Product Specification

Product Name: VGM160128A3W03

Product Code: M01233

Customer
Approved by Customer
Approved Date:

Designed By	Checked By	Approved By	
		R&D	QA

CONTENT

REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
D01	Initial Release	2015-12-23	

1 Overview

VGM160128A3W03 is a monochrome OLED display module with 160×128 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.

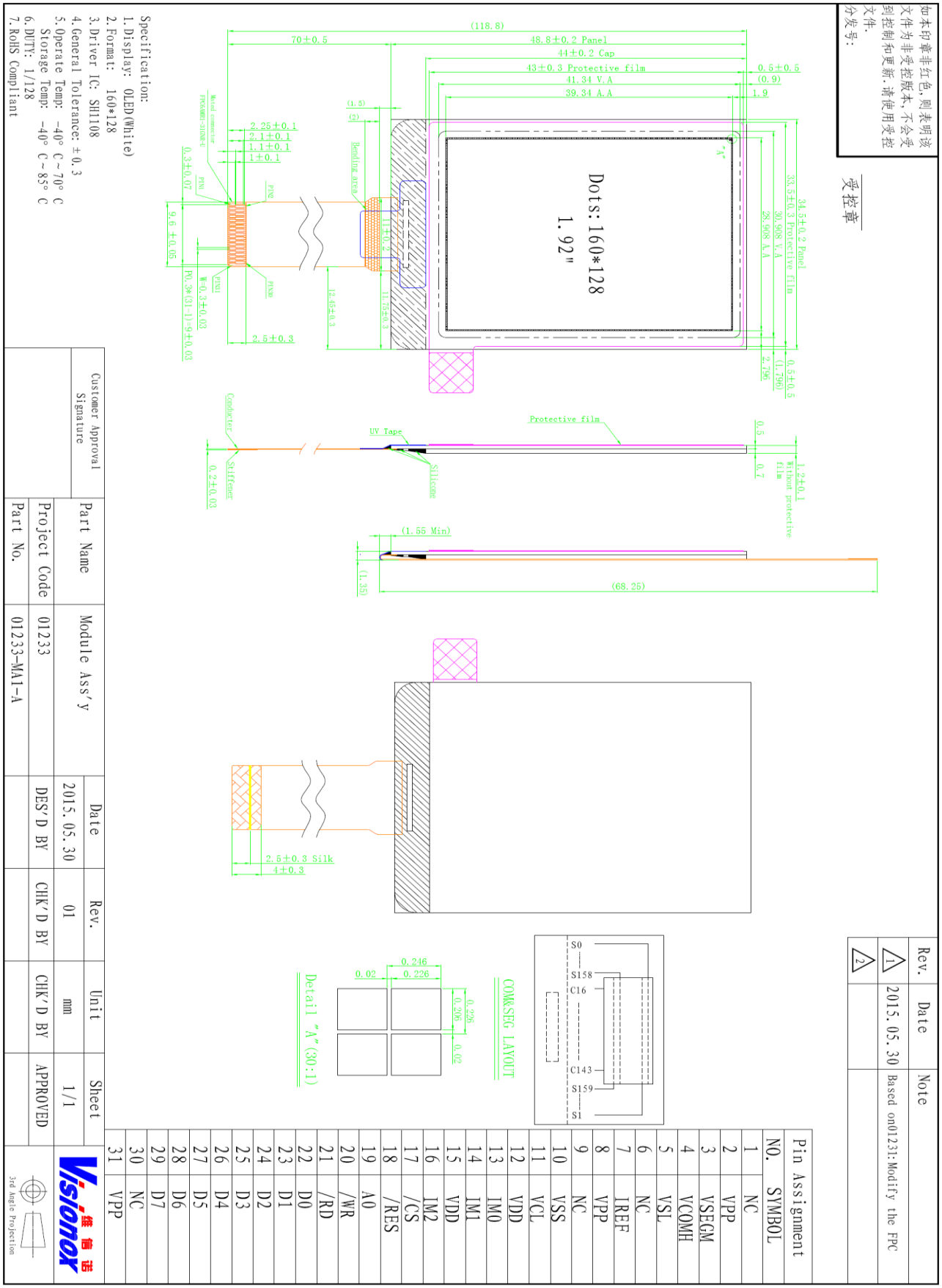
2 Features

- Display Color: White
- Dot Matrix:160×128
- Driver IC: SH1108
- Interface: 8-bit 8080,8-bit 6800, 3-wire SPI, 4-wire SPI,I² C
- Wide range of operating temperature: -40℃ to 70℃

3 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	160(W)×128(H)	-
2	Dot Size	0.206(W)×0.226(H)	mm^2
3	Dot Pitch	0.226(W)×0.246(H)	mm^2
4	Aperture Rate	84	%
5	Active Area	28.908(W)×39.34(H)	mm^2
6	Panel Size	34.5(W) ×48.8(H) × 1.2(T)	mm^3
7	Module Size	34.5(W) ×118.8(H) × 1.2(T)	mm^3
8	Diagonal A/A Size	1.92	inch
9	Module Weight	4.25±10%	gram

4 Mechanical Drawing

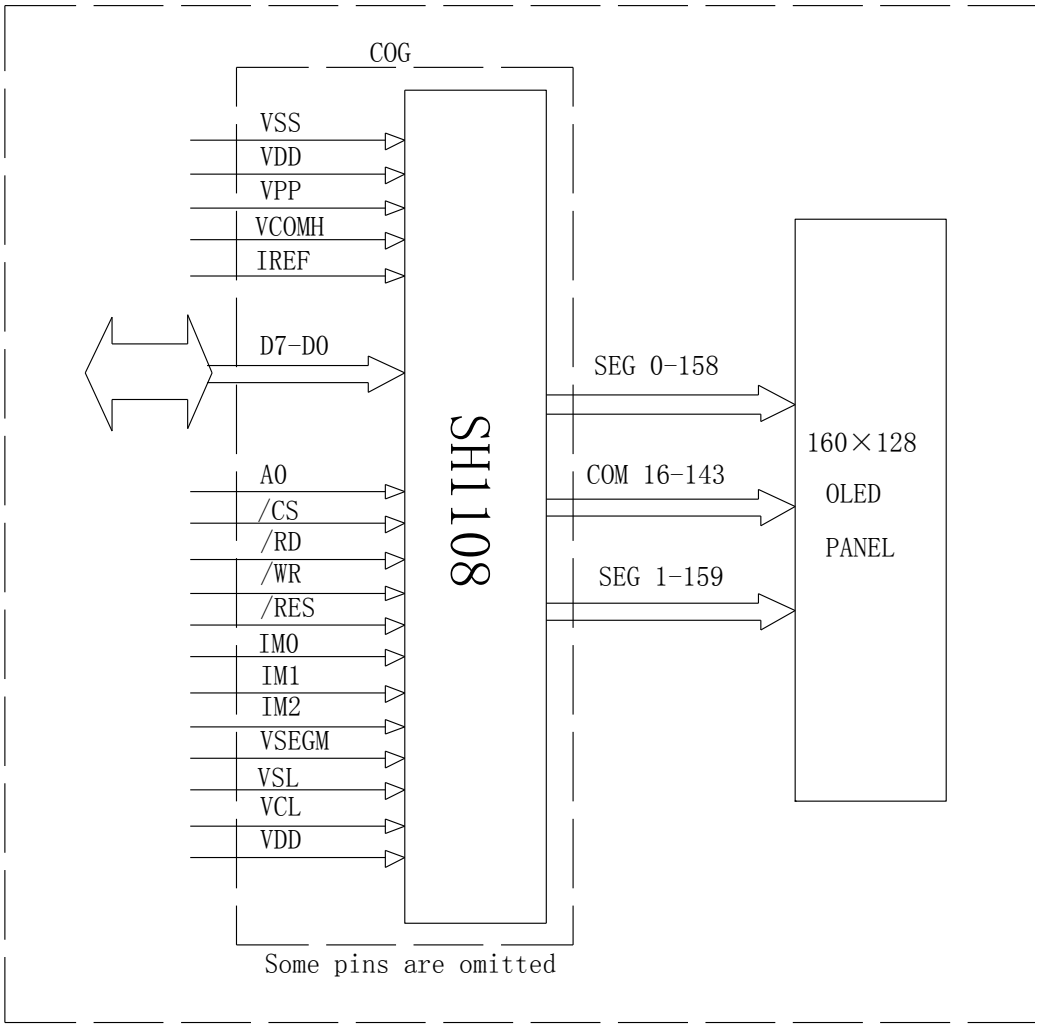


5 Module Interface

<table>
<tr><th>PIN NO.</th><th>PIN NAME</th><th>DESCRIPTION</th></tr>
<tr><td>1、6、9、30</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>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>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>This is a segment voltage reference pad
A capacitor should be connected between this pad and VSS</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. Set the current at 15.625μ A</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>10</td><td>VSS</td><td>Ground for analog, logic&buffer respectively.</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>1.65 - 3.5V power supply input pad for logic.</td></tr>
<tr><td>13</td><td>IM0</td><td rowspan="4">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>14</td><td>IM1</td></tr>
<tr><td>16</td><td>IM2</td></tr>
<tr><td>15</td><td>VDD</td></tr>
<tr><td>15</td><td>VDD</td><td>1.65 - 3.5Vpower supply input pad</td></tr>
<tr><td>17</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>18</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>19</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>20</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>
</table>

