Product Specification

（Common Application）

Product Name: VGM128080A3W02

Product Code: M02561

Customer
Approved by Customer
Approved Date:

Designed By	Checked By	Approved By	
		R&D	QA
2019.09.09	2019.9.9	2019.9.10 2019.9.10	2019.9.10 2019.9.11

CONTENT

REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
Y01	Initial release.	2019-09-09	

1 Application filed

Common Application

2 Overview

VGM128080A3W02 is a monochrome OLED display module with 128×80 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.

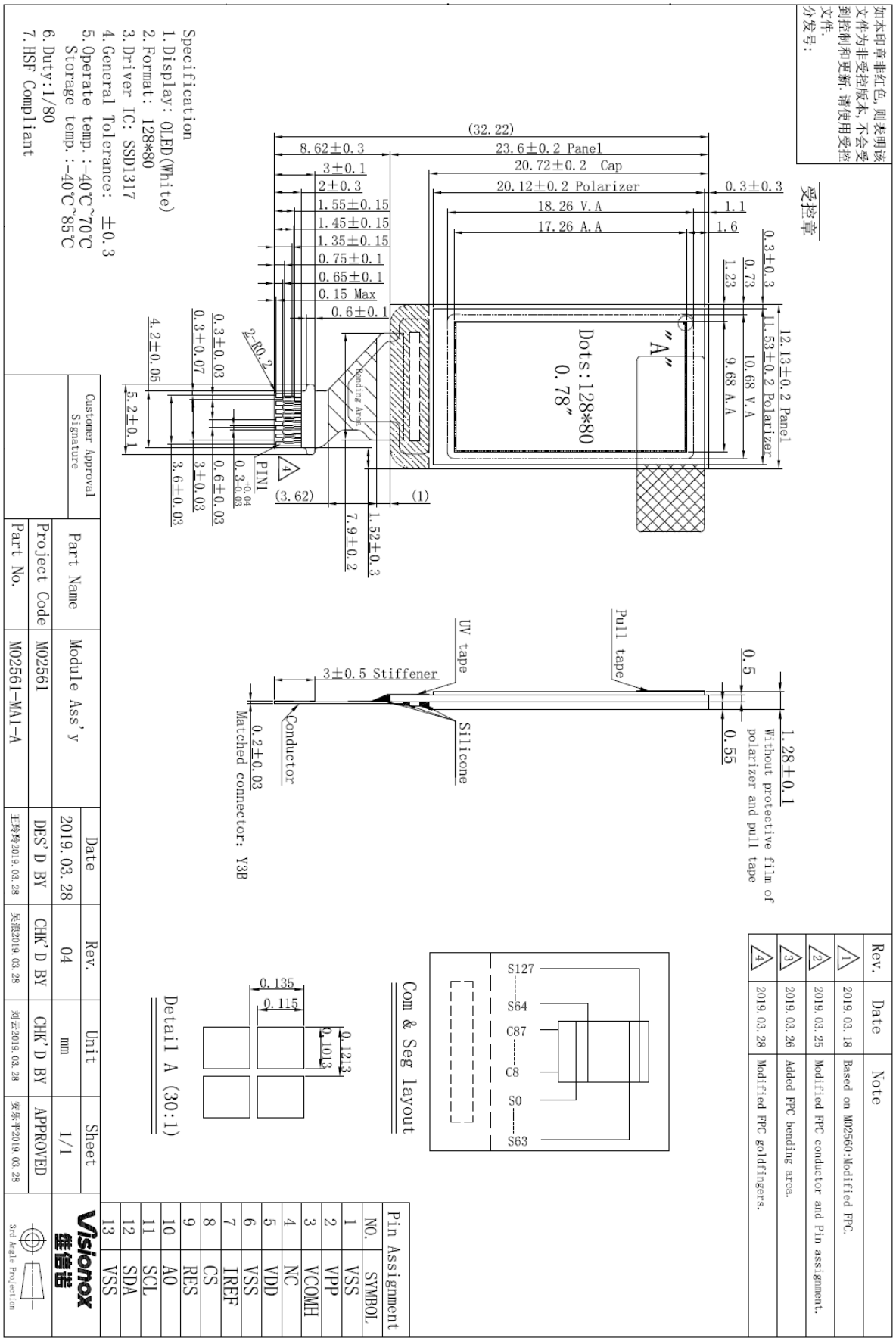
3 Features

- Display Color: White
- Dot Matrix: 128×80
- Driver IC: SSD1317
- Interface: 4-wire SPI
- Wide range of operating temperature: -40℃ to 70℃
- Wide range of Storage temperature: -40℃ to 85℃

