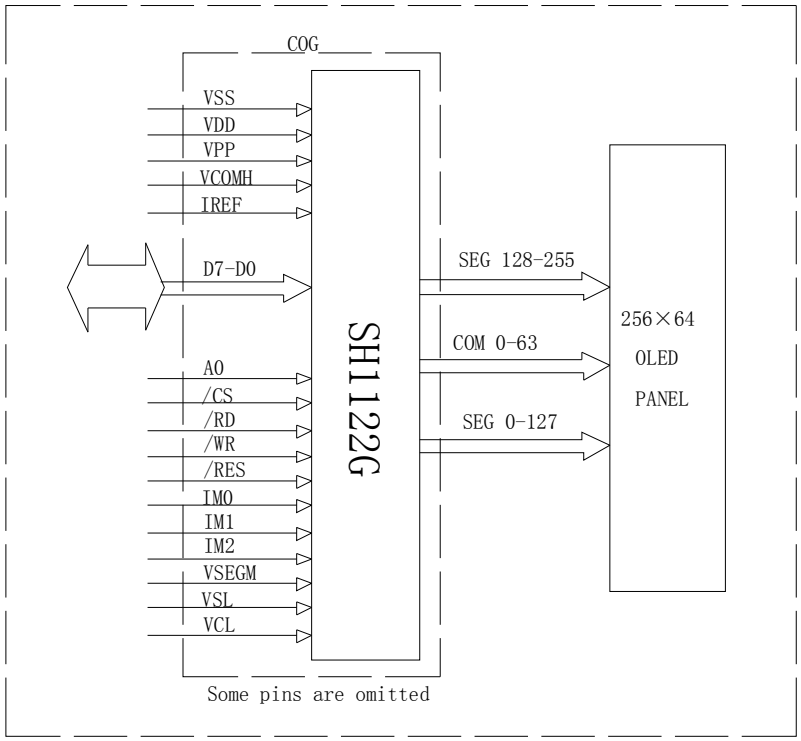


5 Module Interface

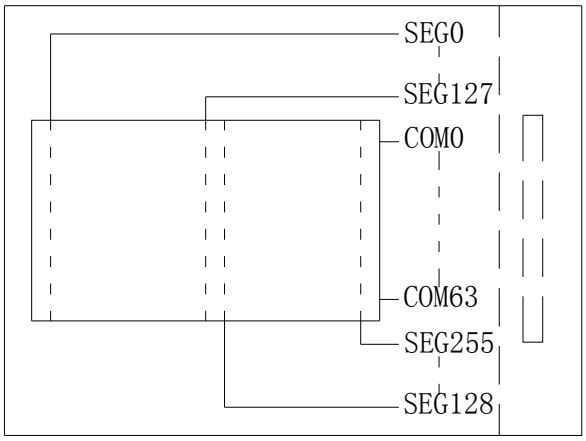
<table>
<tr><th>PIN NO.</th><th>PIN NAME</th><th>DESCRIPTION</th></tr>
<tr><td>1</td><td>VPP</td><td>This is the most positive voltage supply pad of the chip
It should be supplied externally.</td></tr>
<tr><td>2</td><td>VSEGM</td><td>This is a pad for the voltage output level for segment pre-charge.
A capacitor should be connected between this pad and VSS.</td></tr>
<tr><td>3</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>4</td><td>VSL</td><td>This is a segment voltage reference pad
A capacitor should be connected between this pad and VSS</td></tr>
<tr><td>5</td><td>IREF</td><td>This is a segment current reference pad
A resistor should be connected between this pad and VSS. Set the current at 15.625 μA</td></tr>
<tr><td>6</td><td>VSS</td><td>Ground for analog, logic&buffer respectively.</td></tr>
<tr><td>7</td><td>VCL</td><td>This is a common voltage reference pad
This pad should be connected to VSS externally</td></tr>
<tr><td>8</td><td>VDD</td><td>1.65 - 3.5V power supply input pad for logic.</td></tr>
<tr><td>9</td><td>IM0</td><td rowspan="3">These are the MPU interface mode select pads.
<table>
<tr><th></th><th>8080</th><th>I²C</th><th>6800</th><th>4-wire SPI</th><th>3-wire SPI</th></tr>
<tr><td>IM0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td></tr>
<tr><td>IM1</td><td>1</td><td>1</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>IM2</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td></tr>
</table></td></tr>
<tr><td>10</td><td>IM1</td></tr>
<tr><td>11</td><td>IM2</td></tr>
<tr><td>12</td><td>/CS</td><td>This pad is the chip select input. When /CS = “L”, then the chip select becomes active, and data/command I/O is enabled.</td></tr>
<tr><td>13</td><td>/RES</td><td>This is a reset signal input pad. When /RES is set to “L”, the settings are initialized.
The reset operation is performed by the /RES signal level.</td></tr>
<tr><td>14</td><td>A0</td><td>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.</td></tr>
<tr><td>15</td><td>/WR</td><td>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 /WR = “H”: Read.When /WR = “L”: Write.</td></tr>
<tr><td>16</td><td>/RD</td><td>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 SH1122 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.</td></tr>
<tr><td>17~24</td><td>D0~D7</td><td>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 is selected, then D0 serves as the serial clock input pad (SCL) and D1serves as the serial data input pad (SI). At this time, D2 to D7 are set to high impedance.When the I²C interface is selected, then D0 serves as the serial clock input pad (SCL) and D1 serves as the serial data input pad (SDA). At this time, D2 to D7 are set to high impedance.
When the chip select is inactive, D0 to D7 are set to high impedance.</td></tr>
</table>

6 Function Block Diagram

6.1 Function Block Diagram



6.2 Panel Layout Diagram



Com & Seg layout

7 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
Logic supply voltage	VDD	-0.3	3.6	V	IC maximum rating
OLED Operating voltage	VPP	-0.3	14.5	V	IC maximum rating
Operating Temp.	Top	-40	70	℃	-
Storage Temp	Tstg	-40	85	℃	-

Note (1): All of the voltages are on the basis of "VSS = 0V".

Note (2): Permanent breakage of module may occur if the module is used beyond the maximum rating. The module can be normal operated under the conditions according to Section 8 "Electrical Characteristicsb". Malfunctioning of the module may occur and the reliability of the module may deteriorate if the module is used beyond the conditions.

8 Electrical Characteristicsb

8.1 DC Electrical Characteristicsb

ITEM	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Power supply of I/O	VDD	22±3°C, 55±15%R.H	1.65	3.0	3.5	V
OLED Driver Supply Voltage	VPP	22±3°C, 55±15%R.H	11.5	12	12.5	V
High-level Input Voltage	V_{IH}	-	0.8×VDD1	-	VDD1	V
Low-level Input Voltage	V_{IL}	-	VSS	-	0.2×VDD1	V
High-level Output Voltage	V_{OH}	-	0.8×VDD1	-	VDD1	V
Low-level Output Voltage	V_{OL}	-	VSS	-	0.2×VDD1	V

Note : The VPP input must be kept in a stable value; ripple and noise are not allowed.

