

Product Specification

Product Name: VGM096064A5W08

Product Code: M01068

Customer
Approved by Customer
Approved Date:

Designed By	Checked By	Approved By	
		R&D	QA
郭翰 2016.10.18	王明 2016.10.18/16	李立 2016.10.19	马晓静 2016.10.19

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REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
D01	Initial Release	2016-10-18	

1 Overview

VGM096064A5W08 is a monochrome OLED display module with 96×64 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

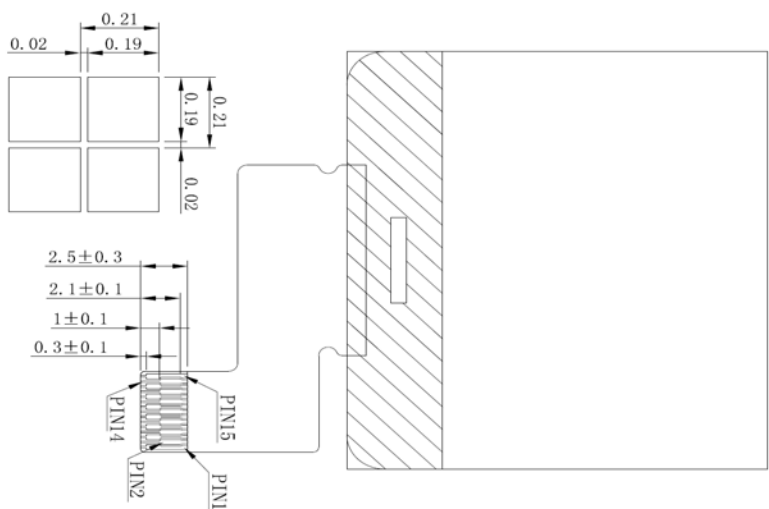
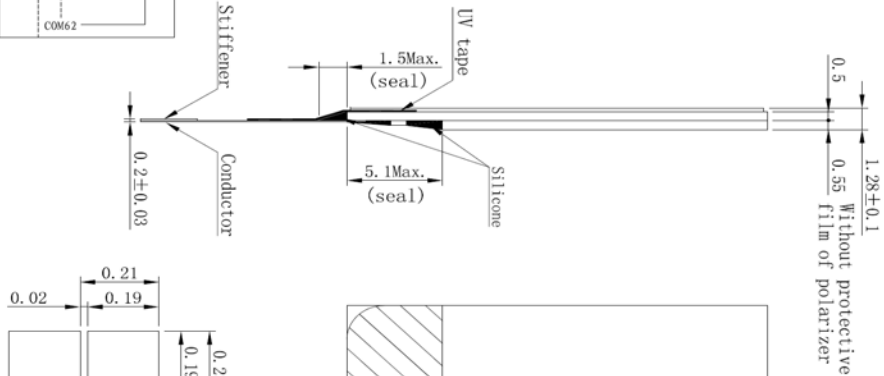
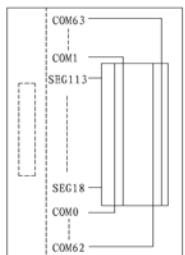
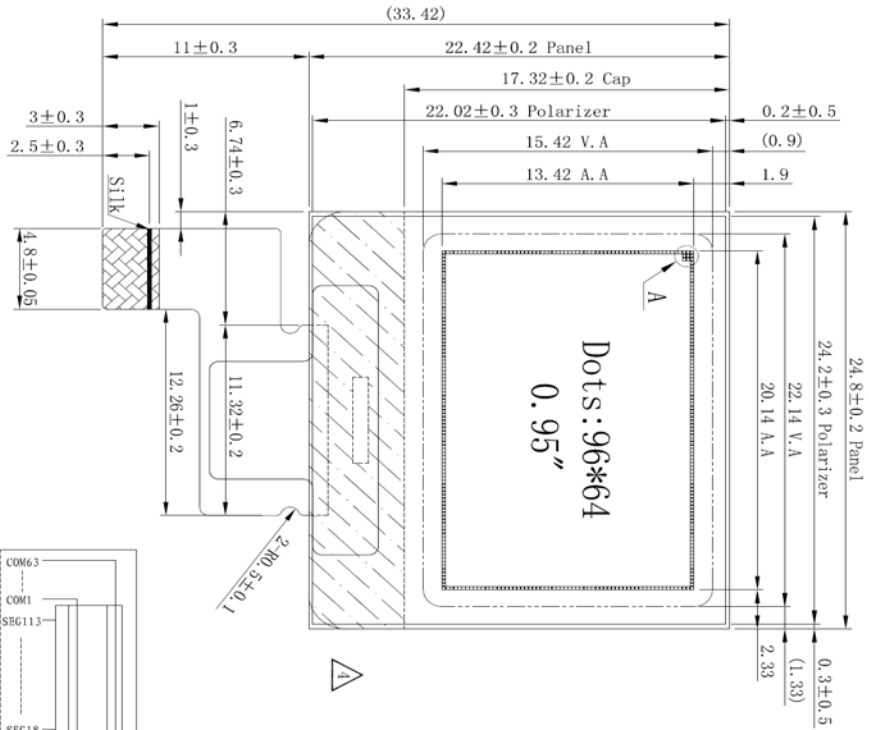
- Display Color: White
- Dot Matrix: 96×64
- Driver IC: SH1106G
- Interface: 4-wire SPI
- Wide range of operating temperature: -20°C to 60°C

3 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	96(W)×64(H)	-
2	Dot Size	0.19(W)×0.19 (H)	mm ²
3	Dot Pitch	0.21(W)×0.21(H)	mm ²
4	Aperture Rate	82	%
5	Active Area	20.14(W)×13.42(H)	mm ²
6	Panel Size	24.8(W)×22.42(H) ×1.05(T)	mm ³
7	Module Size	24.8(W)×33.42(H) ×1.28(T)	mm ³
8	Diagonal A/A Size	0.95	inch
9	Module Weight	1.38±10%	gram

4 Mechanical Drawing

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受控章
分发号:



- Specification
1. Display: OLED (White)
 2. Format: 96*64
 3. Driver IC: SH1106G
 4. General Tolerance: ±0.3
 5. Operate temp: -20°C~60°C
 - Storage temp: -30°C~70°C
 6. DUTY: 1/64
 7. RoHS Compliant