4 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	128(W)×80(H)	-
2	Dot Size	0.115(W)×0.1013(H)	mm^2
3	Dot Pitch	0.135(W)×0.1213(H)	mm^2
4	Aperture Rate	71	%
5	Active Area	17.26(W)×9.68(H)	mm^2
6	Panel Size	23.6(W)×12.13(H) ×1.05(T)	mm^3
7	Module Size	32.22(W)×12.13(H) ×1.28(T)	mm^3
8	Diagonal A/A Size	0.78	inch
9	Module Weight	TBD±10%	gram

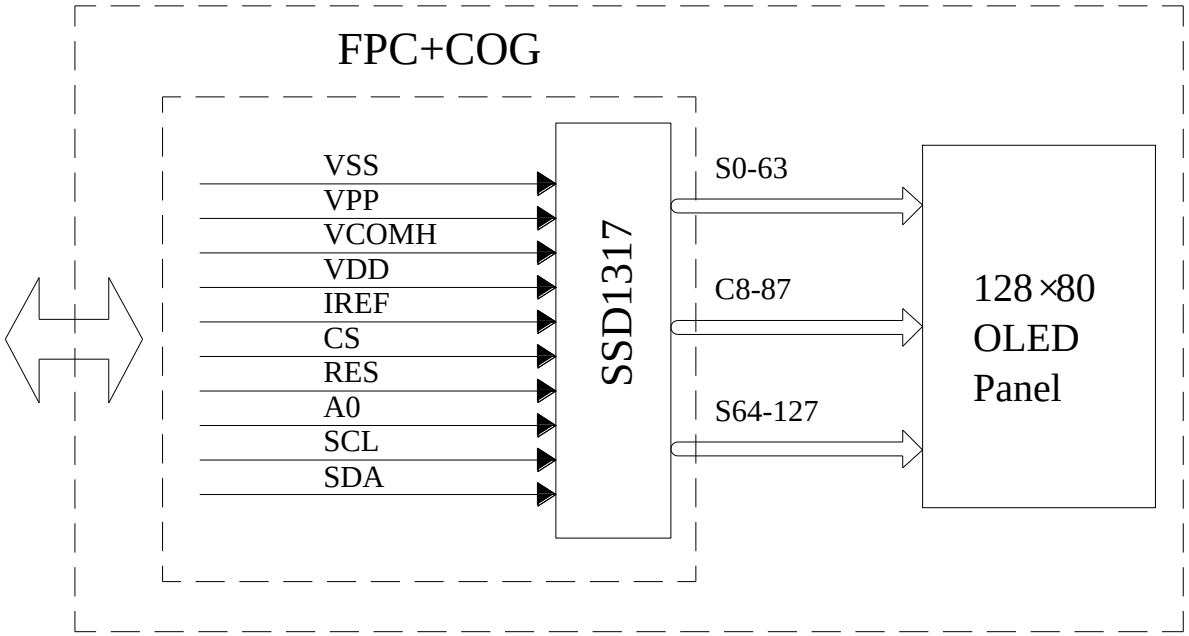
5 Mechanical Drawing



6 Module Interface

PIN NO.	PIN NAME	DESCRIPTION
1,6,13	VSS	Ground pin. It must be connected to external ground.
2	VPP	Power supply for panel driving voltage. This is also the most positive power voltage supply pin.
3	VCOMH	COM signal deselected voltage level. A capacitor should be connected between this pin and VSS.
4	NC	No connection
5	VDD	Power supply pin for core logic operation.
7	IREF	This pin is the segment output current reference pin. IREF is supplied externally. A resistor should be connected between this pin and VSS to maintain the current around 18.75uA. When internal IREF is used, this pin should be kept NC.
8	CS	This pin is the chip select input connecting to the MCU. The chip is enabled for MCU communication only when CS# is pulled LOW (active LOW).
9	RES	This pin is reset signal input. When the pin is pulled LOW, initialization of the chip is executed. Keep this pin pull HIGH during normal operation.
10	A0	This pin is Data/Command control pin connecting to the MCU. When the pin is pulled HIGH, the data at SCL,SDA will be interpreted as data. When the pin is pulled LOW, the data at SCL,SDA will be transferred to a command register.
11	SCL	The serial clock input
12	SDA	The serial data input