21	/RD	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.
22~29	D0~D7	Data bus.
31	VPP	This is the most positive voltage supply pad of the chip It should be supplied externally

6 Function Block Diagram



7 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
Supply voltage	VDD	-0.3	3.6	V	IC maximum rating
	VPP	-0.3	17	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 "GND = 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 Characteristics". Malfunctioning of the module may occur and the reliability of the module may deteriorate if the module is used beyond the conditions.

8 Electrical Characteristics

8.1 DC Electrical Characteristics

ITEM	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Operating Voltage	VPP	-	13	13.5	14	V
Logic Supply Voltage	VDD	-	1.65	3.0	3.5	V
High-level Output voltage	V_{OHC}	I_{oH}=-0.5mA(D0-D7,and CL)	0.8×VDD	-	VDD	V
Low-level Output voltage	V_{OLC}	I_{oL}=0.5mA(D0,D2-D7,and CL)	VSS	-	0.2×VDD	V
High Logic Input voltage	V_{IHC}	A0, D0 - D7, RD(E), WR (R /W), CS ,CLS, CL, IM0~2 and RES .	0.8×VDD	-	VDD	V
Low Logic Input voltage	V_{ILC}		VSS	-	0.2×VDD	V

8.2 Electro-optical Characteristics

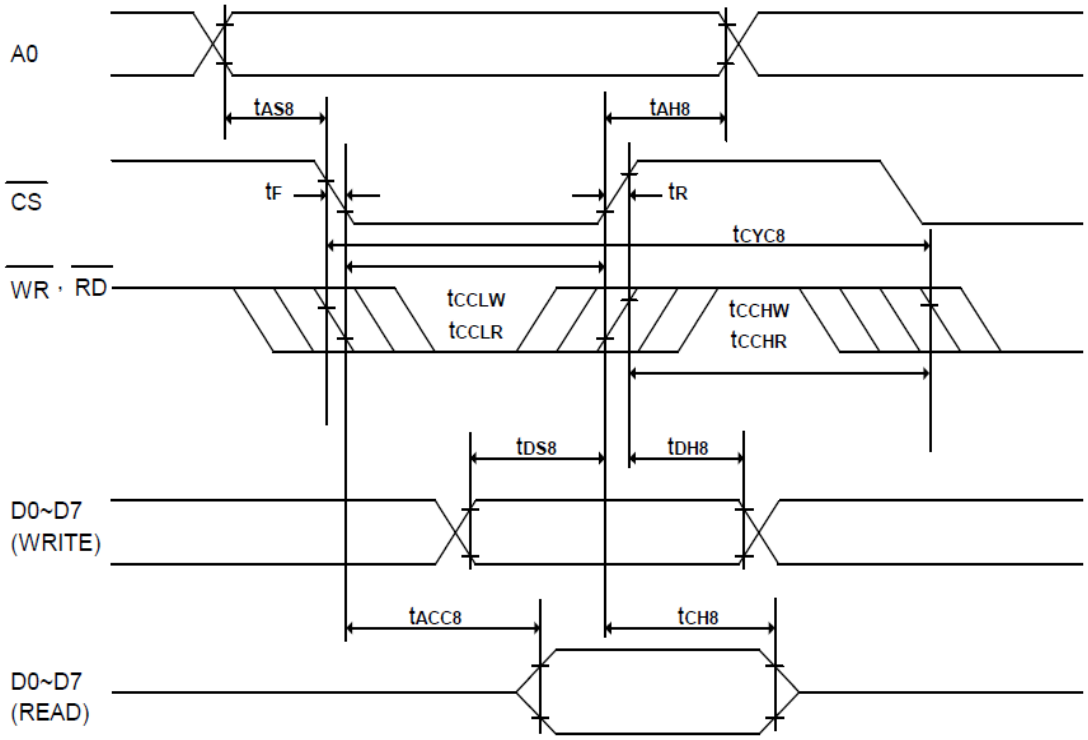
ITEM	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Normal Mode Brightness	L_{br}	All pixels ON(1)	230	280	-	cd/m^2
VDD Sleep mode Current	ISP_VDD	VDD=2.8V,VPP=OFF Display OFF, No panel attached	-	0.02	10	uA
VPP Sleep mode Current	ISP_VPP	VDD=2.8V,VPP=7-16.5V Display OFF, No panel attached	-	0.02	10	uA
Normal Mode Power Consumption	Pt	All pixels ON(1)	-	796.5	945	mW
C.I.E(White)	(x)	x,y(CIE1931)	0.32	0.36	0.40	-
	(y)		0.34	0.38	0.42	-
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 : 13.5V
- Contrast setting : 0xD0
- Frame rate : 100Hz
- Duty setting : 1/128

8.3 AC Electrical Characteristics

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



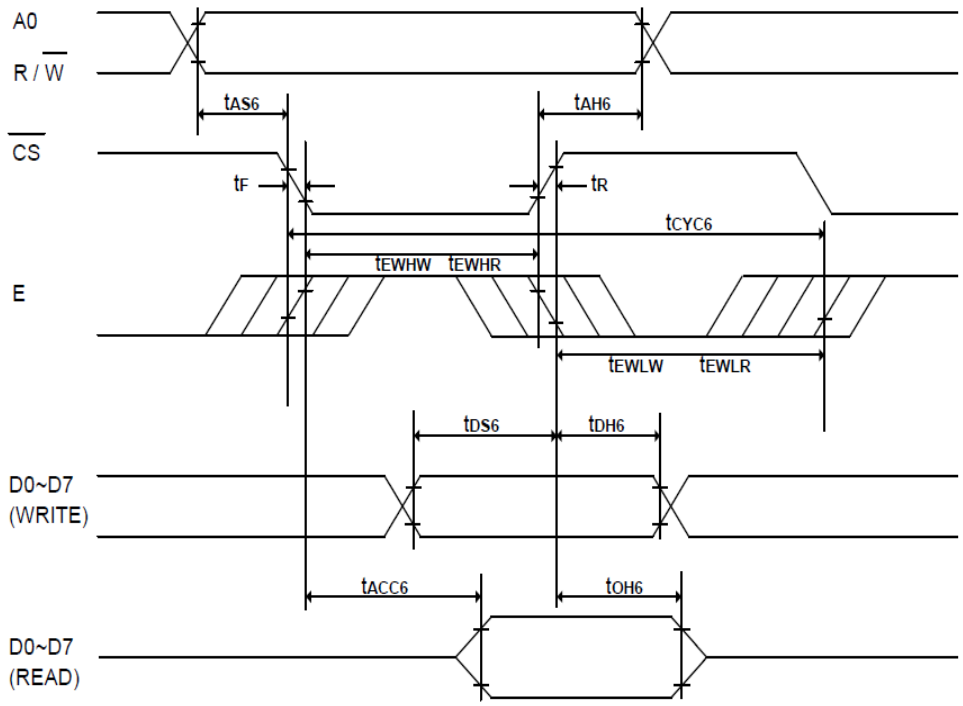
(VDD = 1.65V – 2.4V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tCYC8	System cycle time	300	-	-	ns	
tAS8	Address setup time	0	-	-	ns	
tAH8	Address hold time	0	-	-	ns	
tDS8	Data setup time	40	-	-	ns	
tDH8	Data hold time	30	-	-	ns	
tCH8	Output disable time	10	-	70	ns	CL = 100pF
tACC8	$\overline{RD}$ access time	-	-	280	ns	CL = 100pF
tCCLW	Control L pulse width (WR)	100	-	-	ns	
tCCLR	Control L pulse width (RD)	120	-	-	ns	
tCCHW	Control H pulse width (WR)	100	-	-	ns	
tCCHR	Control H pulse width (RD)	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