8.2 Electro-optical Characteristics

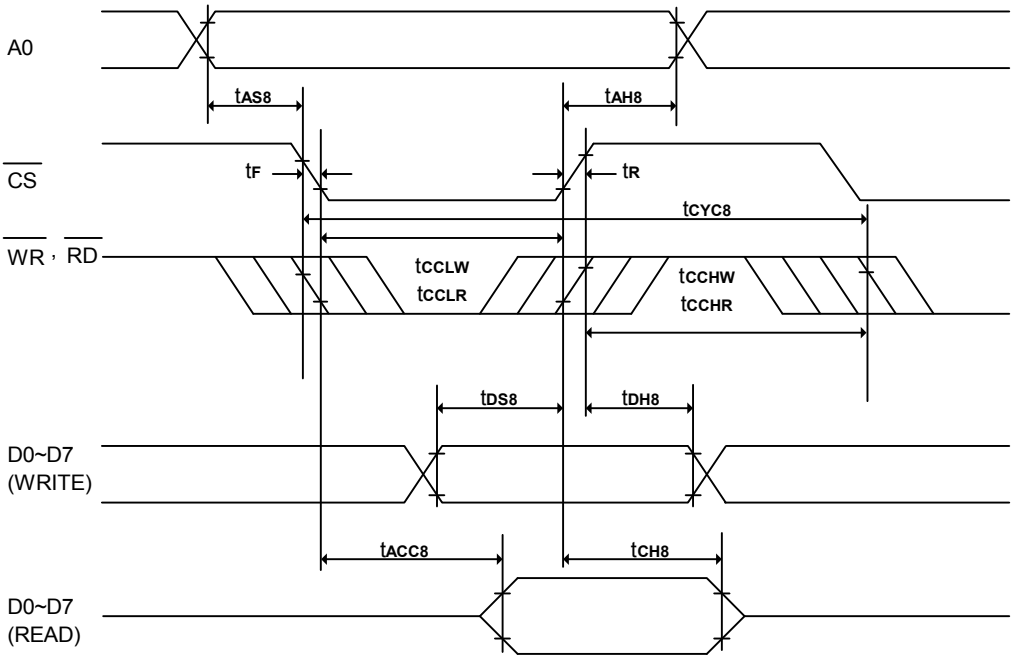
ITEM	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Normal Mode Brightness	L_{br}	All pixels ON(1)	80	100	-	cd/m^2
Sleep mode current Consumption in VDD1 & VDD2	I_{SP}	During sleep, TA = +25℃, VDD1 = 3V, VDD2 = 3V	-	0.02	10	uA
Sleep mode current consumption in VPP		During sleep, TA = +25℃, VPP = 12V	-	0.02	10	uA
Normal Mode Power Consumption	Pt	All pixels ON(1)	-	228	276	mW
C.I.E(Blue)	(x)	x,y(CIE1931)	0.12	0.16	0.20	-
	(y)		0.29	0.33	0.37	-
Dark Room Contrast	CR	-	≥2000:1	-	-	-
Response Time	-	-	---	10	-	μ s
View Angle	-	-	≥160	-	-	Degree

Note(1): Normal Mode test conditions are as follows:

- Driving voltage : 12V
- Contrast setting : 0x26
- Frame rate : 125Hz
- Duty setting : 1/64

8.3 AC Electrical Characteristics

(1) System buses Read/Write characteristics 1 (For the 8080 Series Interface MPU)



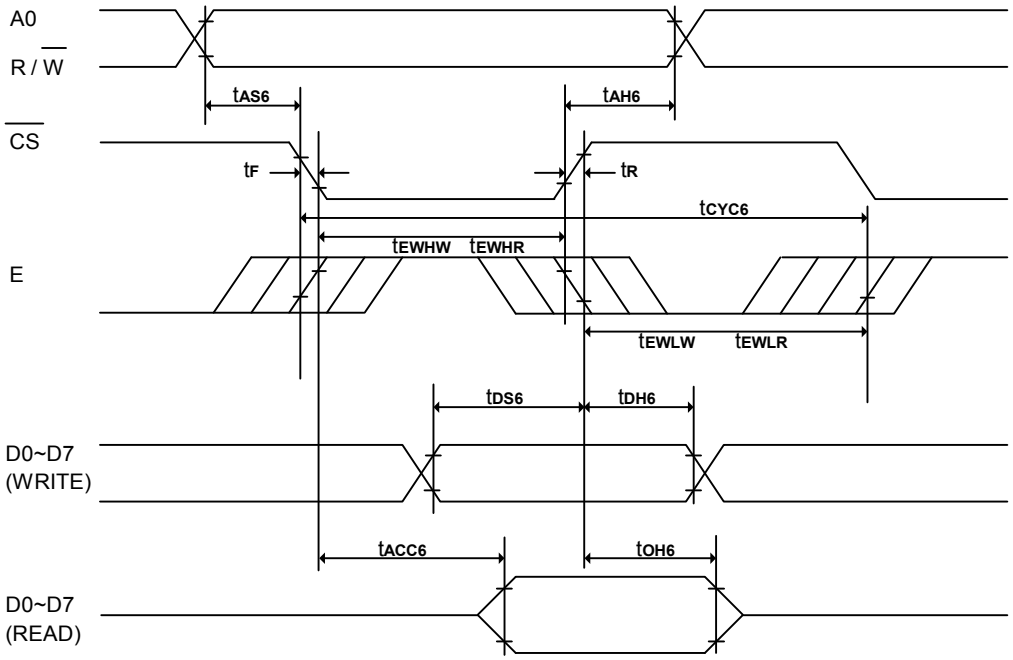
(VDD = 1.65 - 3.5V, TA = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
t_{CYC8}	System cycle time	600	-	-	ns	
t_{AS8}	Address setup time	0	-	-	ns	
t_{AH8}	Address hold time	0	-	-	ns	
t_{DS8}	Data setup time	80	-	-	ns	
t_{DH8}	Data hold time	30	-	-	ns	
t_{CH8}	Output disable time	20	-	140	ns	C_L = 100pF
t_{ACC8}	$\overline{RD}$ access time	-	-	280	ns	C_L = 100pF
t_{CCLW}	Control L pulse width (WR)	200	-	-	ns	
t_{CCLR}	Control L pulse width (RD)	240	-	-	ns	
t_{CCHW}	Control H pulse width (WR)	200	-	-	ns	
t_{CCHR}	Control H pulse width (RD)	200	-	-	ns	
t_R	Rise time	-	-	30	ns	
t_F	Fall time	-	-	30	ns	

(VDD = 2.4 - 3.5V, T_A = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
t_{CYC8}	System cycle time	300	-	-	ns	
t_{AS8}	Address setup time	0	-	-	ns	
t_{AH8}	Address hold time	0	-	-	ns	
t_{DS8}	Data setup time	40	-	-	ns	
t_{DH8}	Data hold time	15	-	-	ns	
t_{CH8}	Output disable time	10	-	70	ns	C_L= 100pF
t_{ACC8}	$\overline{RD}$ access time	-	-	140	ns	C_L= 100pF
t_{CCLW}	Control L pulse width (WR)	100	-	-	ns	
t_{CCLR}	Control L pulse width (RD)	120	-	-	ns	
t_{CCHW}	Control H pulse width (WR)	100	-	-	ns	
t_{CCHR}	Control H pulse width (RD)	100	-	-	ns	
t_R	Rise time	-	-	15	ns	
t_F	Fall time	-	-	15	ns	

(2) System buses Read/Write Characteristics 2 (For the 6800 Series Interface MPU)



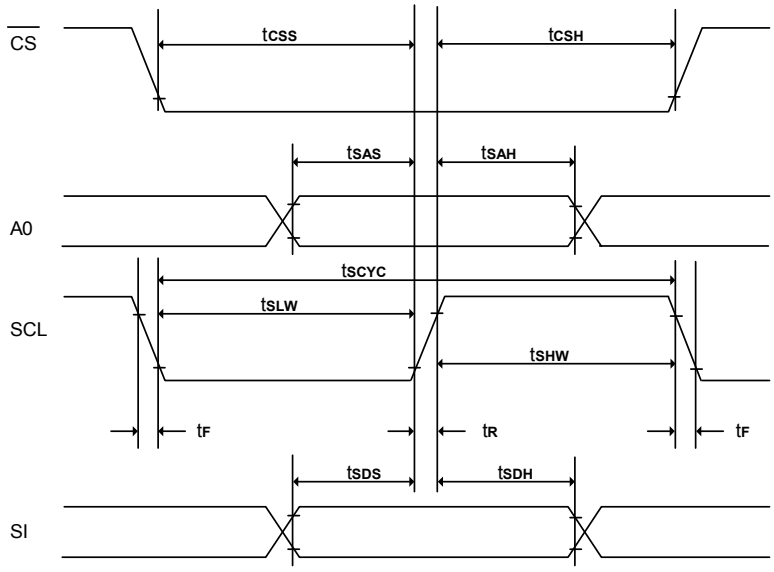
(VDD = 1.65 - 3.5V, TA = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
t_{CYC6}	System cycle time	600	-	-	ns	
t_{AS6}	Address setup time	0	-	-	ns	
t_{AH6}	Address hold time	0	-	-	ns	
t_{DS6}	Data setup time	80	-	-	ns	
t_{DH6}	Data hold time	30	-	-	ns	
t_{OH6}	Output disable time	20	-	140	ns	C_L = 100pF
t_{ACC6}	Access time	-	-	280	ns	C_L = 100pF
t_{EWHW}	Enable H pulse width (Write)	200	-	-	ns	
t_{EWHR}	Enable H pulse width (Read)	240	-	-	ns	
t_{EWLW}	Enable L pulse width (Write)	200	-	-	ns	
t_{EWLR}	Enable L pulse width (Read)	200	-	-	ns	
t_R	Rise time	-	-	30	ns	
t_F	Fall time	-	-	30	ns	