7 Function Block Diagram



8 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
Logic supply voltage	VDD	-0.3	+4.0	V	IC maximum rating
OLED Operating voltage	VPP	-0	+17.0	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 9 "Electrical Characteristics". Malfunctioning of the module may occur and the reliability of the module may deteriorate if the module is used beyond the conditions.

9 Electrical Characteristics

9.1 DC Electrical Characteristics

ITEM	SYMBOL	TEST CONDITION	MIN	TYPE	MAX	UNIT
Logic Supply Voltage	VDD	22±3°C, 55±15%R.H	1.65	3.0	3.3	V
OLED Driver Supply Voltage (Supply Externally)	VPP	22±3°C, 55±15%R.H	9.5	10.0	10.5	V
High-level Input Voltage	V_{IHC}	-	0.8×VDD	-	-	V
Low-level Input Voltage	V_{ILC}	-	-	-	0.2×VDD	V
High-level Output Voltage	V_{OHC}	IOUT = 100uA, 3.3MHz	0.9×VDD	-	-	V
Low-level Output Voltage	V_{OLC}	IOUT = 100uA, 3.3MHz	-	-	0.1×VDD	V

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

9.2 Electro-optical Characteristics

ITEM	SYMBOL	TEST CONDITION	MIN	TYPE	MAX	UNIT
Normal Mode Brightness (With Polarizer)	L_{br}	All pixels ON (1) (VPP supply by External)	350	430	-	cd/m^2
Normal Mode Power Consumption	Pt	All pixels ON(1)	-	310	405	mW
ICC,Sleep mode Current	ICC,SLEEP	VDD = 1.65V~3.3V, VPP = 7V~16.5V Display OFF, No panel attached	-	-	20	uA
IDD,Sleep mode Current	IDD,SLEEP	VDD = 1.65V~3.3V, VPP = 7V~16.5V Display OFF, No panel attached	-	-	20	uA
C.I.E(White)	(X)	x,y(CIE1931)	0.26	0.30	0.34	-
	(Y)		0.29	0.33	0.37	-
Dark Room Contrast	CR	-	≥2000:1	-	-	-
Response Time	-	-	-	10	-	μs
View Angle	-	-	≥160	-	-	Degree

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

- Driving voltage: 10.0V
- Contrast setting: 0x80
- Frame rate: 107HZ
- Duty setting: 1/80