(V_{DD} = 2.4V – 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)



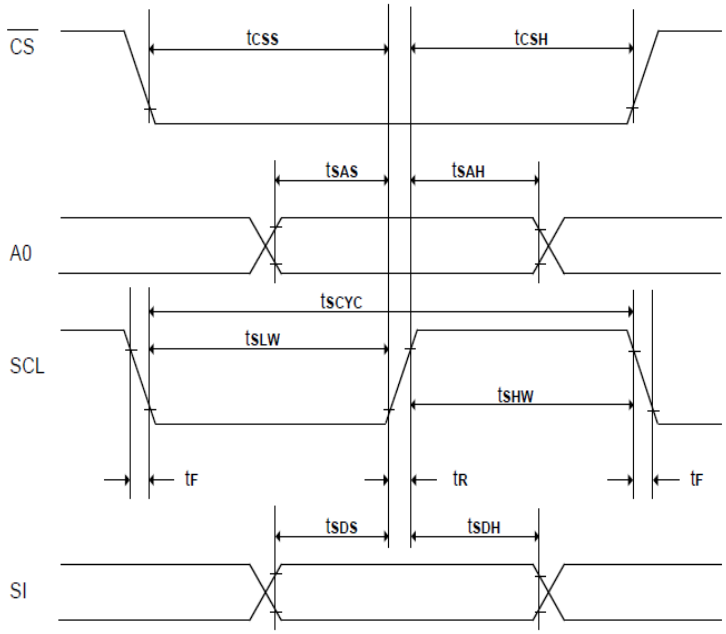
(V_{DD} = 1.65 – 2.4V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tCYC6	System cycle time	300	-	-	ns	
tAS6	Address setup time	0	-	-	ns	
tAH6	Address hold time	0	-	-	ns	
tDS6	Data setup time	40	-	-	ns	
tDH6	Data hold time	30	-	-	ns	
tOH6	Output disable time	10	-	70	ns	C_L = 100pF
tACC6	Access time	-	-	280	ns	C_L = 100pF
tEWHW	Enable H pulse width (Write)	100	-	-	ns	
tEWHR	Enable H pulse width (Read)	120	-	-	ns	
tEWLW	Enable L pulse width (Write)	100	-	-	ns	
tEWLR	Enable L pulse width (Read)	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

(V_{DD} = 2.4 – 3.5V, TA = +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)



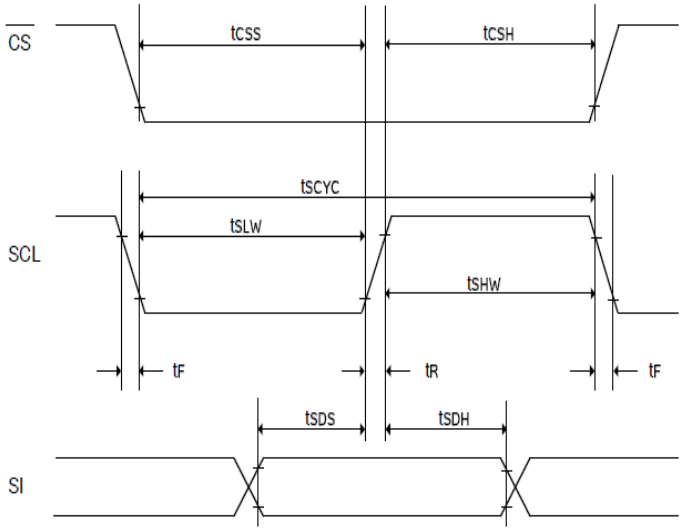
(V_{DD1} = 1.65 – 2.4V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tSCYC	Serial clock cycle	500	-	-	ns	
tSAS	Address setup time	300	-	-	ns	
tSAH	Address hold time	300	-	-	ns	
tSDS	Data setup time	200	-	-	ns	
tSDH	Data hold time	200	-	-	ns	
tCSS	$\overline{CS}$ setup time	240	-	-	ns	
tCSH	$\overline{CS}$ hold time time	120	-	-	ns	
tSHW	Serial clock H pulse width	200	-	-	ns	
tSLW	Serial clock L pulse width	200	-	-	ns	
tR	Rise time	-	-	30	ns	
tF	Fall time	-	-	30	ns	

(V_{DD1} = 2.4 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tSCYC	Serial clock cycle	250	-	-	ns	
tSAS	Address setup time	150	-	-	ns	
tSAH	Address hold time	150	-	-	ns	
tSDS	Data setup time	100	-	-	ns	
tSDH	Data hold time	100	-	-	ns	
tCSS	$\overline{CS}$ setup time	120	-	-	ns	
tCSH	$\overline{CS}$ hold time time	60	-	-	ns	
tSHW	Serial clock H pulse width	100	-	-	ns	
tSLW	Serial clock L pulse width	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

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



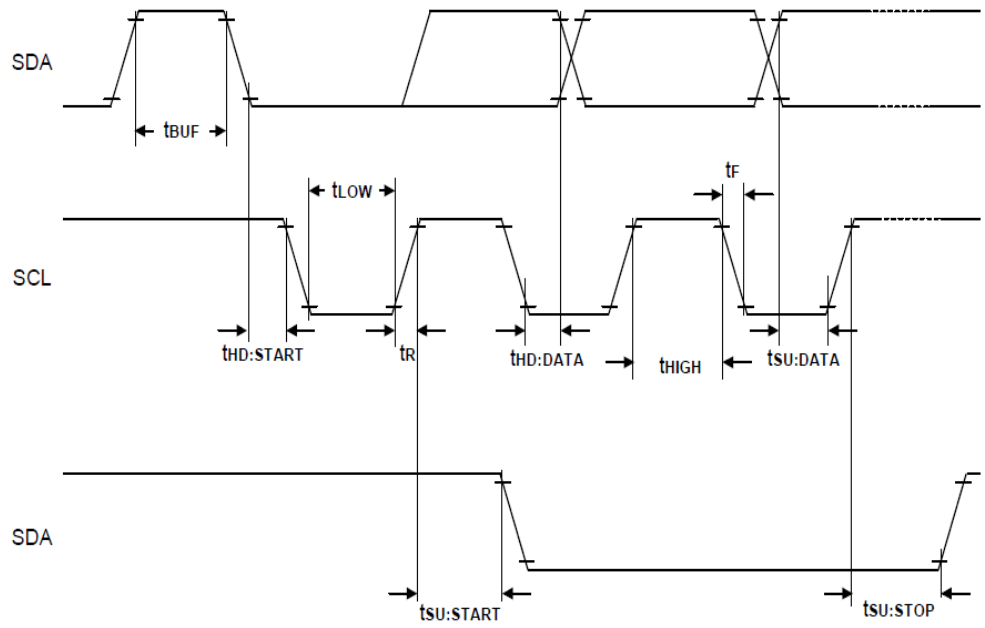
(V_{DD1} = 1.65 – 2.4V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tSCYC	Serial clock cycle	500	-	-	ns	
tSDS	Data setup time	200	-	-	ns	
tSDH	Data hold time	200	-	-	ns	
tCSS	$\overline{CS}$ setup time	240	-	-	ns	
tCSH	$\overline{CS}$ hold time time	120	-	-	ns	
tSHW	Serial clock H pulse width	200	-	-	ns	
tSLW	Serial clock L pulse width	200	-	-	ns	
tR	Rise time	-	-	30	ns	
tF	Fall time	-	-	30	ns	

(V_{DD1} = 2.4 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tSCYC	Serial clock cycle	250	-	-	ns	
tSDS	Data setup time	100	-	-	ns	
tSDH	Data hold time	100	-	-	ns	
tCSS	$\overline{CS}$ setup time	120	-	-	ns	
tCSH	$\overline{CS}$ hold time time	60	-	-	ns	
tSHW	Serial clock H pulse width	100	-	-	ns	
tSLW	Serial clock L pulse width	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

