Product Specification

（Common Application）

Product Name: VGM256064A1B01

Product Code: M03280

Customer
Approved by Customer
Approved Date:

Designed By	Checked By	Approved By	
		R&D	QA
李胜坤 12/17/19	2019.12.17	2019.12.17	12/17

CONTENT

REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
Y01	Initial release.	2019-12-17	

1 Application Filed

Common Application

2 Overview

VGM256064A1B01 is a gray-scale 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.

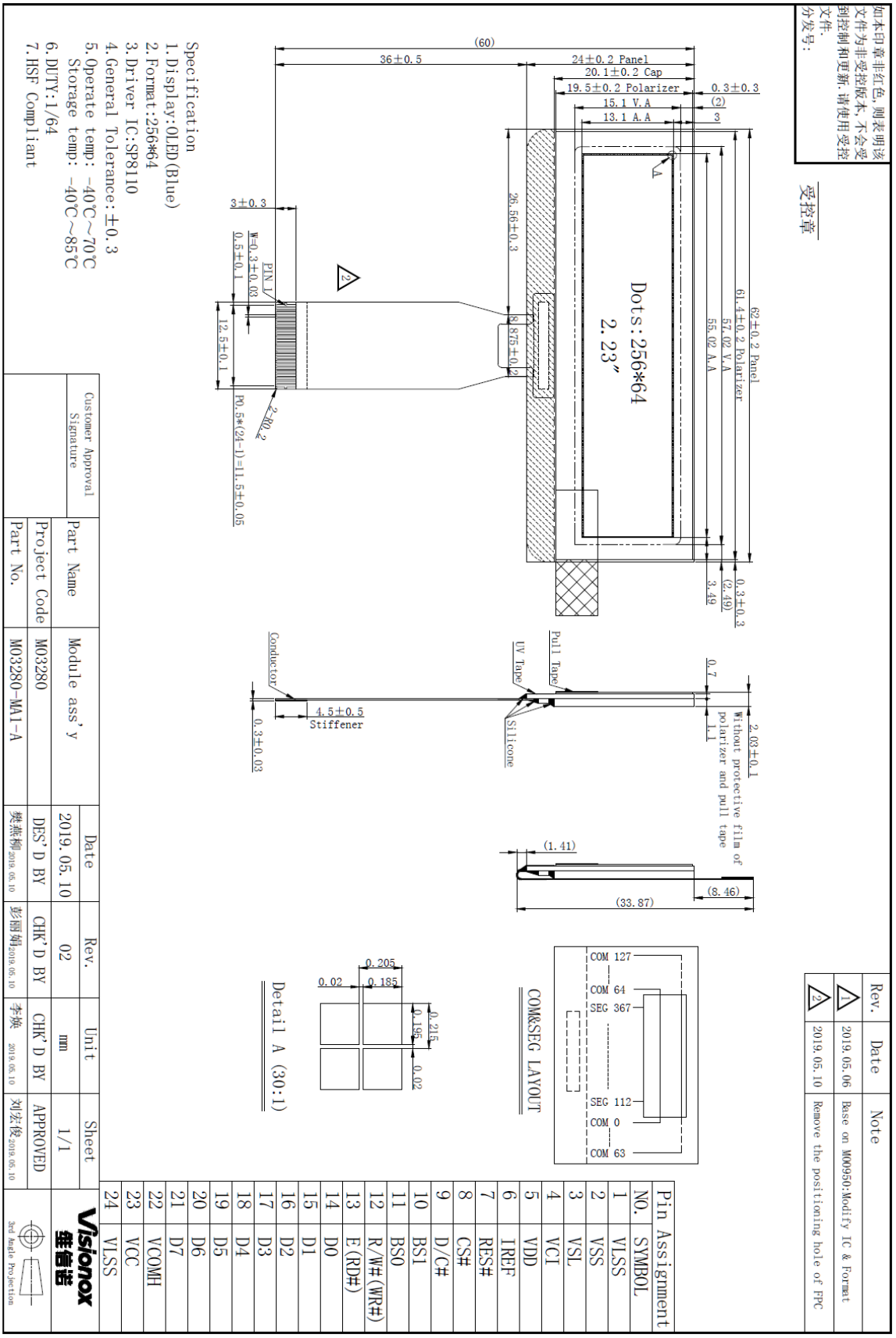
3 Features

- Display Color: Blue
- Dot Matrix: 256×64
- Driver IC: SP8110
- Interface: 4-SPI\3-SPI\8-8080\8-6800