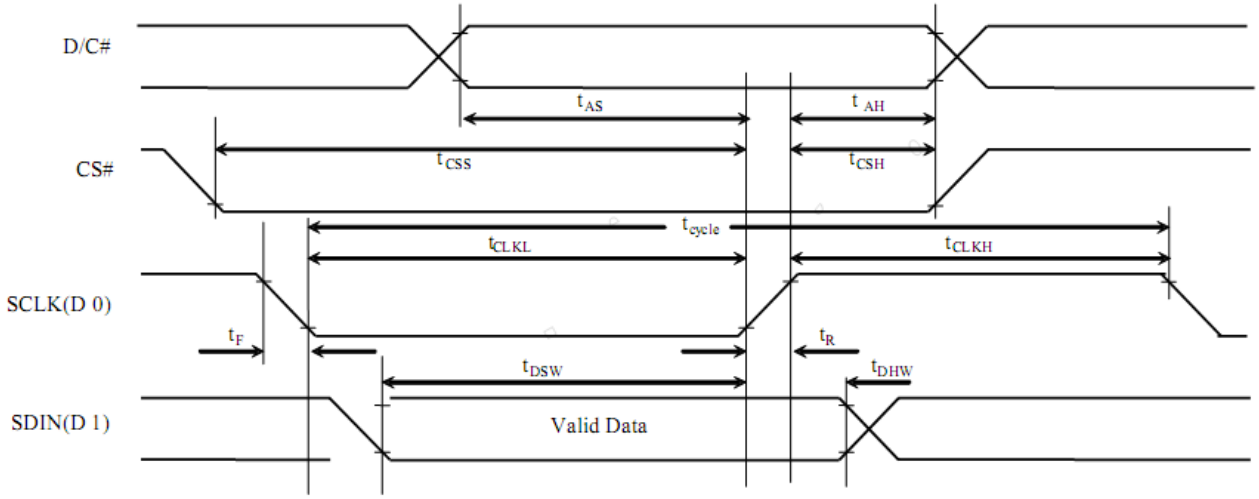
9.3 AC Electrical Characteristics

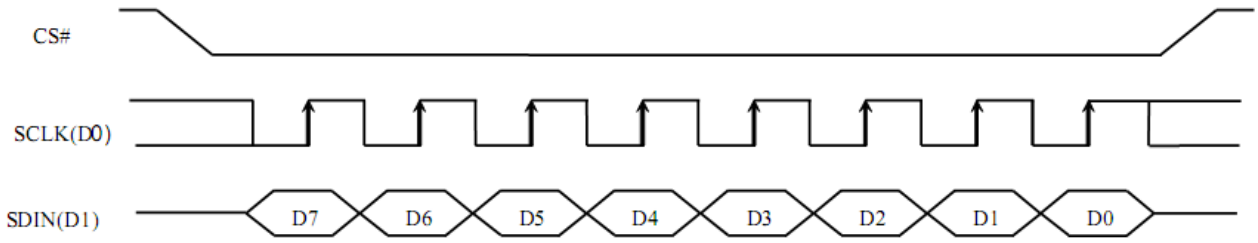
(1) System buses Write characteristics (For 4 wire SPI)

(VDD - VSS = 1.65V to 3.3V, TA = 25℃)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	100	-	-	ns
t_{AS}	Address Setup Time	15	-	-	ns
t_{AH}	Address Hold Time	15	-	-	ns
t_{CSS}	Chip Select Setup Time	20	-	-	ns
t_{CSH}	Chip Select Hold Time	50	-	-	ns
t_{DSW}	Write Data Setup Time	20	-	-	ns
t_{DHW}	Write Data Hold Time	20	-	-	ns
t_{CLKL}	Clock Low Time	50	-	-	ns
t_{CLKH}	Clock High Time	50	-	-	ns
t_R	Rise Time	-	-	40	ns
t_F	Fall Time	-	-	40	ns