(5)I²C Interface Characteristics



(VDD = 1.65 - 3.5V, TA = +25°C)

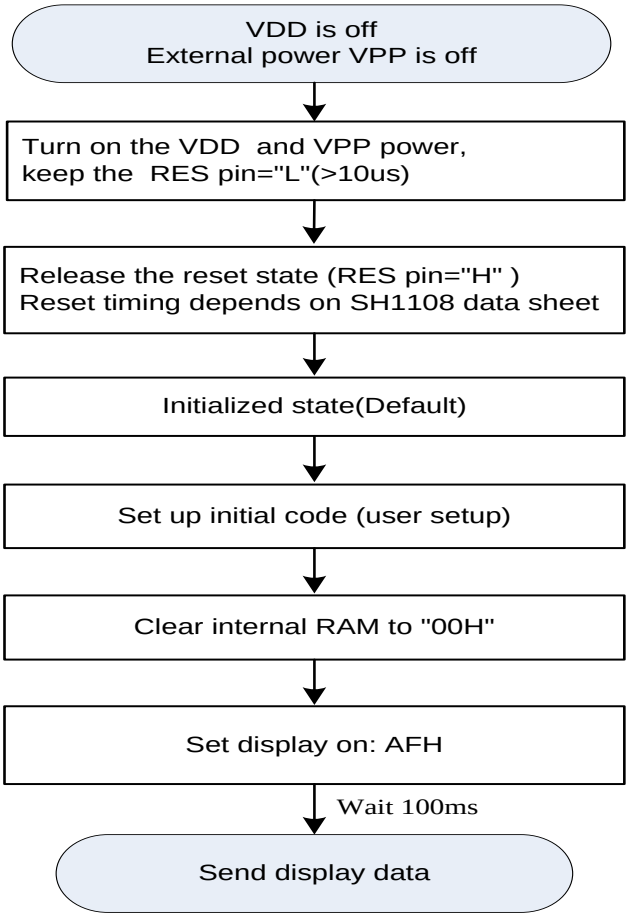
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
fSCL	SCL clock frequency	DC	-	400	kHz	
TLOW	SCL clock Low pulse width	1.3	-	-	s	
THIGH	SCL clock H pulse width	0.6	-	-	s	
TSU:DATA	data setup time	100	-	-	ns	
THD:DATA	data hold time	0	-	0.9	s	
TR	SCL、SDA rise time	20+0.1Cb	-	300	ns	
TF	SCL、SDA fall time	20+0.1Cb	-	300	ns	
Cb	Capacity load on each bus line	-	-	400	pF	
TSU:START	Setup timefor re-START	0.6	-	-	s	
THD:START	START Hold time	0.6	-	-	s	
TSU:STOP	Setup time for STOP	0.6	-	-	s	
TBUF	Bus free times between STOP and START condition	1.3	-	-	s	

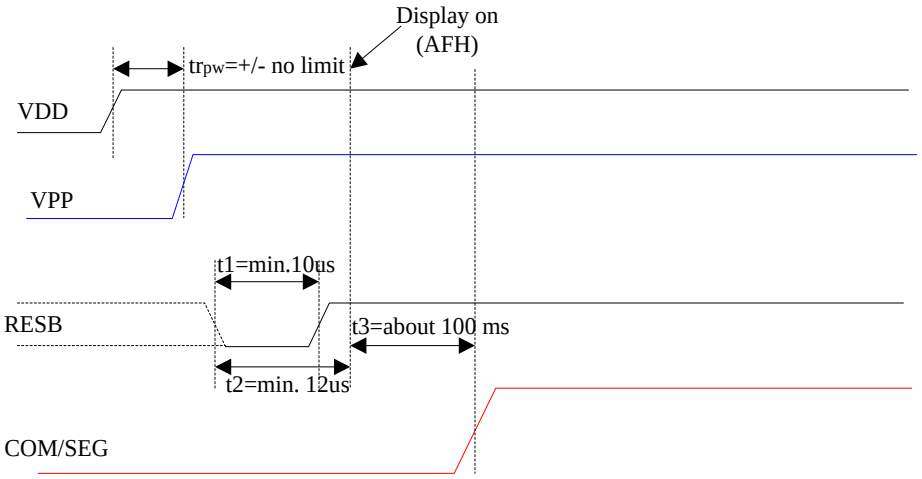
9 Functional Specification and Application Circuit

9.1 Power ON/OFF Sequence and Initialization

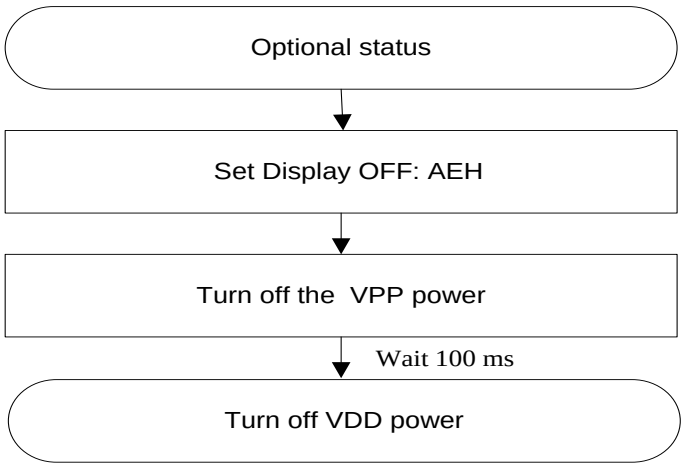
Power on sequence:

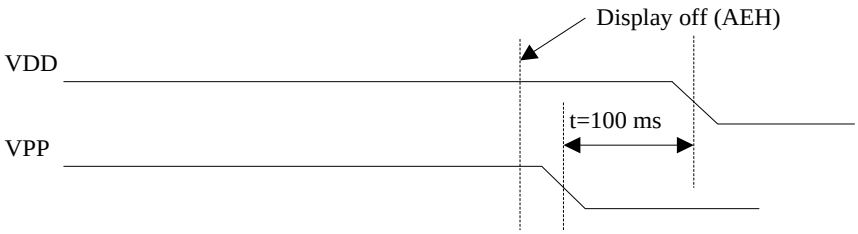
External power is being used immediately after turning on the power:





Power off sequence：





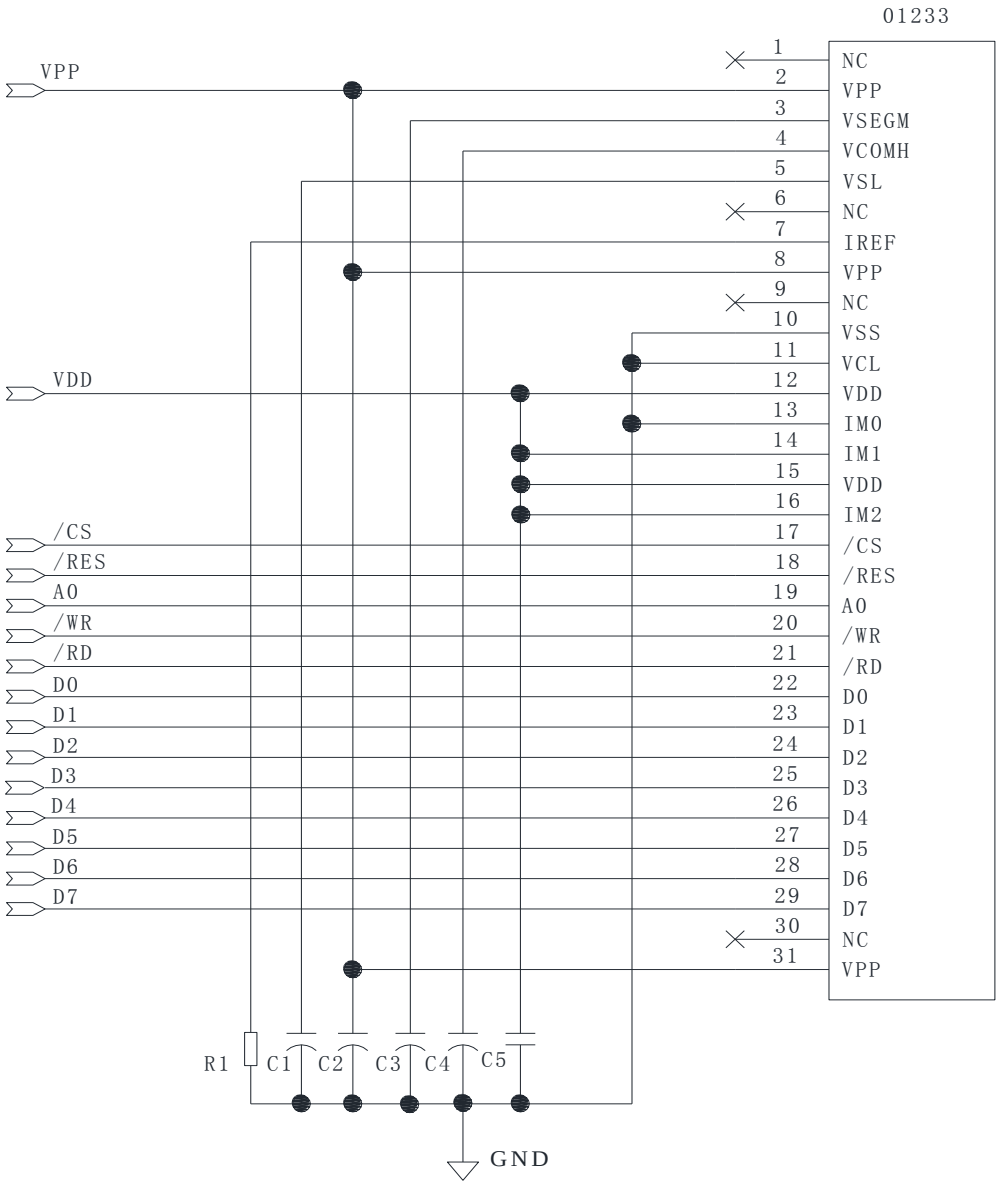
Note：There will be no damages to the display module if the power sequences are not met.