(VDD = 2.4 - 3.5V, T_A = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
t_{CYC6}	System cycle time	300	-	-	ns	
t_{AS6}	Address setup time	0	-	-	ns	
t_{AH6}	Address hold time	0	-	-	ns	
t_{DS6}	Data setup time	40	-	-	ns	
t_{DH6}	Data hold time	15	-	-	ns	
t_{OH6}	Output disable time	10	-	70	ns	C_L= 100pF
t_{ACC6}	Access time	-	-	140	ns	C_L= 100pF
t_{EWHW}	Enable H pulse width (Write)	100	-	-	ns	
t_{EWHR}	Enable H pulse width (Read)	120	-	-	ns	
t_{EWLW}	Enable L pulse width (Write)	100	-	-	ns	
t_{EWLR}	Enable L pulse width (Read)	100	-	-	ns	
t_R	Rise time	-	-	15	ns	
t_F	Fall time	-	-	15	ns	

(3) System buses Write characteristics 3(For 4 wire SPI)



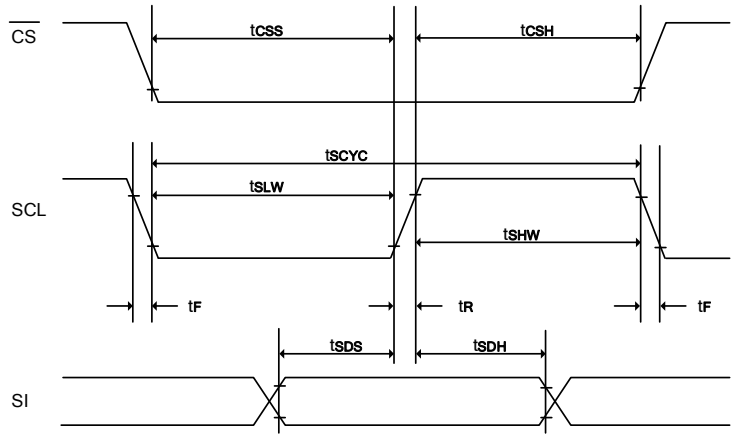
(VDD = 1.65 - 3.5V, TA = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
t_{SCYC}	Serial clock cycle	500	-	-	ns	
t_{SAS}	Address setup time	300	-	-	ns	
t_{SAH}	Address hold time	300	-	-	ns	
t_{SDS}	Data setup time	200	-	-	ns	
t_{SDH}	Data hold time	200	-	-	ns	
t_{CSS}	$\overline{CS}$ setup time	240	-	-	ns	
t_{CSH}	$\overline{CS}$ hold time time	120	-	-	ns	
t_{SHW}	Serial clock H pulse width	200	-	-	ns	
t_{SLW}	Serial clock L pulse width	200	-	-	ns	
t_R	Rise time	-	-	30	ns	
t_F	Fall time	-	-	30	ns	

(VDD = 2.4 - 3.5V, T_A = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
t_{SCYC}	Serial clock cycle	250	-	-	ns	
t_{SAS}	Address setup time	150	-	-	ns	
t_{SAH}	Address hold time	150	-	-	ns	
t_{SDS}	Data setup time	100	-	-	ns	
t_{SDH}	Data hold time	100	-	-	ns	
t_{CSS}	$\overline{CS}$ setup time	120	-	-	ns	
t_{CSH}	$\overline{CS}$ hold time time	60	-	-	ns	
t_{SHW}	Serial clock H pulse	100	-	-	ns	
t_{SLW}	Serial clock L pulse	100	-	-	ns	
t_R	Rise time	-	-	15	ns	
t_F	Fall time	-	-	15	ns	

(4) System buses Write characteristics 4(For 3 wire SPI)



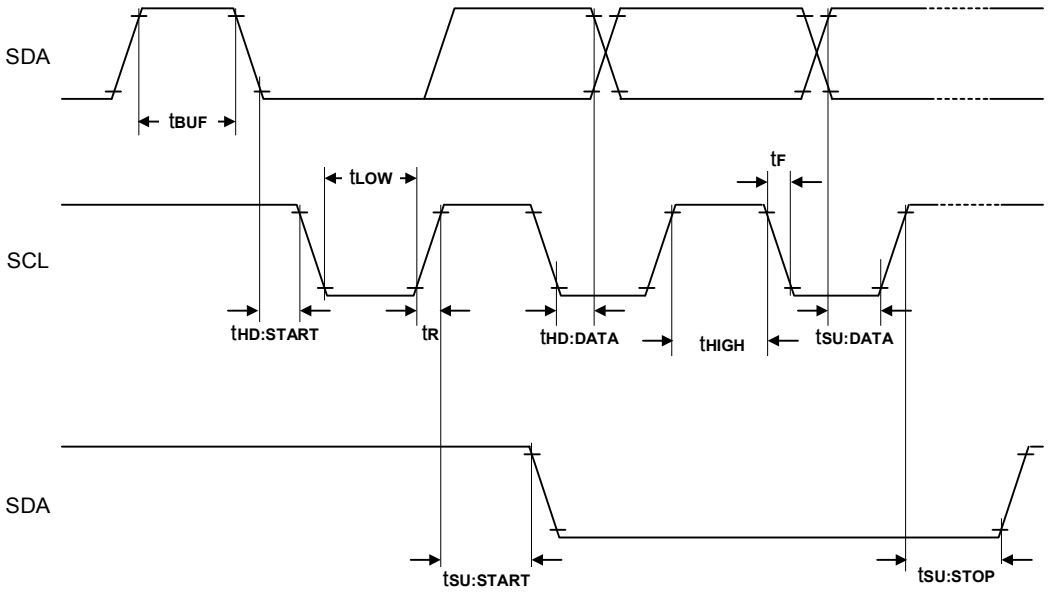
(VDD = 1.65 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t_{SCYC}	Serial clock cycle	500	-	-	ns	
t_{SDS}	Data setup time	200	-	-	ns	
t_{SDH}	Data hold time	200	-	-	ns	
t_{CSS}	$\overline{CS}$ setup time	240	-	-	ns	
t_{CSH}	$\overline{CS}$ hold time time	120	-	-	ns	
t_{SHW}	Serial clock H pulse width	200	-	-	ns	
t_{SLW}	Serial clock L pulse width	200	-	-	ns	
t_R	Rise time	-	-	30	ns	
t_F	Fall time	-	-	30	ns	

(VDD = 2.4 - 3.5V, T_A = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t_{SCYC}	Serial clock cycle	250	-	-	ns	
t_{SDS}	Data setup time	100	-	-	ns	
t_{SDH}	Data hold time	100	-	-	ns	
t_{CSS}	$\overline{CS}$ setup time	120	-	-	ns	
t_{CSH}	$\overline{CS}$ hold time time	60	-	-	ns	
t_{SHW}	Serial clock H pulse	100	-	-	ns	
t_{SLW}	Serial clock L pulse	100	-	-	ns	
t_R	Rise time	-	-	15	ns	
t_F	Fall time	-	-	15	ns	