Customer Approval	Signature	Part Name	Module Ass'y	Date	Rev.	Unit	Sheet
		Project Code	01068	2014.10.22	04	mm	1/1
		Part No.	01068-MA1-C	DES' D BY	CHK' D BY	CHK' D BY	APPROVED

Rev.	Date	Note
1	2014.03.10	Based on M01060-Modify the PFC
2	2014.06.03	Modify the PFC
3	2014.07.17	Modify the PFC
4	2014.10.22	Remove the handle

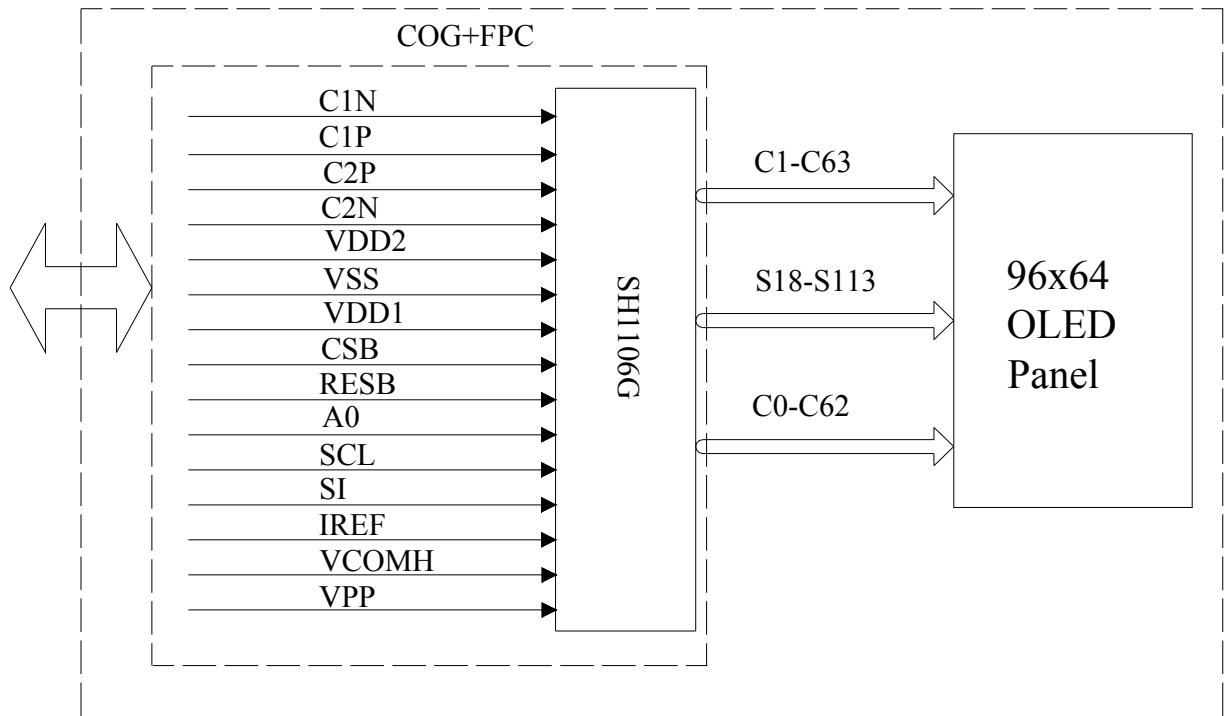


1	Pin Assignment
2	Pin Symbol
3	Pin
4	Pin
5	Pin
6	Pin
7	Pin
8	Pin
9	Pin
10	Pin
11	Pin
12	Pin
13	Pin
14	Pin
15	Pin

5 Module Interface

PIN NO.	PIN NAME	DESCRIPTION
1	C1N	C1P/C1N – Pin for charge pump capacitor; Connect to each other with a capacitor. C2P/C2N – Pin for charge pump capacitor; Connect to each other with a capacitor.
2	C1P	
3	C2P	
4	C2N	
5	VDD2	3.0 – 4.2V power supply pad for Power supply for charge pump circuit. This pin can be disconnected when VPP is supplied externally.
6	VSS	Ground.
7	VDD1	Power supply input: 1.65 - 3.5V
8	CSB	This pad is the chip select input. When CSB = “L”, then the chip select becomes active, and data/command I/O is enabled.
9	RESB	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.
10	A0	This is the Data/Command control pad that determines whether the data bits are data or a command.
11	SCL	This is a serial clock input pad.
12	SI	This is a serial data input pad.
13	IREF	This is a segment current reference pad. A resistor should be connected between this pad and VSS. Set the current at 12.5 μ A.
14	VCOMH	This is a pad for the voltage output high level for common signals. A capacitor should be connected between this pad and VSS.
15	VPP	OLED panel power supply. Generated by internal charge pump. Connect to capacitor. It could be supplied externally.

6 Function Block Diagram



7 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
DC Supply Voltage	VDD1	-0.3	3.6	V	IC maximum rating
	VDD2	-0.3	4.8	V	IC maximum rating
OLED Operating voltage	VPP	-0.3	14.5	V	IC maximum rating
Operating Temp.	Top	-20	60	°C	-
Storage Temp	Tstg	-30	70	°C	-

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 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
Logic Supply Voltage	VDD1	22±3°C, 55±15%R.H	1.65	3.0	3.5	V
DC-DC Supply Voltage	VDD2	22±3°C, 55±15%R.H	3.0	3.7	4.2	V
OLED Driver Supply Voltage	VPP	22±3°C, 55±15%R.H	8.5	9	-	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) (VPP generated by internal DC/DC) VDD2=3.7V	75	95	-	cd/m ²
Sleep mode current consumption in VDD1 & VDD2	ISP	During sleep, TA=+25°C, VDD1=3V VDD2=3.7V	-	-	20	uA
Sleep mode current consumption in VPP		During sleep, TA=+25°C, VPP=9V	-	-	20	uA
Normal Mode Power Consumption	Pt	All pixels ON(1) (VPP generated by internal DC/DC) VDD2=3.7V	-	133.2	159.84	mW
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 : 3.7V
- DC-DC Control Mode Set: 0x8B, 0x33
- Contrast setting : 0xCC
- Frame rate : 105Hz
- Duty setting : 1/64