9.2. Application Circuit

9.2.1. Under external VPP Mode, the charge Pump Setting (ADh) must be set as follow:

ADh:DC-DC Control Mode Set DC-DC is disable(D=”L”, Refer to SH1108 IC Specification)

(1).The configuration for 8080-parallel interface mode, external VPP is shown in the following diagram:



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

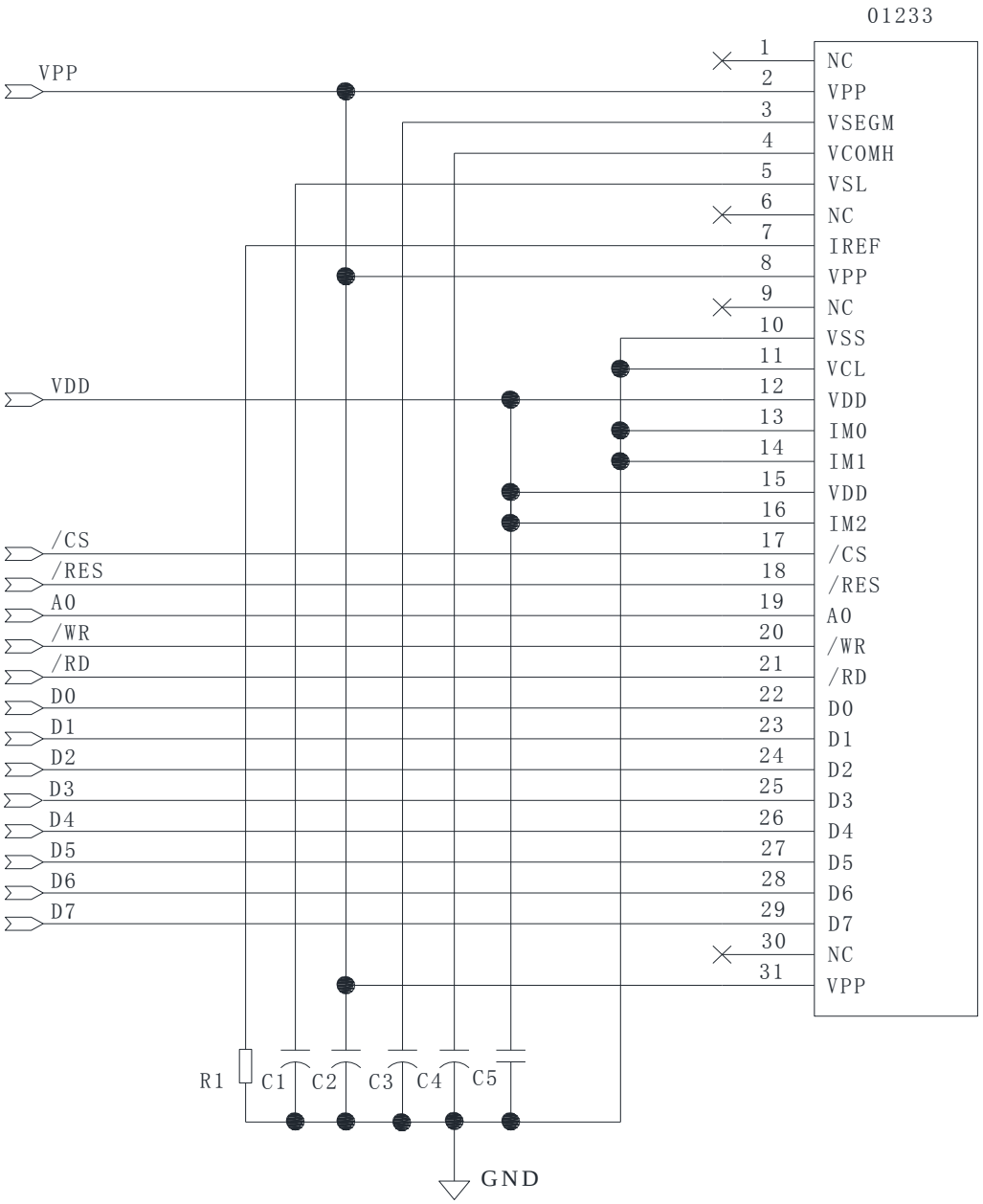
Recommended components

C5: 0.1uF-0603-X7R±10%.RoHS

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

R1: 0603 1/10W +/-5% 750Kohm.RoHS

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



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

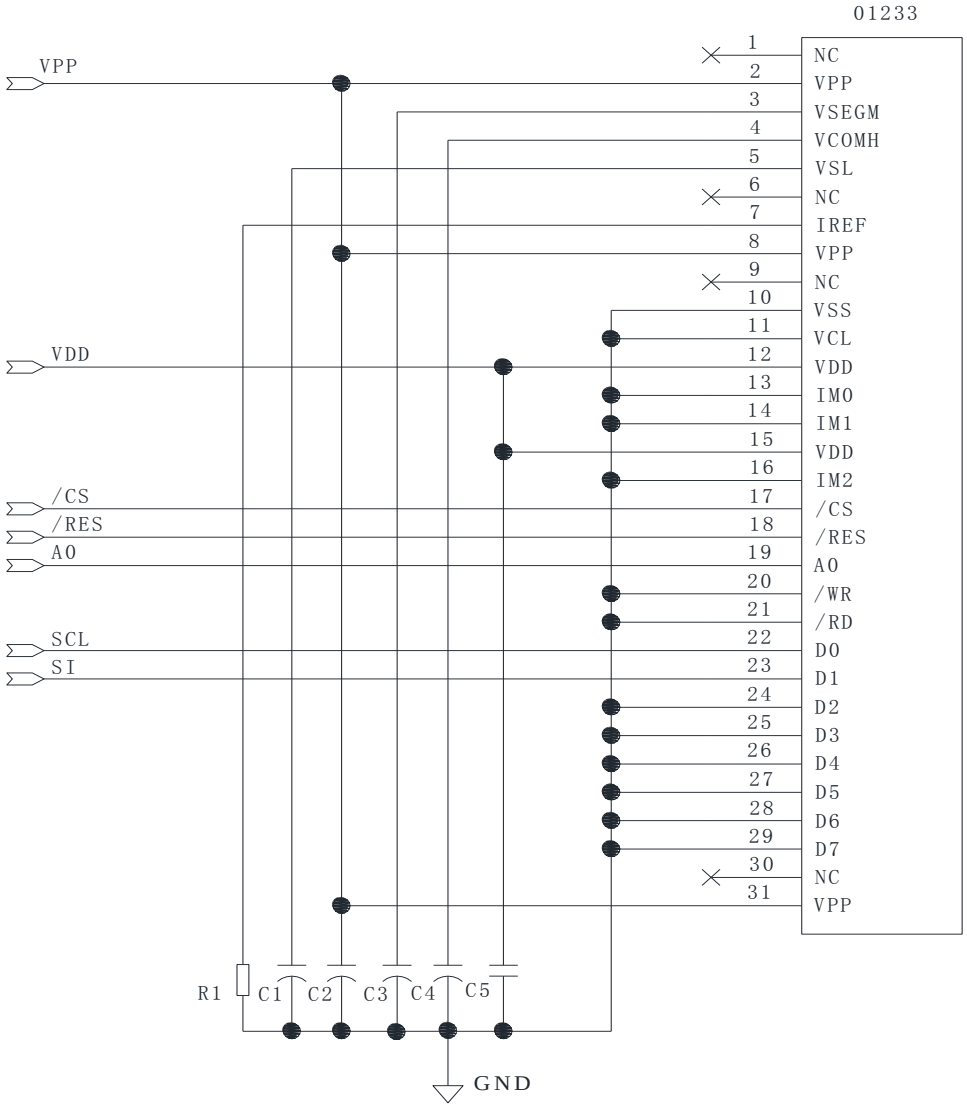
Recommended components

C5: 0.1uF-0603-X7R±10%.RoHS