- 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	256(W)×64(H)	-
2	Dot Size	0.195(W)×0.185(H)	mm^2
3	Dot Pitch	0.215(W)×0.205(H)	mm^2
4	Aperture Rate	82	%
5	Active Area	55.02(W)×13.1(H)	mm^2
6	Panel Size	62.0(W)×24.0(H) ×1.8(T)	mm^3
7	Module Size	62.0(W)×60.0(H) ×2.03(T)	mm^3
8	Diagonal A/A Size	2.23	inch
9	Module Weight	TBD±10%	gram

5 Mechanical Drawing

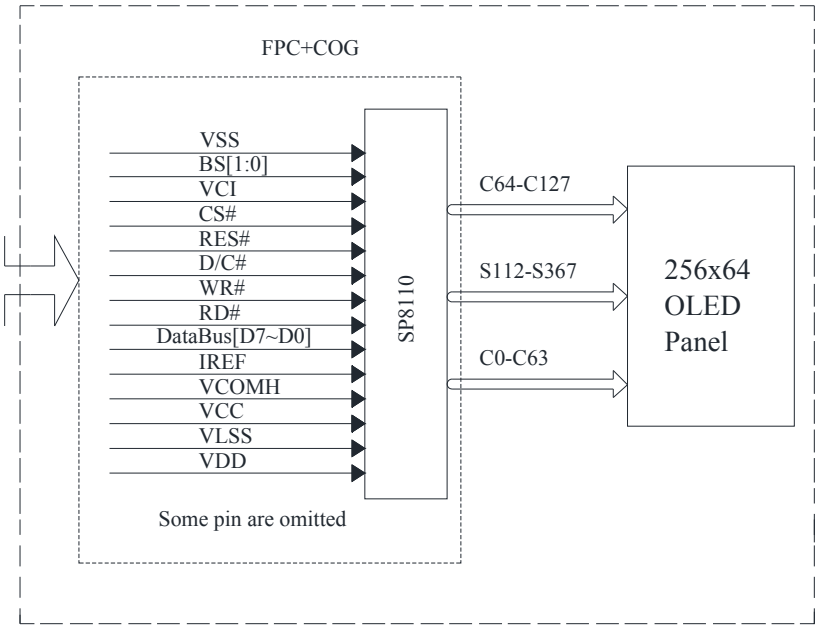


Pin Assignment		
NO.	SYMBOL	
1	VLSS	
2	VSS	
3	VSL	
4	VCI	
5	VDD	
6	IREF	
7	RES#	
8	CS#	
9	D/C#	
10	BS1	
11	BS0	
12	R/W#(WR#)	
13	E(RD#)	
14	D0	
15	D1	
16	D2	
17	D3	
18	D4	
19	D5	
20	D6	
21	D7	
22	VCOMH	
23	VCC	
24	VLSS	