4-wire Serial interface characteristics



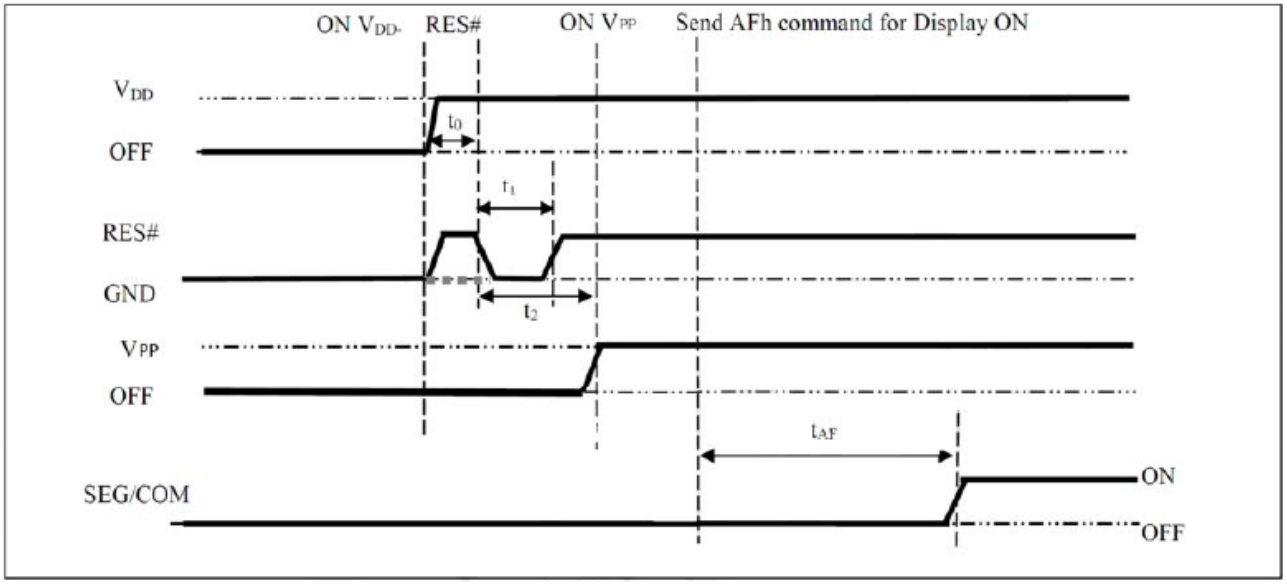


10 Functional Specification and Application Circuit

10.1 Power ON and Power OFF Sequence with External VPP

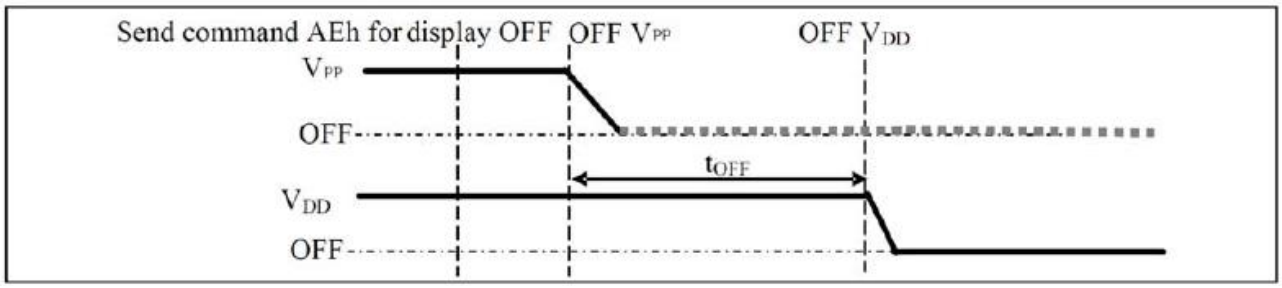
Power ON Sequence:

1. Power ON VDD.
2. After VDD become stable, wait at least 20ms (t0), set RES# pin LOW (logic low) for at least 3us (t1)[4] and then HIGH (logic high).
3. After set RES# pin LOW (logic low), wait for at least 3us (t2). Then Power ON VPP. [1]
4. After VPP become stable, send command AFh for display ON. SEG/COM will be ON after 100ms (tAF).



Power OFF Sequence:

1. Send command AEh for display OFF.
2. Power OFF VPP.[1], [2]
3. Power OFF VDD after t_{OFF}. [4] (where Minimum tOFF=0ms, typical tOFF=100ms)



Note:

[1] VPP should be kept float (i.e. disable) when it is OFF.

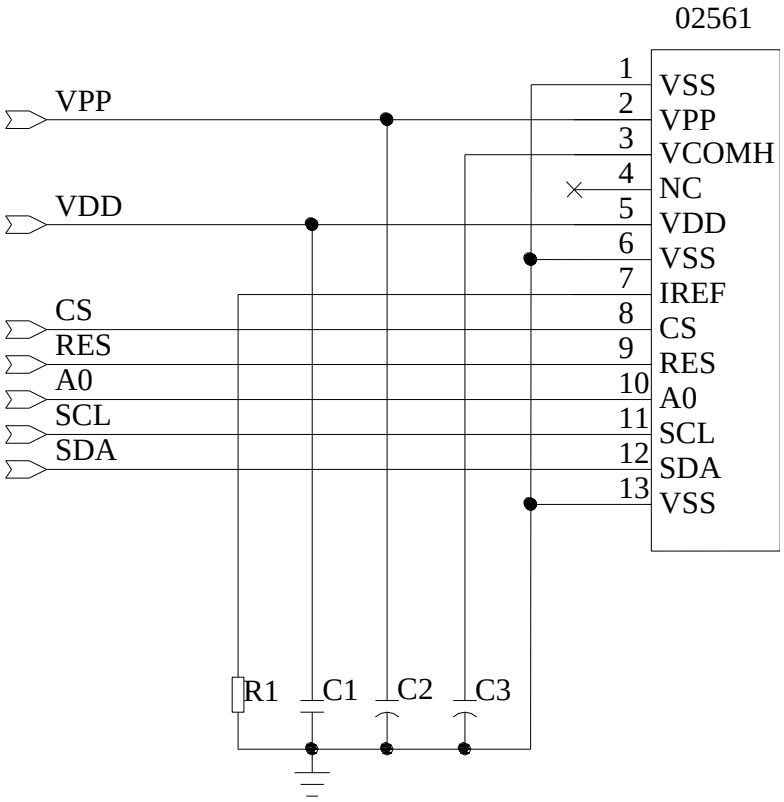
[2] Power Pins (VDD, VPP) can never be pulled to ground under any circumstance.