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

R1: 0603 1/10W +/-5% 750Kohm.RoHS

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



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

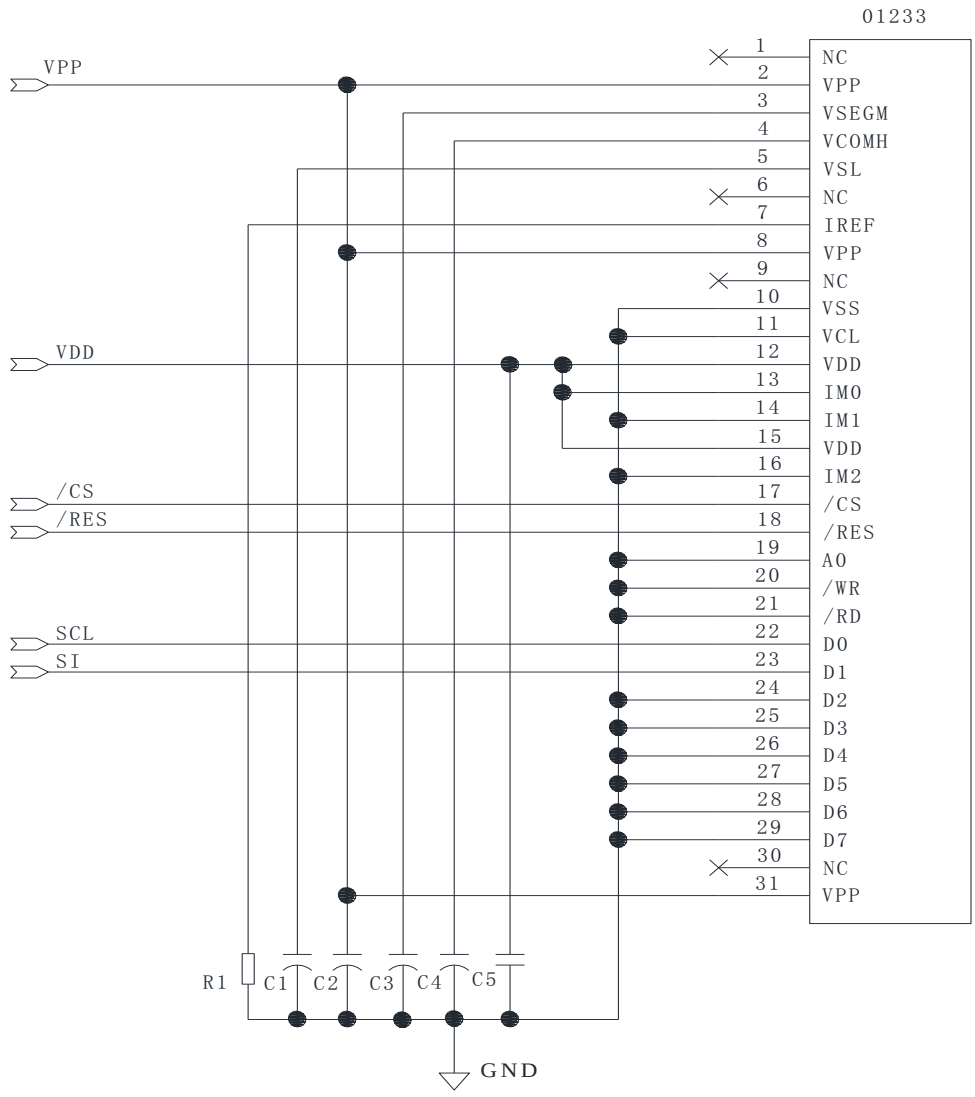
Recommended components

C5: 0.1uF-0603-X7R±10%.RoHS

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

R1: 0603 1/10W +/-5% 750Kohm.RoHS

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



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

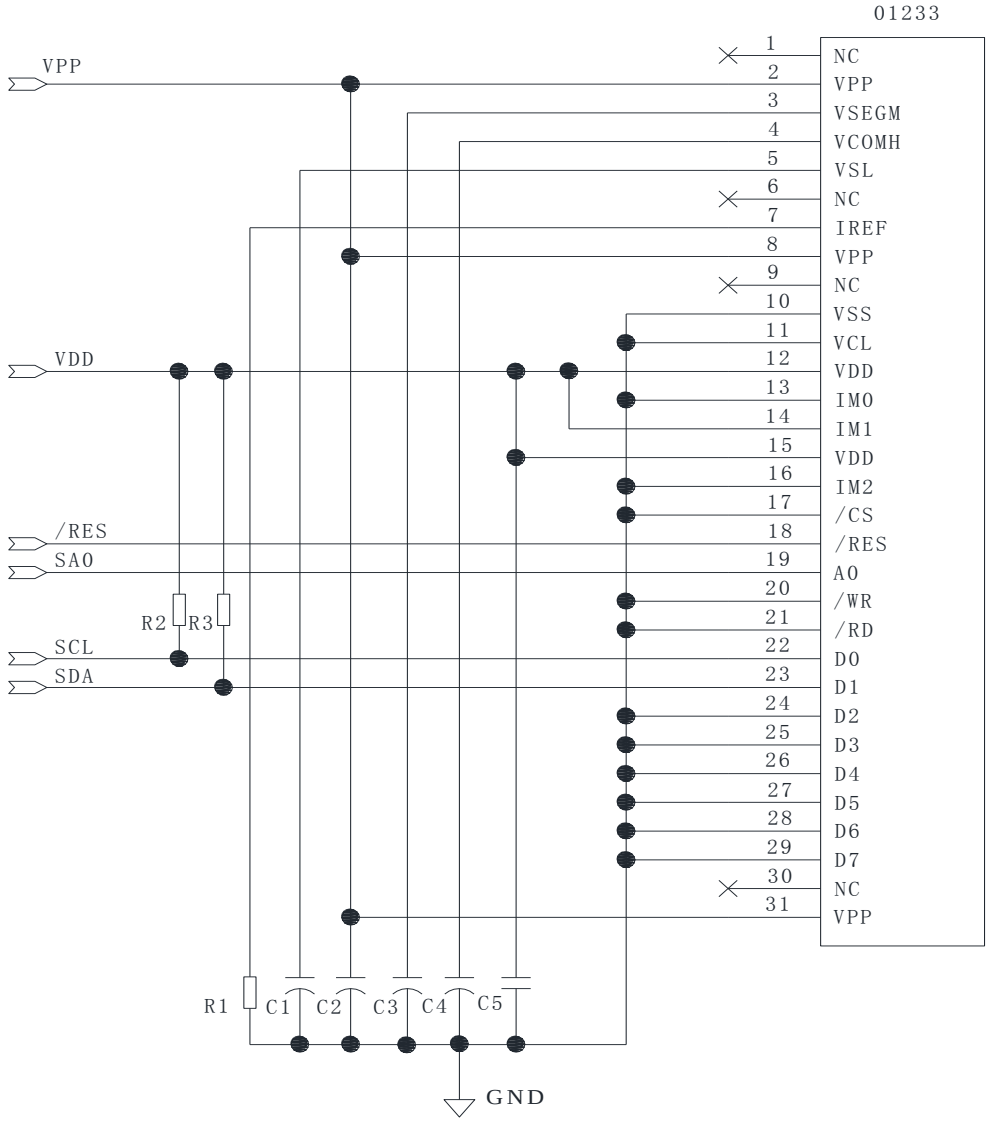
Recommended components

C5: 0.1uF-0603-X7R±10%.RoHS

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

R1: 0603 1/10W +/-5% 750Kohm.RoHS

(5).The configuration for I²C interface mode, external VPP is shown in the following diagram:



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

SA0	I² C Address
0	0x78
1	0x7A

Recommended components

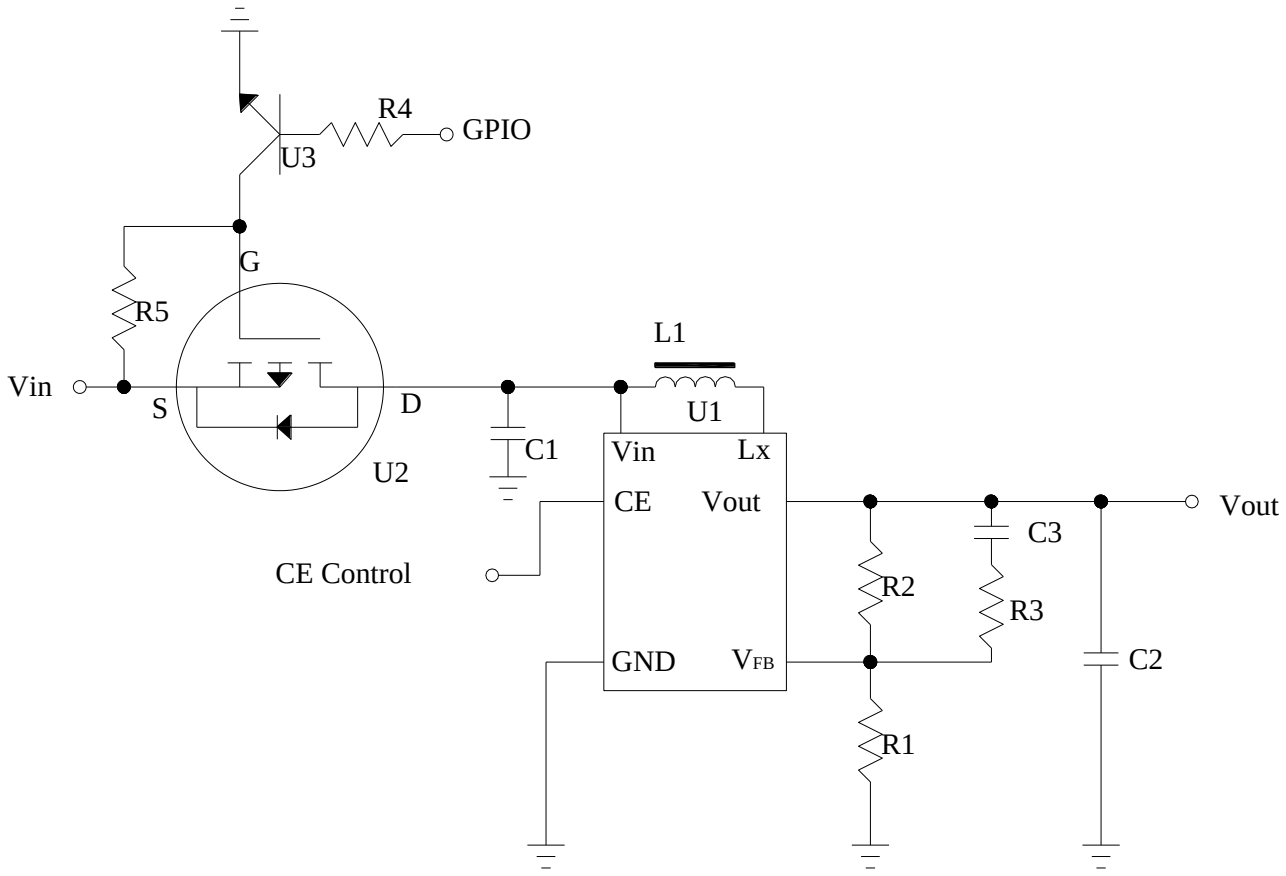
C5: 0.1uF-0603-X7R±10%.RoHS

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

R1: 0603 1/10W +/-5% 750Kohm.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 +/-5% 1.25Mohm.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 SH1108 IC Specification.

9.5. Recommended Software Initialization

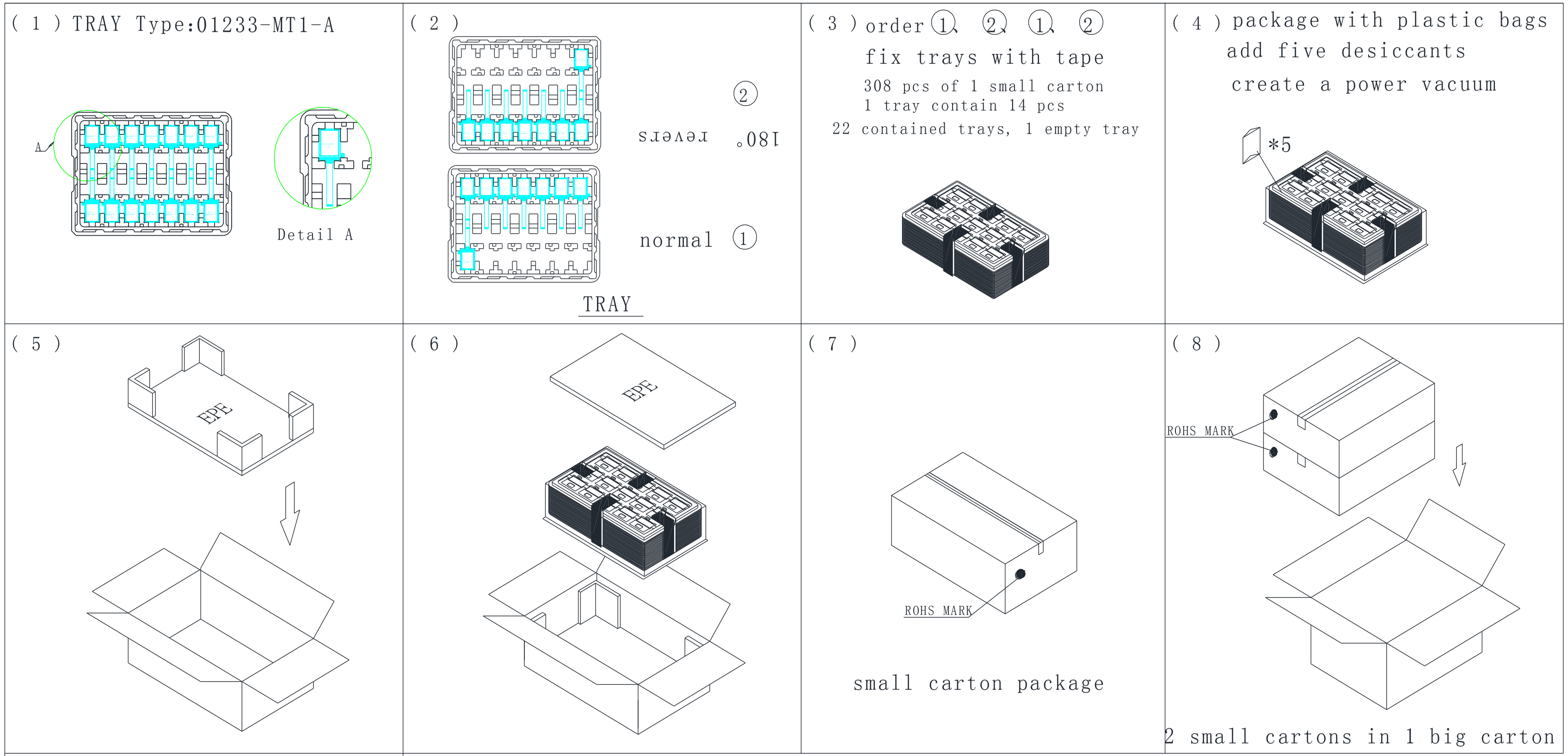
In order to ensure the reliability and stability of the module, the module must initialized use the following code, Malfunctioning of the module may occur and the reliability of the module may deteriorate if the module is used beyond the initialize code.