(5) I^2C interface characteristics

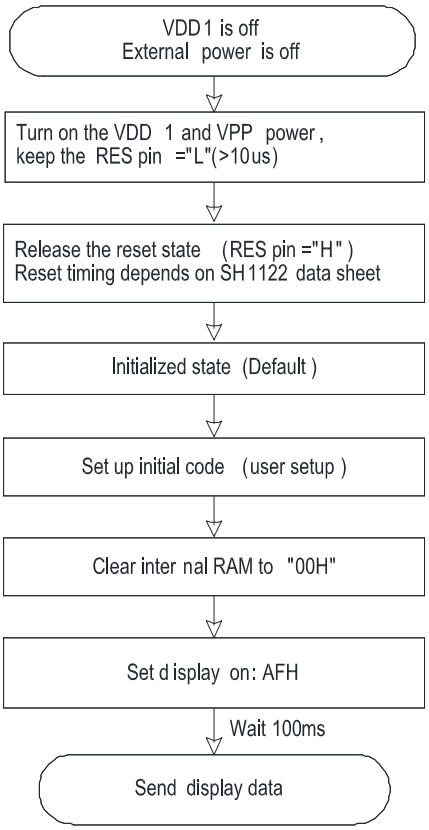


(VDD = 1.65 - 3.5V, TA = +25°C)

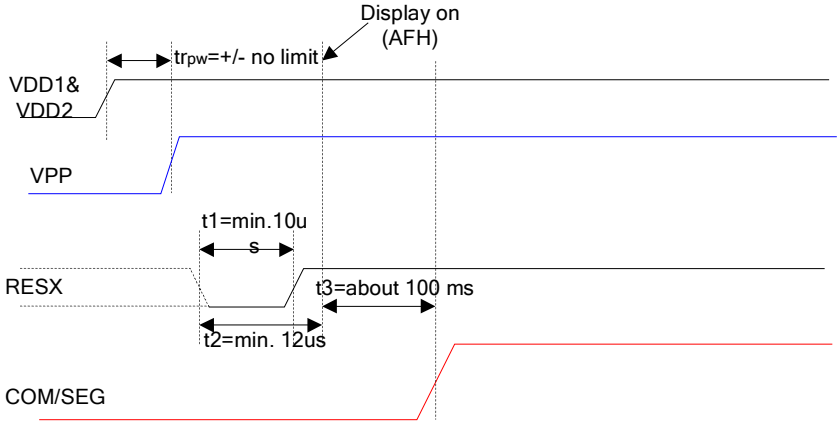
Symbol	Parameter	Min	Typ	Max	Unit	Condition
f_{SCL}	SCL clock frequency	DC	-	400	kHz	
T_{LOW}	SCL clock Low pulse width	1.3	-	-	uS	
T_{HIGH}	SCL clock H pulse width	0.6	-	-	uS	
$T_{SU:DATA}$	data setup time	100	-	-	nS	
$T_{HD:DATA}$	data hold time	0	-	0.9	uS	
T_R	SCL,SDA rise time	20+0.1Cb	-	300	nS	
T_F	SCL,SDA fall time	20+0.1Cb	-	300	nS	
Cb	Capacity load on each bus line	-	-	400	pF	
$T_{SU:START}$	Setup timefor re-START	0.6	-	-	uS	
$T_{HD:START}$	START Hold time	0.6	-	-	uS	
$T_{SU:STOP}$	Setup time for STOP	0.6	-	-	uS	
T_{BUF}	Bus free times between STOP and START condition	1.3	-	-	uS	

9 Functional Specification and Application Circuit

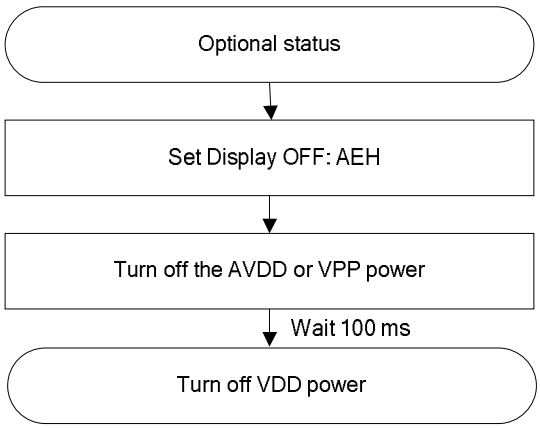
9.1 External DC-DC pump power is being used immediately after turning on the power:



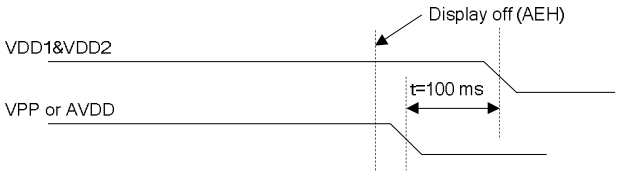
Power on sequence:



Power Off



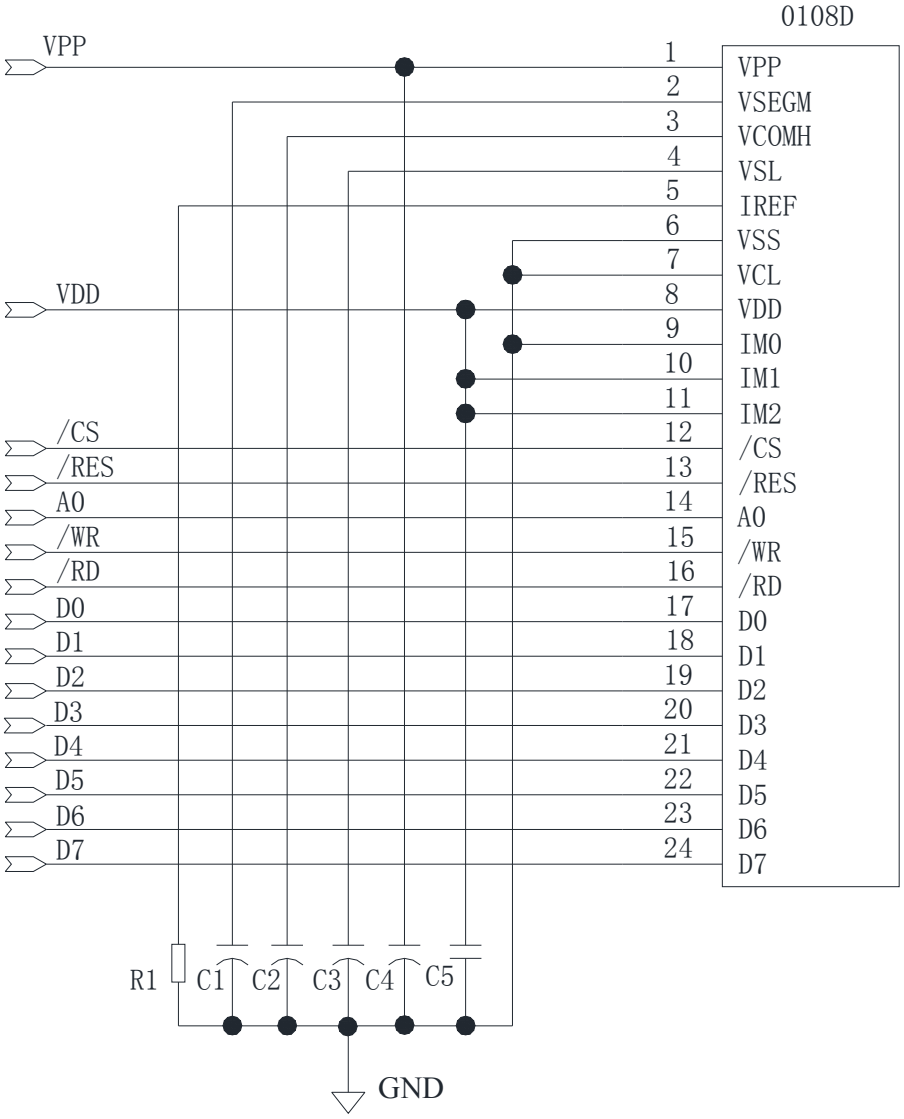
Power off sequence:



Note：There will be no damages to the display module if the power on/off sequences are not met.