[3] The register values are reset after t1.

[4] VDD should not be Power OFF before VCC Power OFF.

10.2 Application Circuit

10.2.1 The configuration for 4-wire SPI interface mode ,VPP supply by external is shown in the following diagram:



Pin connected to MCU interface: CS, A0, SCL, SDA

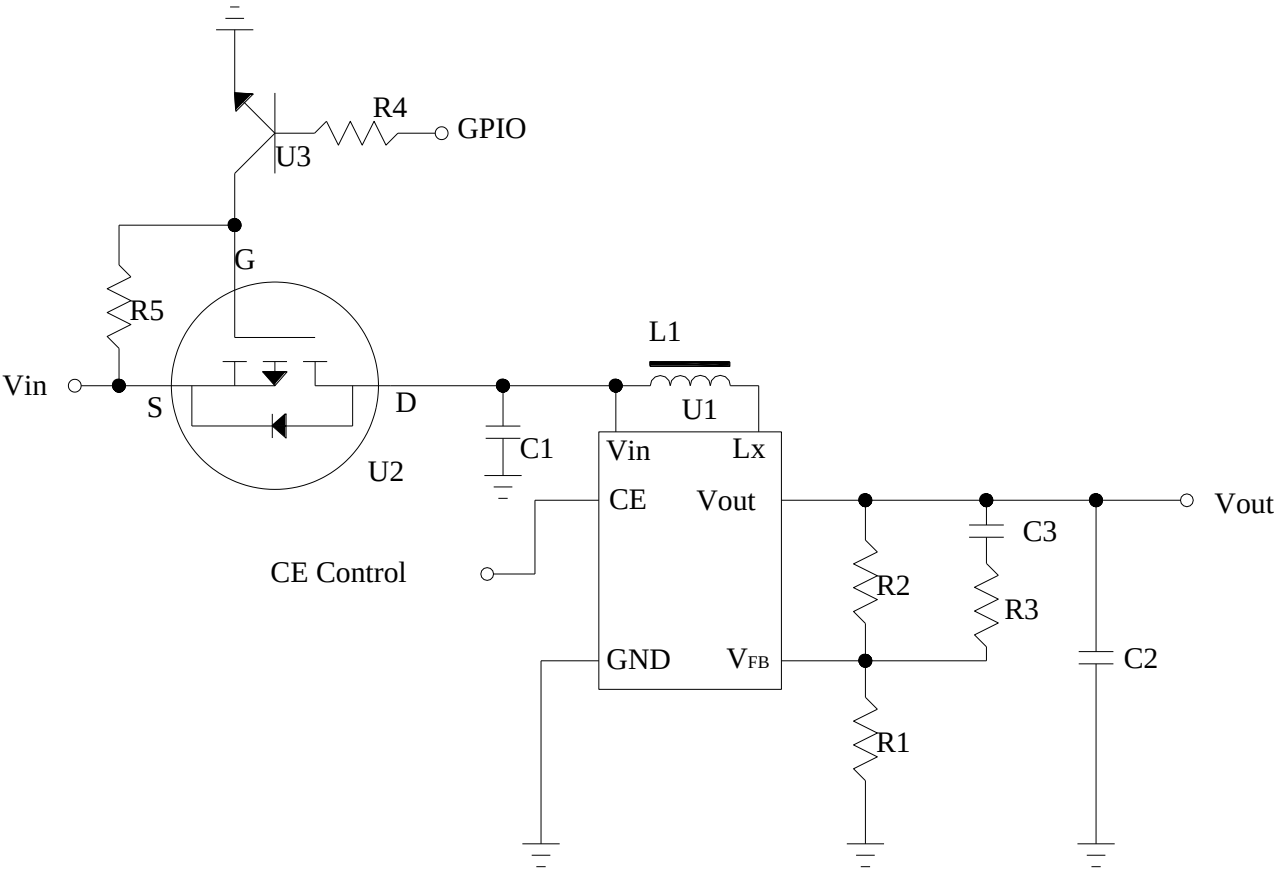
Recommended components

C1: 1uF-0603-X7R ±10%.RoHS

C2,C3 : 2.2μF/25V.RoHS (Tantalum Capacitors)

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

10.3 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% 90Kohm.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

10.4 Display Control Instruction

Refer to SSD1317 IC Specification.