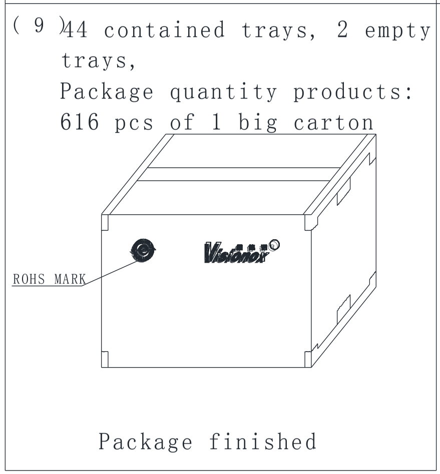
```
void init_program()
  {
   write_c(0xae);          //Display OFF
   write_c(0x20);          // Set Memory addressing mode
   write_c(0x81);          // Set contrast control
   write_c(0xD0);
   write_c(0xa0);          // Segment remap
   write_c(0xa6);          // Normal display
   write_c(0xa9);          //Set Display Resolution
   write_c(0x02);          //160*128
   write_c(0xad);          // Set external VPP
   write_c(0x80);
   write_c(0xc0);          // Set Common scan direction
   write_c(0xd5);          // Divide Ratio/Oscillator Frequency Mode Set
   write_c(0xf1);          //100Hz
   write_c(0xd9);          // Set Dis-charge/Pre-charge Period
   write_c(0x13);
   write_c(0xdb);          // Set Vcomh voltage
   write_c(0x2b);          // 0.687*VPP
   write_c(0xdc);          //Set VSEGM Deselect Level
   write_c(0x35);
   write_c(0x30);          //Set Discharge VSL Level,0V
   Clear_screen();
   write_c(0xaf);          //Display ON
  }
```

10. Package Specification

Controlled Seal

Packing Process(1)~(9)





NOTE:1、The inner carton and master carton must be sealed with adhesive tape.

2、Fill up the gap with EPE.

3、If the customer has special needs with the RoHS making, the inner carton and master carton need adhesive new RoHS marking at ◎.

11. Reliability

11.1 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	ESD Air discharge	+/-8kV,Test 9 points;Each point discharge 10 times.Time interval is less than 1 second	4
8	Vibration	Frequency: 5~50Hz,0.5G Scan rate: 1 oct/min Time: 2 hrs/axis Test axis: X,Y, Z	1 Carton
9	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.

11.2 Lifetime

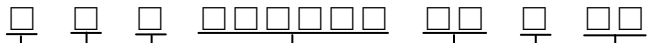
End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	10,000	-	hrs	280 cd/m^2, 50% alternating checkerboard, 22±3℃, 55±15% RH

11.3 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℃; 55±15% RH.

12 Illustration of OLED Product Name



Flow No. :

01~99

Display Color :

R—red

G—green

B—blue

Y—yellow

W—white

A—area color

F—full color

M—amber

Panel Flow No. :

A0~A9, B0~B9…Z0~Z9

Display Format :

Graphic—columns and rows

Character—characters and line number

Segment—segment number

Icon—pixel number

Product Type :

P—panel

M—module

Display Type :

G—graphic

C—character

S—segment

I—Icon

M—mixed

Company :

V—Visionox

13 Outgoing Quality Control Specifications

13.1 Sampling Method

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

(2) AQL: Major 0.65; Minor 1.0

13.2 Inspection Conditions

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

Temperature: 22±3°C

Humidity: 55±15%R.H

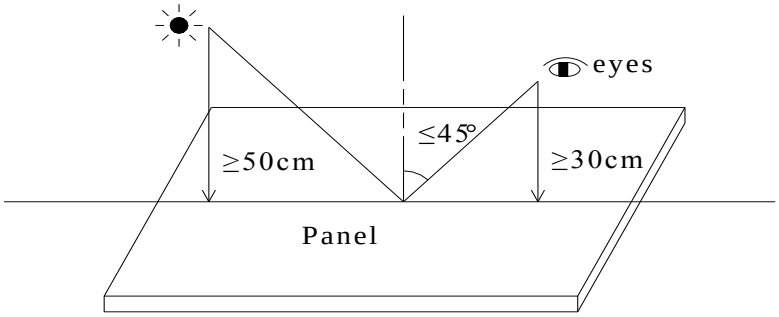
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: ≥50cm

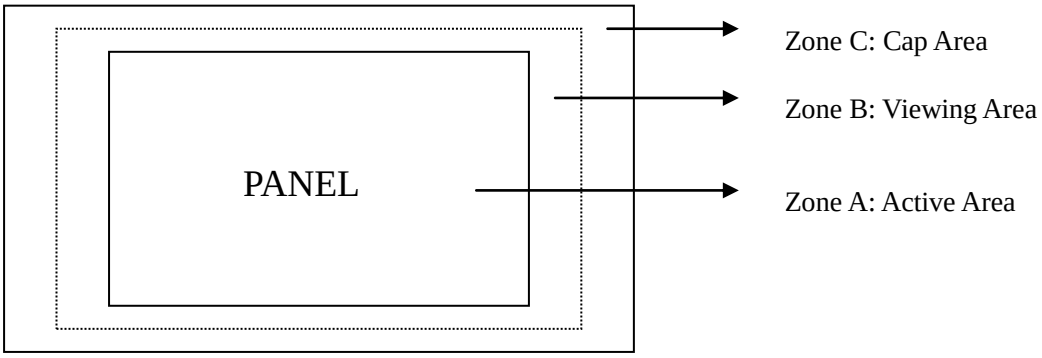
Distance between the Panel & Eyes: ≥30cm

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

(See the sketch below)

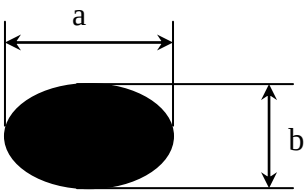


13.3 Quality Assurance Zones

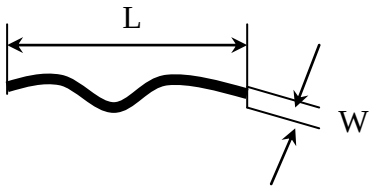


13.4 Inspection Standard

Definition of Φ&L&W (Unit: mm)

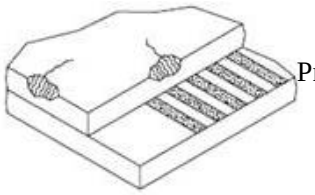
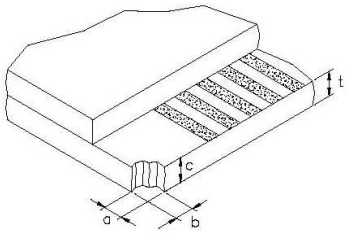
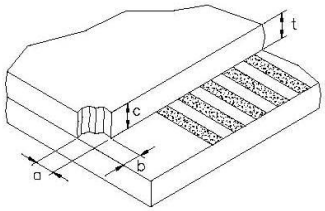
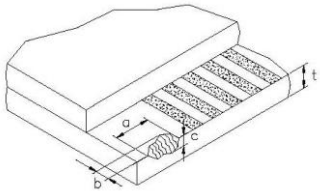
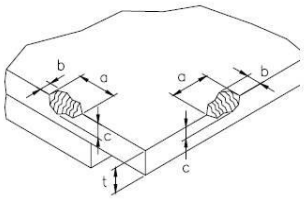
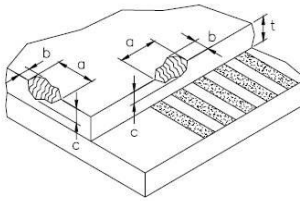


Φ=(a+b)/2



Ⅰ. Appearance Defects

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

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

14.1 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 aromatics. 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.

14.2 Soldering

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

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

(3) Iron:The temperature setting of electric iron is 350℃, but we suggest that during soldering, the tem perature of iron tip should be no higher than 330℃ and soldering be finished within 3~4 seconds

14.3 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.

14.4 Warranty period

Visionox warrants for a period of 12 months from the shipping date when stored or used under normal condition.

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