9.2 Application Circuit

(1) The configuration for 8-bit 8080 mode, external VPP is shown in the following diagram:



Pin connected to MCU interface: D[7:0], /RD, /WR, A0, /RES ,/CS

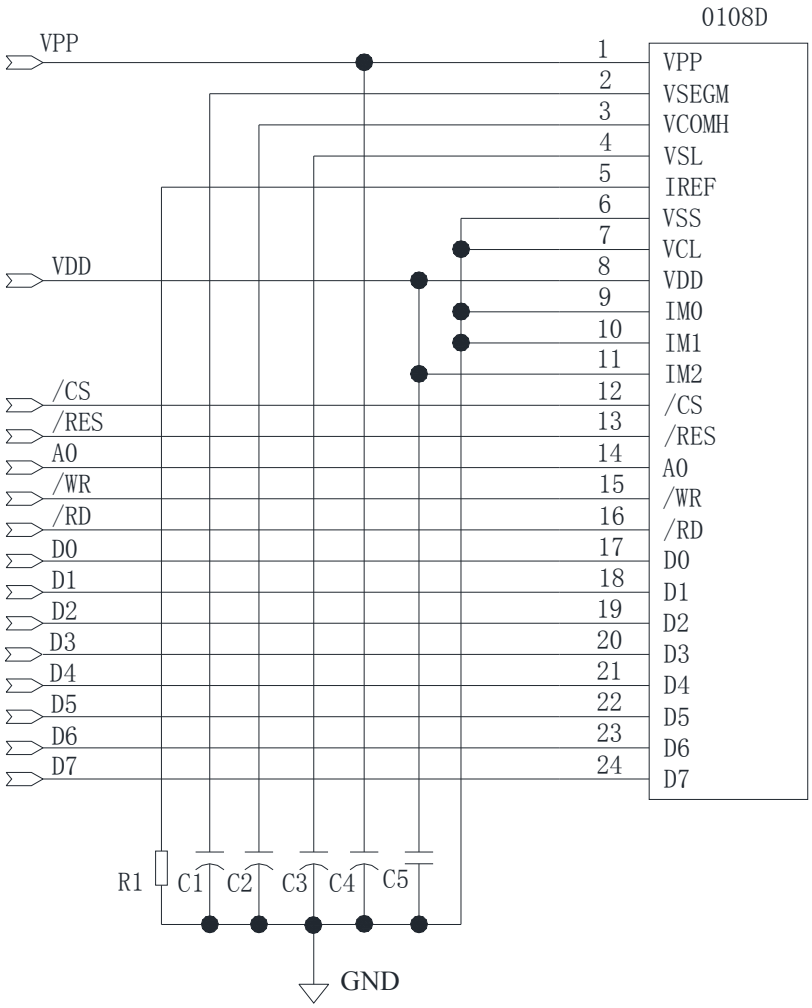
Recommended components

C1,C2,C3,C4: 4.7μF/25V.ROHS (Tantalum Capacitors)

C5: 0.1uF-0603-X7R±10%.ROHS

R1: 0603 1/10W +/-5% 620Kohm.ROHS

(2) The configuration for 8-bit 6800 mode, external VPP is shown in the following diagram:



Pin connected to MCU interface: D[7:0], /RD, /WR, A0, /RES,/CS

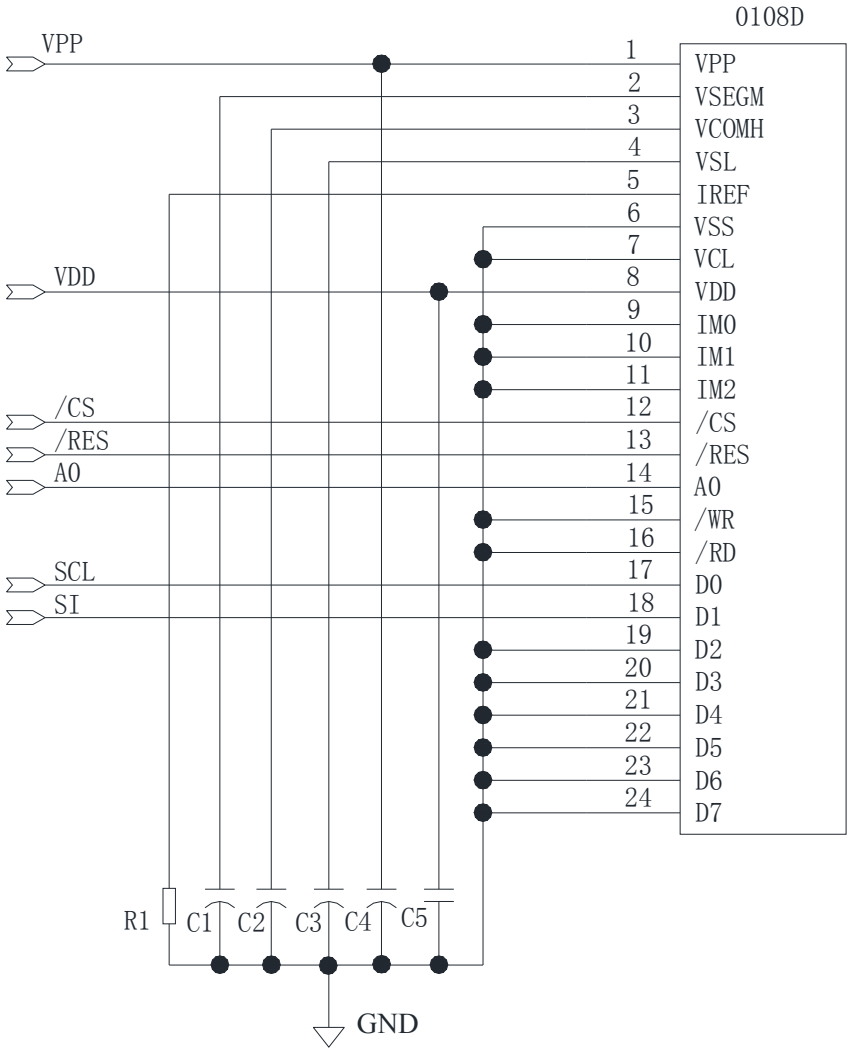
Recommended components

C1,C2,C3,C4: 4.7μF/25V.ROHS (Tantalum Capacitors)

C5: 0.1uF-0603-X7R±10%.ROHS

R1: 0603 1/10W +/-5% 620Kohm.ROHS

(3) The configuration for 4-wire SPI mode, external VPP is shown in the following diagram:



Pin connected to MCU interface: SCL,SI, A0, /RES ,/CS

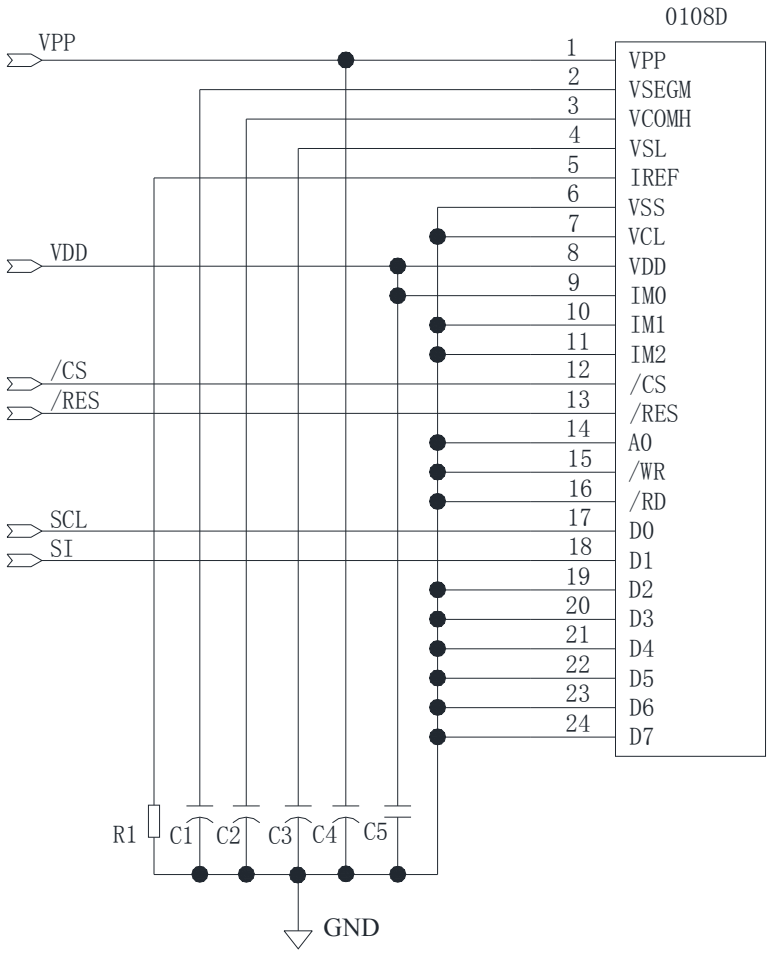
Recommended components

C1,C2,C3,C4: 4.7μF/25V.ROHS (Tantalum Capacitors)