8.3 AC Electrical Characteristics

4-Wire SPI Interface Timing Characteristics

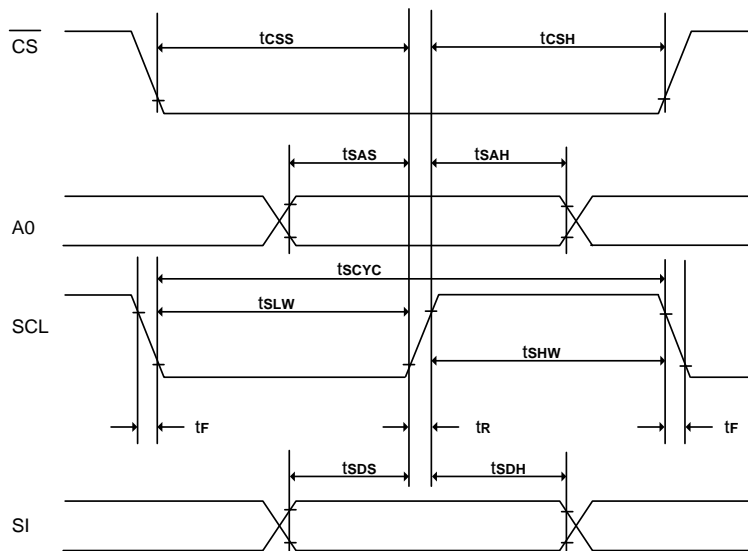
(VDD1 = 1.65V to 3.5V, TA = 25°C)

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	

(VDD1 = 2.4V to 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	100	-	-	ns	
tSLW	Serial clock L pulse	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

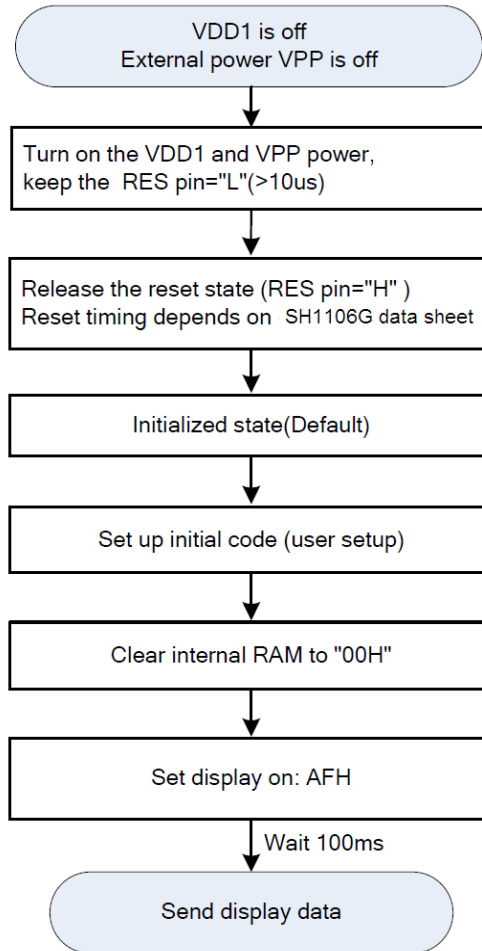
4-wire SPI interface characteristics



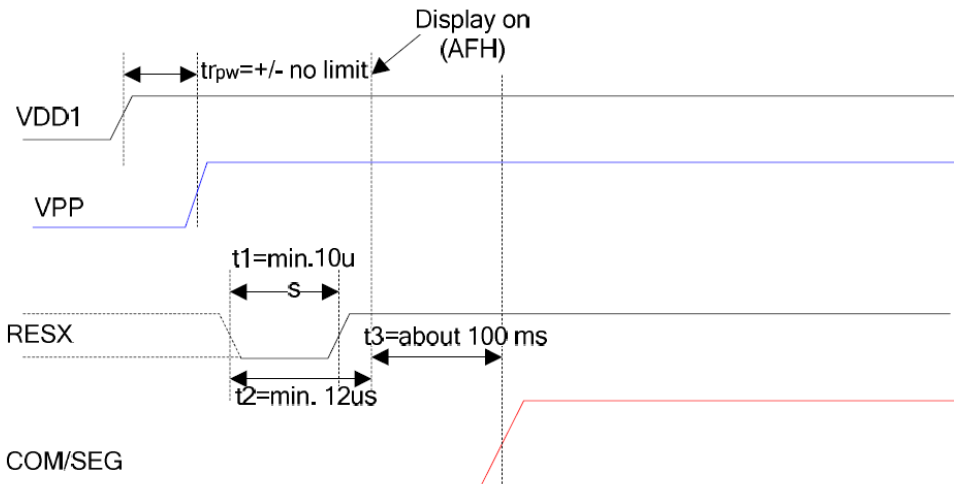
9 Functional Specification and Application Circuit

9.1 Power ON and Power OFF Sequence

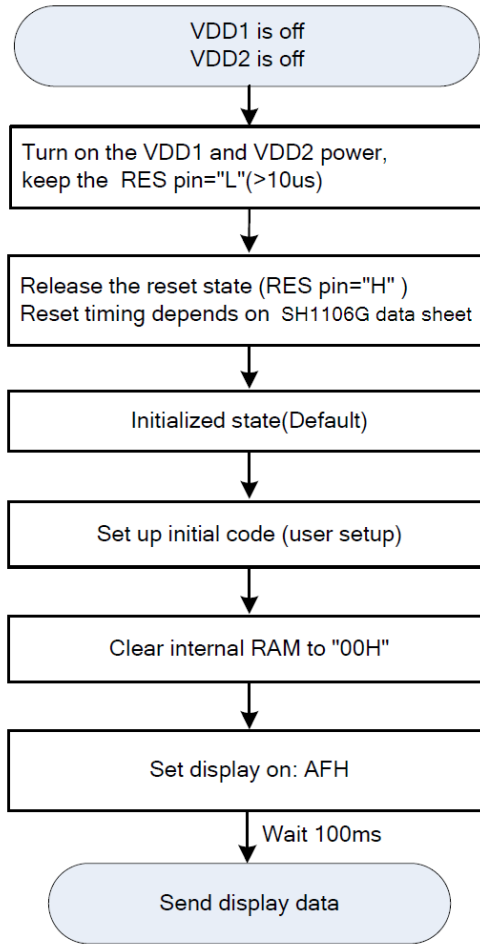
9.1.1 External power is being used immediately after turning on the power:



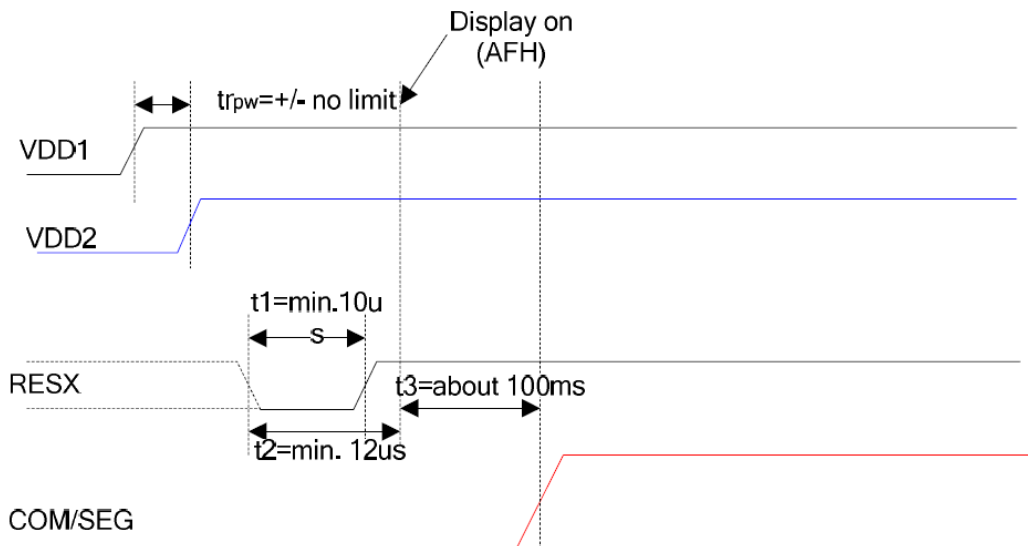
Power ON Sequence:



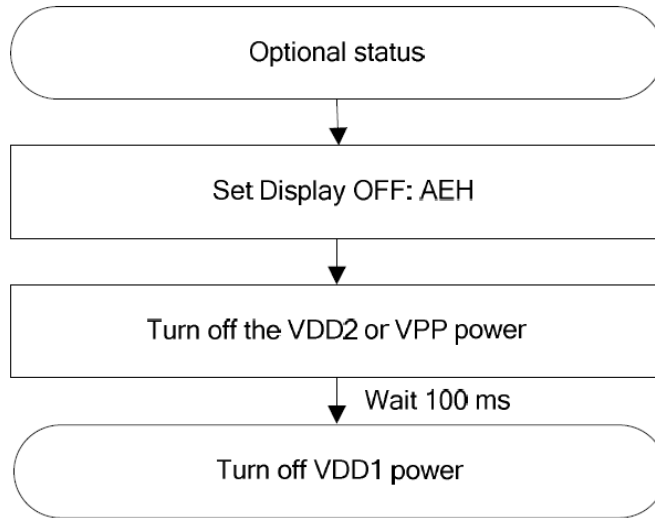
9.1.2 Built-in DC-DC pump power is being used immediately after turning on the power:



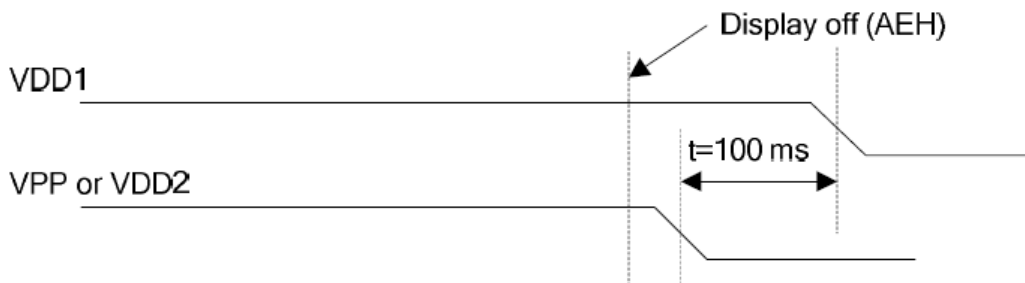
Power ON Sequence:



9.1.3 Power OFF



Power OFF Sequence:



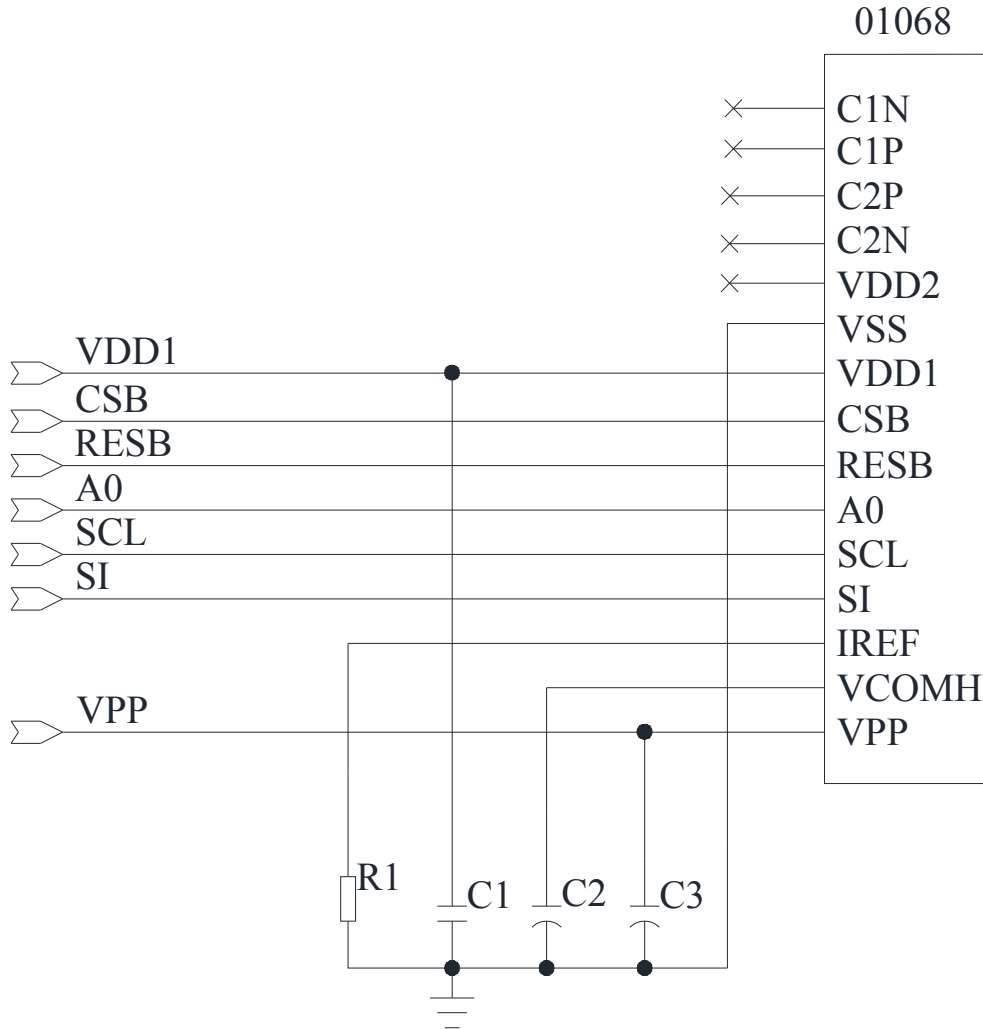
Note : There will be no damages to the display module if the power sequences are not met.