10.5 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_IC()
{
  Write_Command(0xAE);        //Set Display Off
  Write_Command(0xD5);        //Display divide ratio/osc. freq. mode
  Write_Command(0xD1);
  Write_Command(0xA8);        //Multiplex ratio mode
  Write_Command(0x50);
  Write_Command(0xD3);        //Set Display Offset
  Write_Command(0x58);
  Write_Command(0xA2);        //Set Display Start Line
  Write_Command(0x00);
  Write_Command(0xA0);        //Segment Re-map
  Write_Command(0xC1);        //Set COM Output Scan Direction
  Write_Command(0xDA);        //Common pads hardware: alternative
  Write_Command(0x12);
  Write_Command(0x20);        //Set memory addressing mode
  Write_Command(0x02);        //Page addressing mode
  Write_Command(0xAD);        //Set Select external or internal IREF
  Write_Command(0x00);        //External IREF
  Write_Command(0x81);        //Contrast control
  Write_Command(0x80);
  Write_Command(0xD9);        //Set pre-charge period
  Write_Command(0x22);
  Write_Command(0xDB);        //VCOM deselect level mode
  Write_Command(0x30);
  Write_Command(0xA4);        //Set Entire Display On/Off
  Write_Command(0xA6);        //Set Normal Display
  Clear_screen();
  Write_Command(0xAF);      //Set Display On
}
```

11 Package Specification

TBD

12 Reliability

12.1 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 (Non-operation)	±8kV, Test 9 point; Each point discharge 10 times. Time interval is less than 1 second.	4

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.

12.2 Lifetime

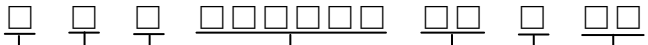
End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	3,500	-	hrs	430 cd/m^2, 50% alternating checkerboard, 22±3 ℃, 55±15% RH

12.3 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.

13 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

Mixed—pixel number

Product Type :

P—panel

M—module

Display Type :

G—graphic

C—character

S—segment

I—Icon

M—mixed

Company :

V—Visionox

14 Outgoing Quality Control Specifications

14.1 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

14.2 Inspection Conditions

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