C5: 0.1uF-0603-X7R±10%.ROHS

R1: 0603 1/10W +/-5% 620Kohm.ROHS

(4) The configuration for 3-wire SPI mode, external VPP is shown in the following diagram:



Pin connected to MCU interface: SCL,SI, /RES ,/CS

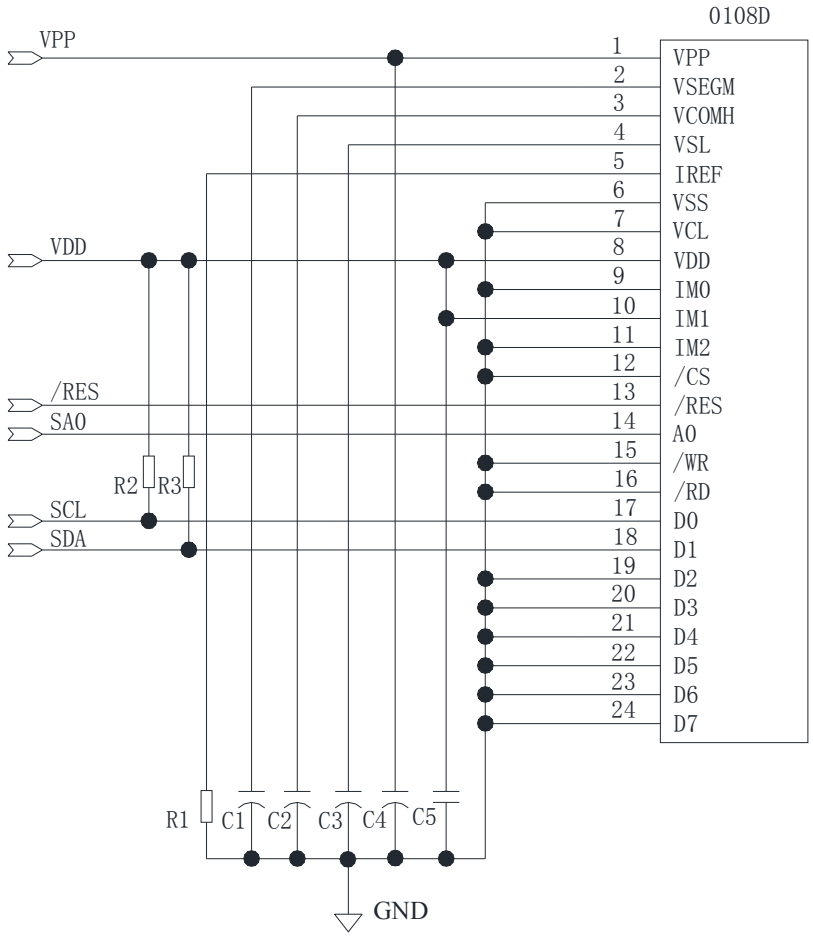
Recommended components

C1,C2,C3,C4: 4.7μF/25V.ROHS (Tantalum Capacitors)

C5: 0.1uF-0603-X7R±10%.ROHS

R1: 0603 1/10W +/-5% 620Kohm.ROHS

(5) The configuration for I^2C mode, external VPP is shown in the following diagram:



Pin connected to MCU interface: SCL,SDA, SA0,/RES

SA0	I^2C Address
0	0x78
1	0x7a

Recommended components

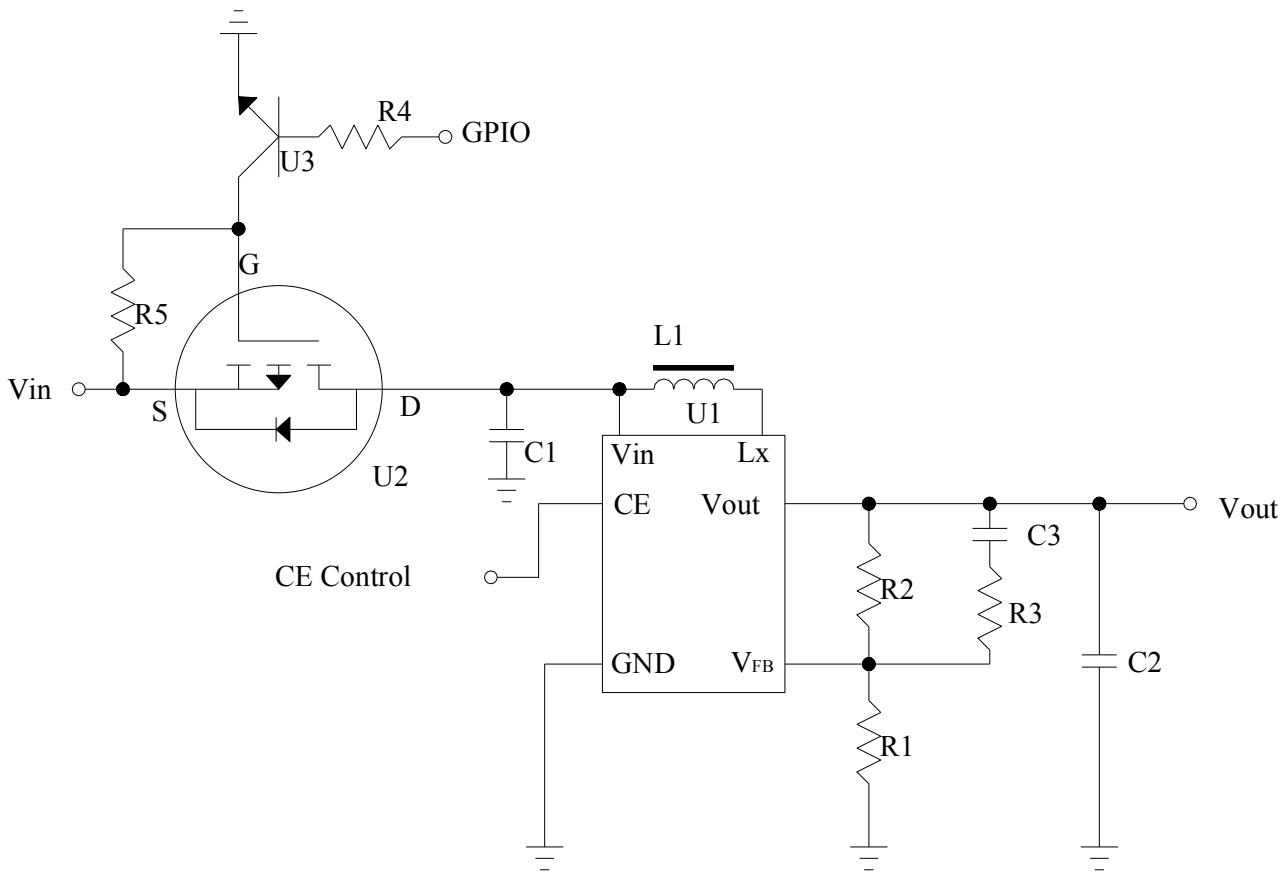
C1,C2,C3,C4: 4.7μF/25V.ROHS (Tantalum Capacitors)

C5: 0.1uF-0603-X7R±10%.ROHS

R1: 0603 1/10W +/-5% 620Kohm.ROHS

R2,R3: 0603 1/10W +/-5% 10Kohm.ROHS

9.3 External DC-DC application circuit



Recommend component

The C1	: 1 uF-0603-X7R±10%.ROHS
The C2	: 1 uF-0603-X7R±10%.ROHS
The C3	: 220pF-0603-X7R±10%.ROHS
The R1	: 0603 1/10W +/-5% 10Kohm.ROHS
The R2	: 0603 1/10W +/-1% 110Kohm.ROHS
The R3	: 0603 1/10W +/-5% 2Kohm.ROHS
The R4	: 0603 1/10W +/-5% 1Kohm.ROHS
The R5	: 0603 1/10W +/-5% 10Kohm.ROHS
The L1	: 22uH
The U1	: R1200
The U2	: FDN338P
The U3	: 8050

9.4 Display Control Instruction

Refer to SH1122G IC Specification.