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 8Ah:DC-DC is disable

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



Pin connected to MCU interface: CSB, RESB, A0, SCL,SI

Recommended components

C2, C3: 4.7 μ F/25V.RoHS (Tantalum Capacitors)

C1: 0.1 μ F-0603-X7R \pm 10%.RoHS

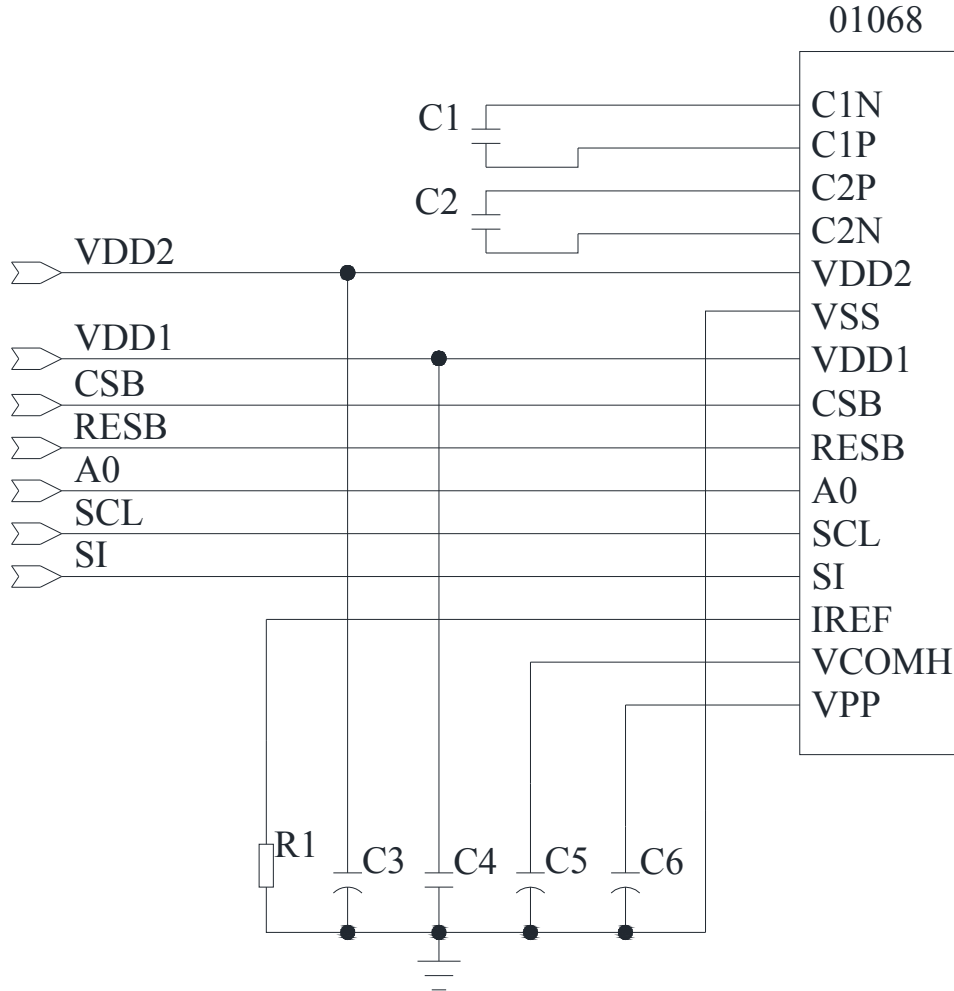
R1: 0603 1/10W \pm 5% 910Kohm.RoHS

9.2.2 Under Internal DC/DC Mode, the charge Pump Setting (ADh) must be set as follow:

ADh: DC-DC Control Mode Set

8Bh: DC-DC is will be turned on when display on

(2) The configuration for 4-Wire SPI Generated by Internal DC/DC Circuit is shown in the following diagram:



Pin connected to MCU interface: CSB, RESB, A0, SCL, SI

Recommended components

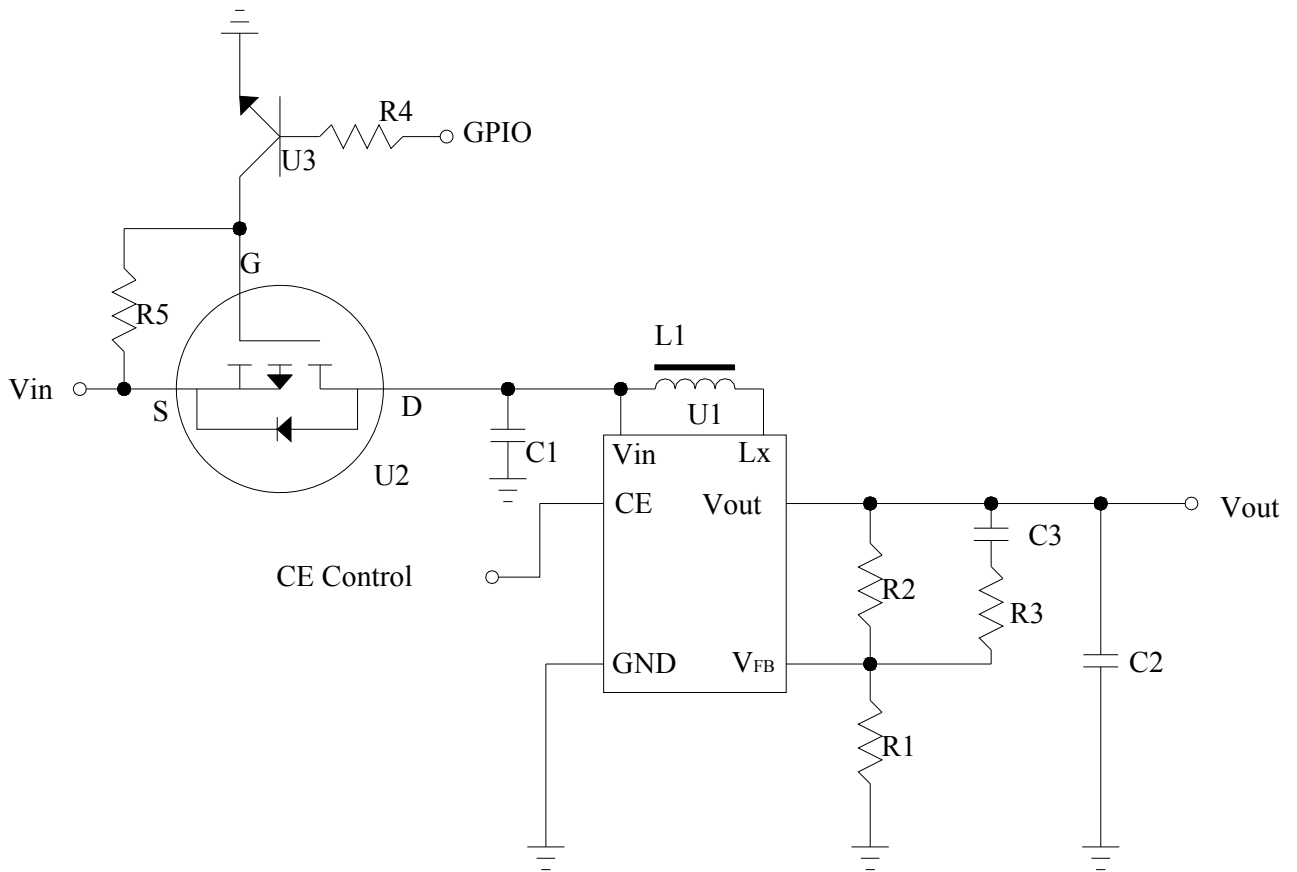
C3, C5, C6: 4.7μF/25V. RoHS (Tantalum Capacitors)

C4: 1uF-0603-X7R±10%. RoHS

C1, C2: 1μF/25V. RoHS (Tantalum Capacitors)

R1: 0603 1/10W +/-5% 910Kohm. 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% 80Kohm.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

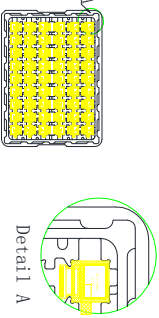
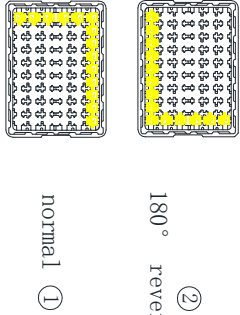


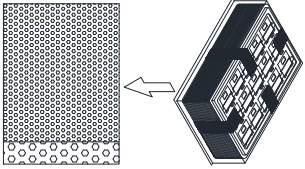
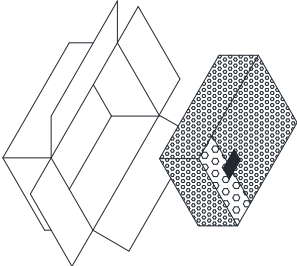
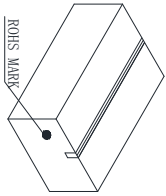
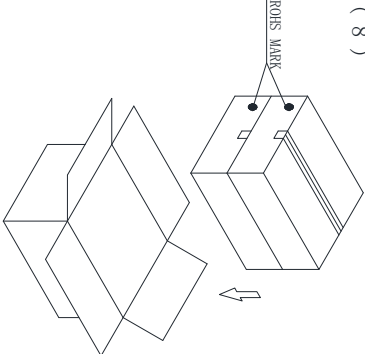
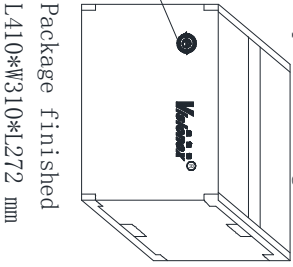

Refer to SH1106G IC Specification.