Temperature: 22±3°C

Humidity: 55±15%R.H

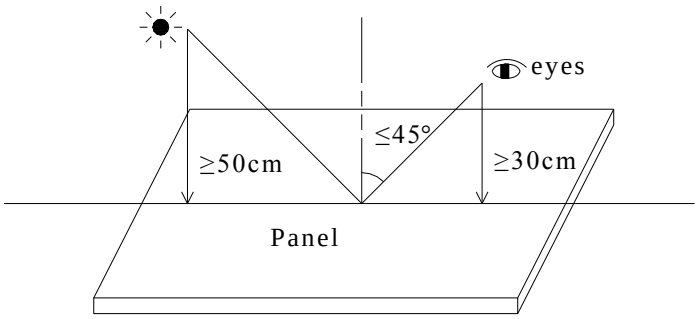
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: ≥50cm

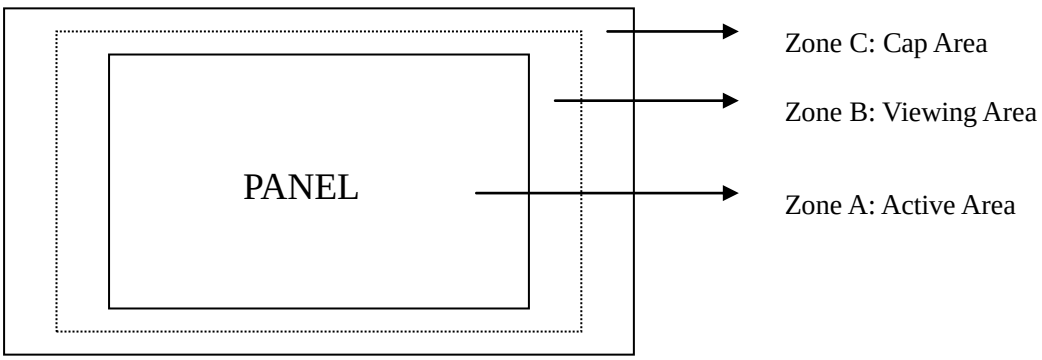
Distance between the Panel & Eyes: ≥30cm

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

(See the sketch below)

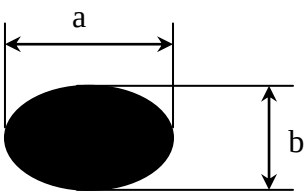


14.3 Quality Assurance Zones

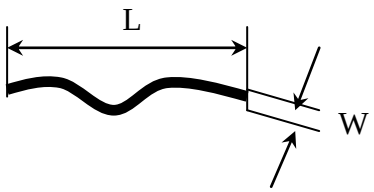


14.4 Inspection Standard

Definition of Φ&L&W (Unit: mm)

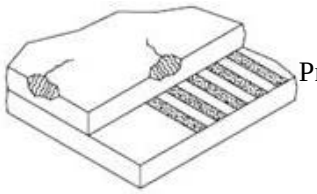
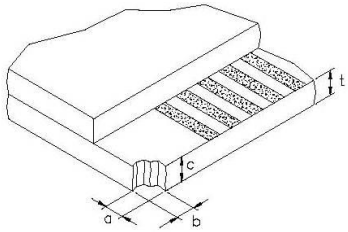
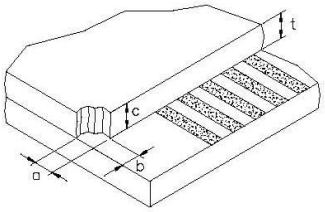
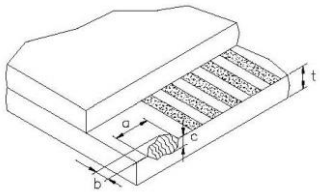
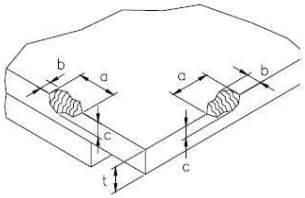
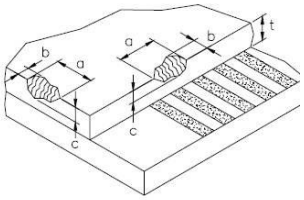


Φ=(a+b)/2



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≤0.05</td><td>---</td><td>Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.05<W≤0.1</td><td>L≤5.0</td><td>3</td></tr>
<tr><td>W>0.1</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≤0.2</td><td>Ignore</td><td rowspan="3">Ignore</td></tr>
<tr><td>0.2<Φ≤0.5</td><td>3</td></tr>
<tr><td>Φ>0.5</td><td>0</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>Minor</td></tr>
<tr><td>5</td><td>Any Dirt on Cap Glass</td><td>Inside the Cap， Ignore the dirt without moving.</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≤2.0mm, 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>Items</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>

15 Precautions for operation and Storage

15.1 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.

15.2 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.

15.3 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 70%. 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.

15.4 Warranty period

Visionox warrants for a period of 12 months from the shipping date when stored or used under normal condition. In addition to the failure and quality problems caused by man-made damage and force majeure, we promise to provide maintenance and replacement free of charge during the warranty period. If the warranty period has been exceeded, we need to collect the staff's travel expenses, materials and other related costs.