9.5 Recommended Software Initialization

```
void Init_IC()
{
    Write_Command(0xAE);        //Set Display Off
    Write_Command(0xB0);        //Row address Mode Setting
    Write_Command(0x00);
    Write_Command(0x10);        //Set Higher Column Address of display RAM
    Write_Command(0x00);        //Set Lower Column Address of display RAM
    Write_Command(0xD5);        //Set Display Clock Divide Ratio/Oscillator Frequency
    Write_Command(0x50);        //50    125hz
    Write_Command(0xD9);        //Set Discharge/Precharge Period
    Write_Command(0x22);
    Write_Command(0x40);        //Set Display Start Line
    Write_Command(0x81);        //The Contrast Control Mode Set
    Write_Command(0x26);
    Write_Command(0xA0);        //Set Segment Re-map
    Write_Command(0xC8);        //Set Common Output Scan Direction
    Write_Command(0xA4);        //Set Entire Display OFF/ON
    Write_Command(0xA6);        //Set Normal/Reverse Display
    Write_Command(0xA8);        //Set Multiplex Ration
    Write_Command(0x3F);
    Write_Command(0xAD);        //DC-DC Setting
    Write_Command(0x80);        //DC-DC is disable
    Write_Command(0xD3);        //Set Display Offset
    Write_Command(0x00);
    Write_Command(0xDB);        //Set VCOM Deselect Level
    Write_Command(0x30);
    Write_Command(0xDC);        //Set VSEGM Level
    Write_Command(0x30);
    Write_Command(0x33);        //Set Discharge VSL Level    1.8V
    Write_Command(0xAF);        //Set Display On
}
```

11 Reliability

11.2 Reliability Test

NO.	ITEM	CONDITION	QUANTITY
1	High Temperature (Non-operation)	85℃,240hrs	4
2	Low Temperature (Non-operation)	-40℃,240hrs	4
3	High Temperature (Operation)	70℃,240hrs	4
4	Low Temperature (Operation)	-40℃,240hrs	4
5	High Temperature / High Humidity (Operation)	60℃,90%RH,240hrs	4
6	Thermal shock (Non-operation)	-40℃~85℃(-40℃/30min;transit/3min;85℃/30min;transit/3min) 1cycle: 66min,30cycles	4
7	Vibration	Frequency: 5~50Hz,0.5G Scan rate: 1 oct/min Time: 2 hrs/axis Test axis: X,Y, Z	1 Carton
8	Drop	Height: 100 cm Sequence: 1 angle, 3 edges and 6 faces	1 Carton

Test and measurement conditions

1. All measurements shall not be started until the specimens attain to temperature stability, the stable time is at least 15 minutes.
2. The degradation of polarizer is ignored for item 5.
3. The tolerance of temperature is ±3℃, and the tolerance of relative humidity is ±5%.

Evaluation criteria

1. The function test is OK.
2. No observable defects.
3. Luminance:≥50% of initial value.
4. Current consumption: within ± 50% of initial value.

11.3 Lifetime

End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	10,000	-	hrs	100 cd/m^2, 50% alternating checkerboard, 22±3°C, 55±15% RH

11.4 Failure Check Standard

After the completion of the described reliability test, the samples were left at room temperature for 2 hrs prior to conducting the failure test at 22±3°C; 55±15% RH.

12 Illustration of OLED Product Name

13 Outgoing Quality Control Specifications

13.2 Sampling Method

(1) GB/T 2828.1-2003/ISO2859-1：1999, inspection level Ⅱ, normal inspection, single sample inspection

(2) AQL: Major 0.65; Minor 1.0

13.3 Inspection Conditions

The environmental conditions for test and measurement are performed as follows.

Temperature: 22±3°C

Humidity: 55±15%R.H

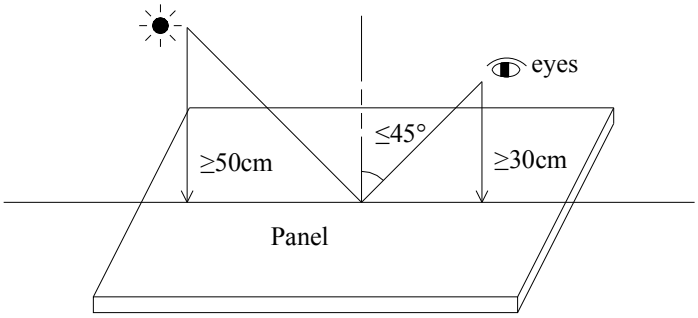
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: ≥50cm

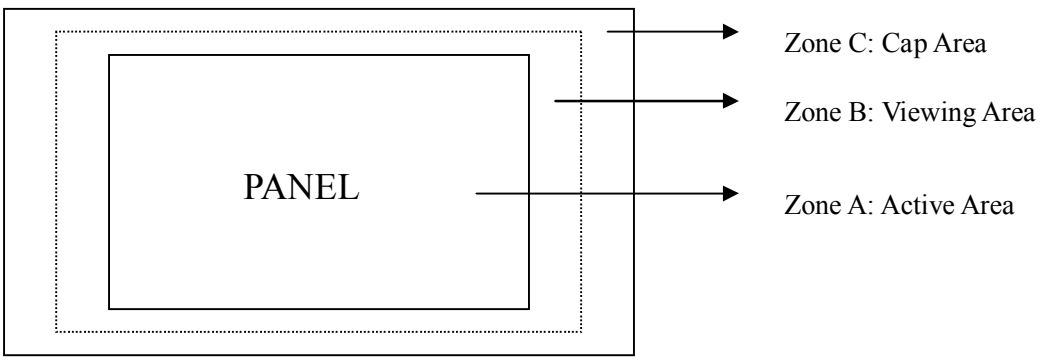
Distance between the Panel & Eyes: ≥30cm

Viewing angle from the vertical in each direction: ≤45°

(See the sketch below)

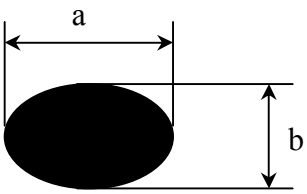


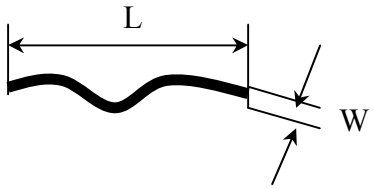
13.4 Quality Assurance Zones



13.5 Inspection Standard

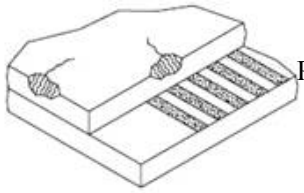
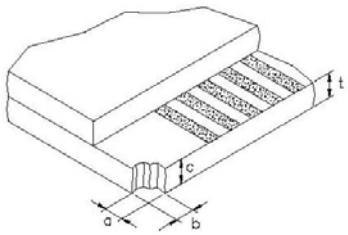
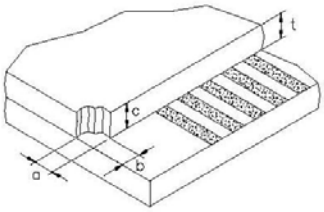
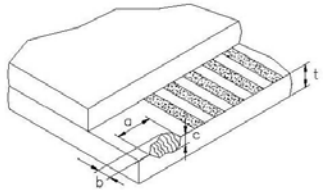
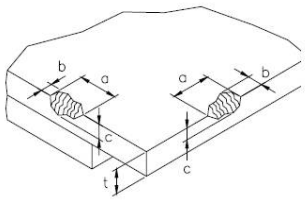
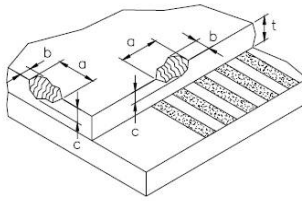
Definition of Φ&L&W (Unit: mm)