9.5 Recommended Software Initialization

In order to ensure the reliability and stability of the module, the module must initialize 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);        //Set Display Off
    write_c(0xD5);        //Display divide ratio/osc. freq. mode
    write_c(0x80);
    write_c(0xA8);        //Multiplex ration mode:63
    write_c(0x3F);
    write_c(0xD3);        //Set Display Offset
    write_c(0x00);
    write_c(0x40);        //Set Display Start Line
    write_c(0xAD);        //DC-DC Control Mode Set
    write_c(0x8B);        //DC-DC ON/OFF Mode Set
                        //8A:disable.8B:Built-in DC-DC is used
    write_c(0x33);        //Set Pump voltage value    30:6.4V;01:7.4V;10:8V;11:9V
    write_c(0xA1);        //Segment Remap
    write_c(0xC8);        //Set COM Output Scan Direction
    write_c(0xDA);        //Common pads hardware: alternative
    write_c(0x12);
    write_c(0x81);        //Contrast control
    write_c(0xCC);
    write_c(0xD9);        //Set pre-charge period
    write_c(0x22);
    write_c(0xDB);        //VCOM deselect level mode
    write_c(0x40);
    write_c(0xA4);        //Set Entire Display On/Off
    write_c(0xA6);        //Set Normal Display
    clear_screen();
    write_c(0xAF);        //Set Display On
}
```

10 Package Specification

Controlled Seal		Packing Process (1)~(9)		
<p>(1) Tray Type:01068-MT6-A</p> 	<p>(2)</p>  <p>TRAY</p> <p>normal ①</p> <p>180° revers ②</p>	<p>(3) order ①、②、①、②</p> <p>fix trays with tape</p> <p>1188 pcs of 1 small carton</p> <p>1 tray contain 54 pcs</p> <p>22 contained trays, 1 empty tray</p> 	<p>(4) Use vacuum bag to package the tray and add 5 bags of desiccant into the vacuum bag *5</p> 	
<p>(5) After tray be packaged, wrap the package in a bubble bag and seal with scotch tape.</p> 	<p>(6)</p> 	<p>(7)</p> <p>small carton package</p> <p>L390*W290*L120 mm</p> 	<p>(8)</p>  <p>2 small cartons in 1 big carton</p>	
<p>(9) 1/4 contained trays, 2 empty trays, Package quantity products: 2376 pcs of 1 big carton</p>  <p>Package finished L410*W310*L272 mm</p>	<p>NOTE:1、The inner carton and master carton must be sealed with adhesive tape.</p> <p>2、Fill up the gap with tray.</p> <p>3、If the customer has special needs with the RoHS making, the inner carton and master carton need adhesive new RoHS marking at  .</p>			

11 Reliability

11.1 Reliability Test

NO.	ITEM	CONDITION	QUANTITY
1	High Temperature(Non-operation)	70°C,240hrs	4
2	Low Temperature(Non-operation)	-30°C,240hrs	4
3	HighTemperatur(Operation)	60°C,240hrs	4
4	Low Temperature(Operation)	-20°C,240hrs	4
5	High Temperature / High Humidity(Operation)	60°C,90%RH,240hrs	4
6	Thermal shock (Non-operation)	-30°C ~70°C (-30°C /30min;transit/3min;70°C /30min;transit/3min) 1cycle: 66min,30cycles	4
7	ESD (Non-operation)	Air discharge model :+/- 8kV Test nine dots and each dots should be discharged ten times and the interval time can't be less than one 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

- All measurements shall not be started until the specimens attain to temperature stability, the stable time is at least 15 minutes.
- The degradation of polarizer is ignored for item 5.
- The tolerance of temperature is $\pm 3^{\circ}\text{C}$, and the tolerance of relative humidity is $\pm 5\%$.

Evaluation criteria

- The function test is OK.
- No observable defects.
- Luminance: $\geq 50\%$ of initial value.
- Current consumption: within $\pm 50\%$ of initial value.

11.2 Lifetime

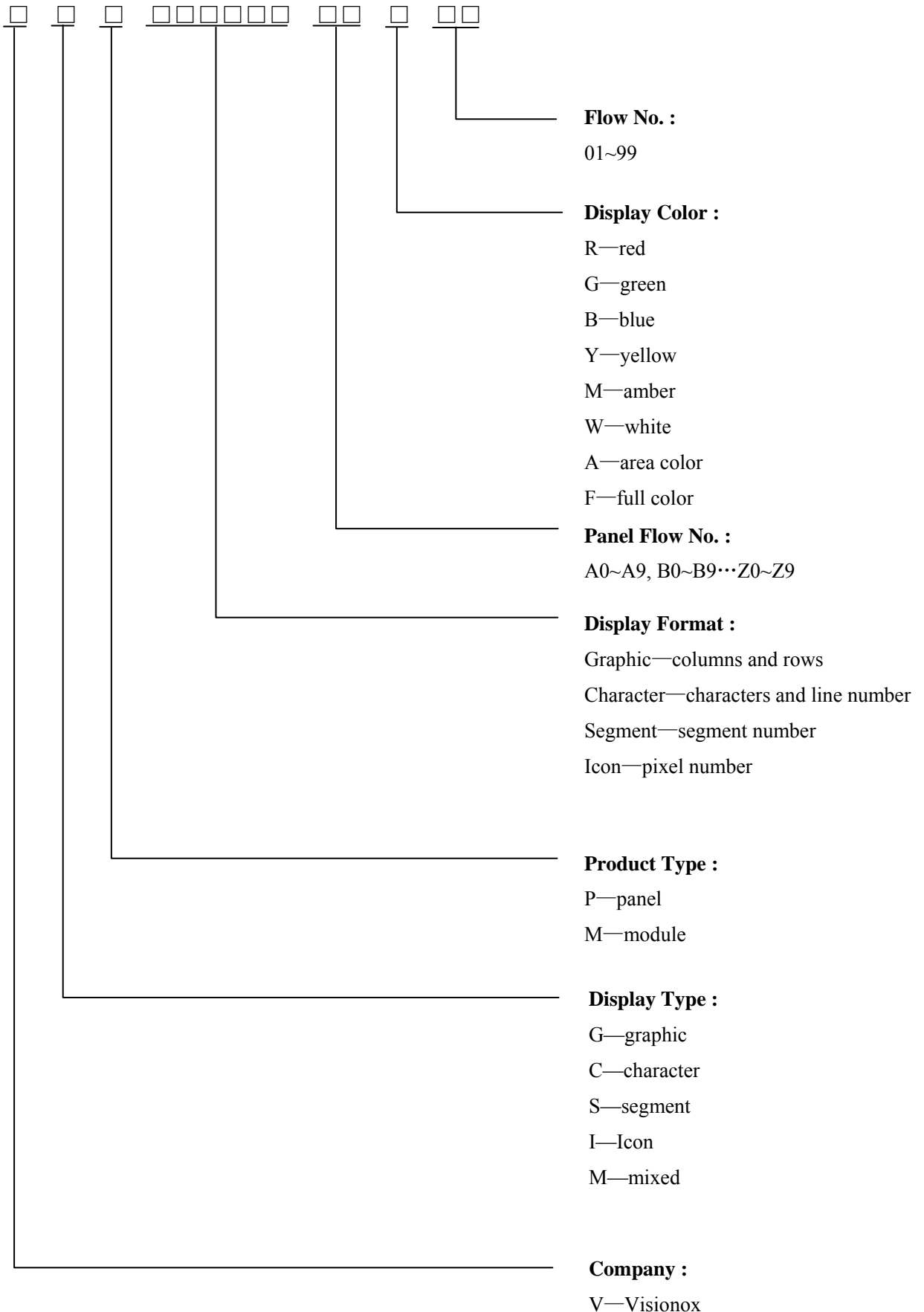
End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	15,000	-	hrs	95 cd/m ² , 50% alternating checkerboard, 22 \pm 3°C, 55 \pm 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 \pm 3°C; 55 \pm 15% RH.

12 Illustration of OLED Product Name



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

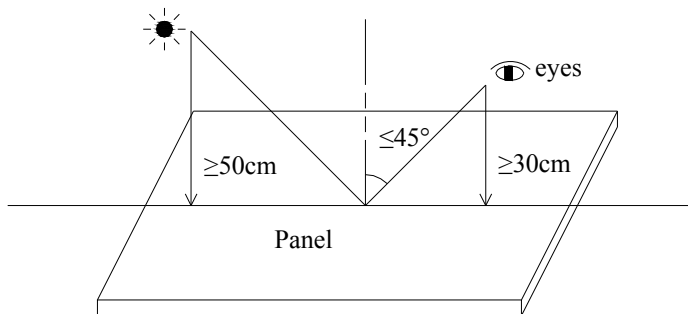
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: ≥50cm

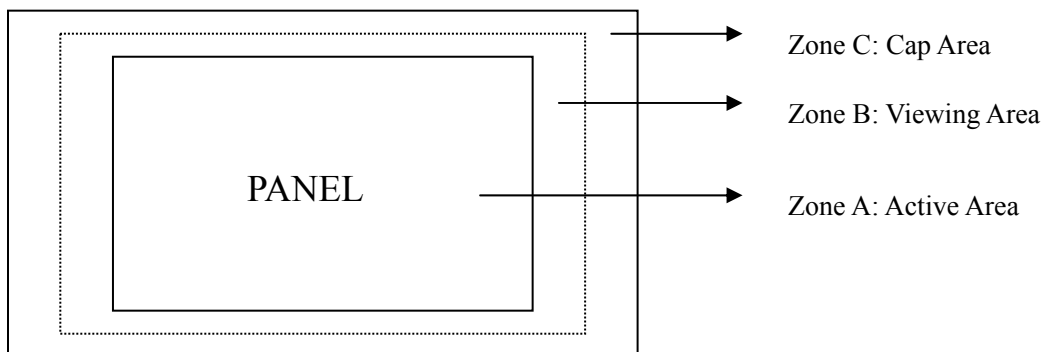
Distance between the Panel & Eyes: ≥30cm

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

(See the sketch below)

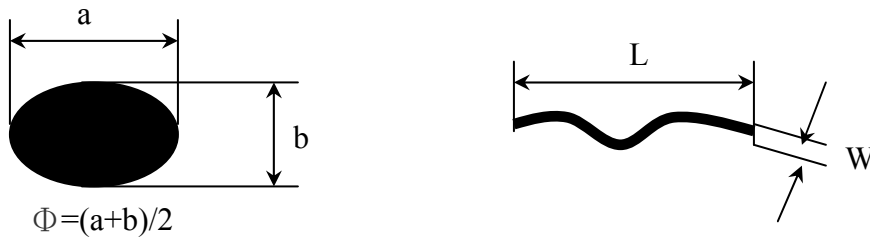


13.3 Quality Assurance Zones



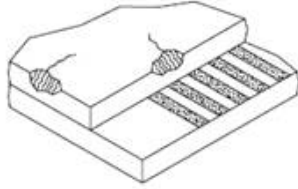
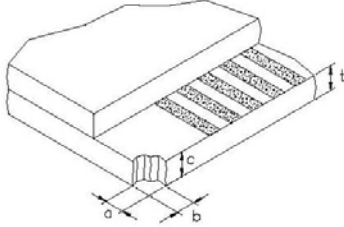
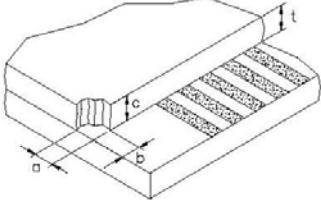
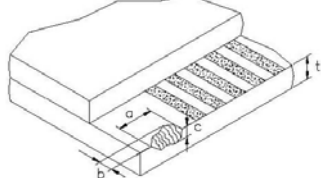
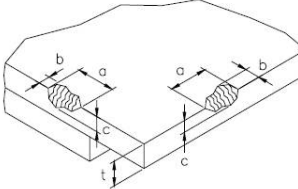
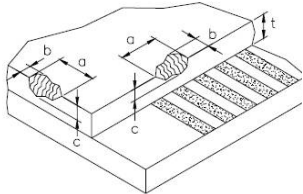
13.4 Inspection Standard

Definition of Φ &L&W (Unit: mm)



I . Appearance Defects

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

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

II. Displaying Defects

NO.	ITEM	CRITERIA		CLASSIFICATION										
1	Black/White spot Dirty spot Foreign matter	Average Diameter (mm)	<table border="1"> <thead> <tr> <th colspan="2" data-bbox="791 316 1210 371">Pieces Permitted</th> </tr> <tr> <th data-bbox="791 371 977 404">Zone A,B</th> <th data-bbox="977 371 1210 404">Zone C</th> </tr> </thead> <tbody> <tr> <td data-bbox="791 404 977 442">$\Phi \leq 0.10$</td> <td data-bbox="977 404 1210 442">Ignore</td> </tr> <tr> <td data-bbox="791 442 977 480">$0.10 < \Phi \leq 0.20$</td> <td data-bbox="977 442 1210 480">3</td> </tr> <tr> <td data-bbox="791 480 977 537">$\Phi > 0.20$</td> <td data-bbox="977 480 1210 537">0</td> </tr> </tbody> </table>	Pieces Permitted		Zone A,B	Zone C	$\Phi \leq 0.10$	Ignore	$0.10 < \Phi \leq 0.20$	3	$\Phi > 0.20$	0	Minor
Pieces Permitted														
Zone A,B	Zone C													
$\Phi \leq 0.10$	Ignore													
$0.10 < \Phi \leq 0.20$	3													
$\Phi > 0.20$	0													
2	No Display	Not allowable.		Major										
3	Irregular Display	Not allowable.		Major										
4	Missing Line (row or column)	Not allowable.		Major										
5	Short	Not allowable.		Major										
6	Flicker	Not allowable.		Major										
7	Abnormal Color	Refer to the SPEC.		Major										
8	Luminance NG	Refer to the SPEC.		Major										
9	Over Current	Refer to the SPEC.		Major										

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°C, but we suggest that during soldering, the temperature of iron tip should be no higher than 330°C 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°C and 35°C 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.

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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