Ⅰ. Appearance Defects

<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th><th>CLASSIFICATION</th></tr>
<tr><td>1</td><td>Polarizer Black or White spot, Dirty spot, Foreign matter, Dent on the polarizer</td><td>
<table>
<tr><td rowspan="2">Average Diameter (mm)</td><td colspan="2">Acceptable Number</td></tr>
<tr><td>Zone A,B</td><td>Zone C</td></tr>
<tr><td>Φ≤0.15</td><td>Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.15<Φ≤0.30</td><td>3</td></tr>
<tr><td>Φ>0.30</td><td>0</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>2</td><td>Scratch/line on the glass/Polarizer</td><td>
<table>
<tr><td rowspan="2">Width (mm)</td><td rowspan="2">Length mm)</td><td colspan="2">Acceptable Number</td></tr>
<tr><td>Zone A,B</td><td>Zone C</td></tr>
<tr><td>W≤0.03</td><td>---</td><td>Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.03<W≤0.08</td><td>L≤5.0</td><td>3</td></tr>
<tr><td>W>0.08</td><td>---</td><td>0</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>3</td><td>Polarizer Bubble</td><td>
<table>
<tr><td rowspan="2">Average Diameter (mm)</td><td colspan="2">Acceptable Number</td></tr>
<tr><td>Zone A,B</td><td>Zone C</td></tr>
<tr><td>Φ>0.5</td><td>0</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.2<Φ≤0.5</td><td>3</td></tr>
<tr><td>Φ≤0.2</td><td>Ignore</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>4</td><td>Any Dirt & Scratch on Polarizer’s Protective Film</td><td>Ignore for not affect the polarizer.</td><td>Acceptable</td></tr>
<tr><td>5</td><td>Any Dirt on Cap Glass</td><td>
<table>
<tr><td>Average Diameter (mm)</td><td>Acceptable Number</td></tr>
<tr><td>Φ≤0.5</td><td>Ignore</td></tr>
<tr><td>0.5<Φ≤1.0</td><td>3</td></tr>
<tr><td>Φ>1.0</td><td>0</td></tr>
</table>
</td><td>Minor</td></tr>
</table>

6	Glass Crack	 Propagation crack is not acceptable.	Major
7	Corner Chip	 t= Glass thickness Accept a≤2.0mm or b≤2.0mm, c≤t	Minor
8	Corner Chip on Cap Glass	 t= Glass thickness Accept a≤1.5mm or b≤1.5mm, c≤t	Minor
9	Chip on Contact Pad	 t= Glass thickness Accept a≤3.0mm or b≤0.8mm, c≤t (on the contact pin) a≤3.0mm or b≤1.5mm, c≤t (outside of the contact pin)	Minor
10	Chip on Face of Display	 t= Glass thickness Accept a≤1.5mm or b≤1.5mm, c≤t	Minor
11	Chip on Cap Glass	 t= Glass thickness Accept a≤3.0mm or b≤3.0mm, c≤t/2 a≤1.5mm or b≤1.5mm, t/2≤c≤t	Minor
12	Stain on Surface	Stain removable by soft cloth or air blow is acceptable.	Minor
13	TCP/FPC Damage	(1) Crack, deep scratch, deep hole and deep pressure mark on the TCP/FPC are not acceptable. (2) Terminal lead twisted or broken is not allowable. (3) Copper exposed is not allowed by naked eye inspection.	Minor
14	Dimension Unconformity	Checking by mechanical drawing.	Major

Ⅱ. Displaying Defects

<table>
<tr><th>NO.</th><th>ITEM</th><th>CRITERIA</th><th>CLASSIFICATION</th></tr>
<tr><td>1</td><td>Black/White spot
Dirty spot
Foreign matter</td><td>
<table>
<tr><td rowspan="2">Average Diameter (mm)</td><td colspan="2">Pieces Permitted</td></tr>
<tr><td>Zone A,B</td><td>Zone C</td></tr>
<tr><td>Φ≤0.10</td><td>Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.10<Φ≤0.20</td><td>3</td></tr>
<tr><td>Φ>0.20</td><td>0</td></tr>
</table>
</td><td>Minor</td></tr>
<tr><td>2</td><td>No Display</td><td>Not allowable.</td><td>Major</td></tr>
<tr><td>3</td><td>Irregular Display</td><td>Not allowable.</td><td>Major</td></tr>
<tr><td>4</td><td>Missing Line
(row or column)</td><td>Not allowable.</td><td>Major</td></tr>
<tr><td>5</td><td>Short</td><td>Not allowable.</td><td>Major</td></tr>
<tr><td>6</td><td>Flicker</td><td>Not allowable.</td><td>Major</td></tr>
<tr><td>7</td><td>Abnormal Color</td><td>Refer to the SPEC.</td><td>Major</td></tr>
<tr><td>8</td><td>Luminance NG</td><td>Refer to the SPEC.</td><td>Major</td></tr>
<tr><td>9</td><td>Over Current</td><td>Refer to the SPEC.</td><td>Major</td></tr>
</table>

14 Precautions for operation and Storage

14.2 Precautions for Operation

(1) Since OLED panel is made of glass, do not apply any mechanical shock or impact or excessive force to it when installing the OLED module. Any strong mechanical impact due to falling dropping etc. may cause damage (breakage or cracking).

(2) The polarizer on the OLED surface is made of soft material and is easily scratched. Please take most care when handing. When the surface of the polarizer of OLED Module is contaminated, please wipe it off gently by using moisten soft cloth with isopropyl alcohol, do not use water, ketone or aromaticsb. If there is saliva or water on the OLED surface, please wipe it off immediately.

(3) When handling OLED module, please be sure that the body and the tools are properly grounded. And do not touch I/O pins with bare hands or contaminate I/O pins, it will cause disconnection or defective insulation of terminals.

(4) Do not attempt to disassemble or process the OLED module.

(5) OLED module should be used under recommended operating conditions shown in the specification. Since the higher voltage leads to the shorter lifetime, be sure to use the specified operating voltage.

(6) Foggy dew, moisture condensation or water droplets deposited on surface and contact terminals will cause polarizer stain or damage, the deteriorated display quality and electrochemical reaction then leads to shorter life time and permanent damage to the module probably. Please pay attention to the environmental temperature and humidity.

(7) An afterimage is created by the difference in brightness between unused dot and the fixed dot, according to the decrease of brightness of the emitting time. Therefore, to avoid having an afterimage, the full set should be thoroughly used instead of using a fixed dot. When the fixed dot emits, an afterimage can be created.

(8) Flicker could be come out at full on display. And it disappears when frame frequency increase, but brightness decreases too.

14.3 Soldering

(1) Soldering should be performed only on the I/O terminals.

(2) Use soldering irons with proper grounding and no leakage.

(3) Iron: no higher than 300℃ and 3~4 sec during soldering.

14.4 Precautions for Storage

(1) Please store OLED module in a dark place. Avoid exposure to sunlight, the light of fluorescent lamp or any ultraviolet ray.

(2) Keep the environment temperature between 10℃ and 35℃ and the relative humidity less than 60%. Avoid high temperature and high humidity.

(3) Keep the OLED modules stored in the container when shipped from supplier before using them is recommended.

(4) Do not leave any article on the OLED module surface for an extended period of time.