6 Module Interface

<table>
<tr><th>PIN NO.</th><th>PIN NAME</th><th>DESCRIPTION</th></tr>
<tr><td>1</td><td>VLSS</td><td>Analog system ground pin.</td></tr>
<tr><td>2</td><td>VSS</td><td>Ground.</td></tr>
<tr><td>3</td><td>VSL</td><td>This is segment voltage reference pin.
When external VSL is used, connect with resistor and diode to ground.</td></tr>
<tr><td>4</td><td>VCI</td><td>Power supply for interface logic level.</td></tr>
<tr><td>5</td><td>VDD</td><td>Power supply pin for core logic operation. A capacitor is required to connect between this pin and VSS.</td></tr>
<tr><td>6</td><td>IREF</td><td>This pin is the segment output current reference pin.
A resistor should be connected between this pin and VSS to maintain the current around 10uA.</td></tr>
<tr><td>7</td><td>RES#</td><td>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.</td></tr>
<tr><td>8</td><td>CS#</td><td>This pin is the chip select input connecting to the MCU. The chip is enabled for MCU communication only when CS# is pulled LOW.</td></tr>
<tr><td>9</td><td>D/C#</td><td>This pin is Data/Command control pin connecting to the MCU.
High: Data, Low: Command.</td></tr>
<tr><td>10</td><td>BS1</td><td rowspan="2"><table><tr><th>BS[1:0]</th><th>Bus Interface Selection</th></tr><tr><td>00</td><td>4 line SPI</td></tr><tr><td>01</td><td>3 line SPI</td></tr><tr><td>10</td><td>8-bit 8080 parallel</td></tr><tr><td>11</td><td>8-bit 6800 parallel</td></tr></table></td></tr>
<tr><td>11</td><td>BS0</td></tr>
<tr><td>12</td><td>R/W#(WR#)</td><td>This pin is read / write control input pin connecting to the MCU interface.
When interfacing to a 6800-series microprocessor, this pin will be used as Read/Write (R/W#) selection input. Read mode will be carried out when this pin is pulled HIGH and write mode when LOW.
When 8080 interface mode is selected, this pin will be the Write (WR#) input. Data write operation is initiated when this pin is pulled LOW and the chip is selected.
When serial interface is selected, this pin R/W (WR#) must be connected to Vss.</td></tr>
<tr><td>13</td><td>E(RD#)</td><td>This pin is MCU interface input.
When interfacing to a 6800-series microprocessor, this pin will be used as the Enable (E) signal. Read/write operation is initiated when this pin is pulled HIGH and the chip is selected.
When connecting to an 8080-microprocessor, this pin receives the Read (RD#) signal. Read operation is initiated when this pin is pulled LOW and the chip is selected.
When serial interface is selected, this pin E(RD#) must be connected to Vss.</td></tr>
<tr><td>14~21</td><td>D[0:7]</td><td>These pins are bi-directional data bus connecting to the MCU data bus.
Unused pins are recommended to tie LOW. (Except for D2 pin in SPI mode)</td></tr>
<tr><td>22</td><td>VCOMH</td><td>COM signal deselected voltage level.
A capacitor should be connected between this pin and Vss.</td></tr>
<tr><td>23</td><td>VCC</td><td>OLED panel power supply. This is also the most positive power voltage supply pin.</td></tr>
<tr><td>24</td><td>VLSS</td><td>Analog system ground pin.</td></tr>
</table>

7 Function Block Diagram



8 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
Logic supply voltage	VDD	-0.5	2.75	V	IC maximum rating
Interface logic Supply Voltage	VCI	-0.5	4.0	V	IC maximum rating
OLED Operating voltage	VCC	-0.5	21	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	TYP	MAX	UNIT
Logic Supply Voltage	VDD	-	2.4	-	2.6	V
Power Supply for I/O pins	VCI	-	2.6	3.3	3.5	V
OLED Driver Supply Voltage	VCC	-	11.5	12	12.5	V
High-level Input Voltage	V_{IHC}	-	0.8×VCI	-	VCI	V
Low-level Input Voltage	V_{ILC}	-	0	-	0.2×VCI	V
High-level Output Voltage	V_{OHC}	Iout = 100uA	0.9×VCI	-	VCI	V
Low-level Output Voltage	V_{OLC}	Iout = 100uA	0	-	0.1×VCI	V

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

9.2 Electro-optical Characteristics

ITEM	SYMBOL	TEST CONDITION		MIN	TYP	MAX	UNIT
Normal Mode Brightness	L_{br}	All pixels ON(1)		100	130	-	cd/m^2
Normal Mode Power Consumption	Pt	All pixels ON(1)		-	456	594	mW
VDD Sleep mode Current	I_{SLP_VDD}	VCI =2.8V, VCC =OFF VDD(external) = 2.5V, Display OFF, No panel attached		-	-	20	uA
VCI Sleep mode Current	I_{SLP_VCI}	VCI =2.8V, VCC =OFF Display OFF, No panel attached	Internal VDD	-	-	40	uA
C.I.E(Blue)	(x)	x, y(CIE1931)		0.09	0.13	0.17	-
	(y)			0.23	0.27	0.31	-
Dark Room Contrast	CR	-		≥2000:1	-	-	-
Response Time	-	-		---	10	-	μ s
View Angle	-	-		≥160	-	-	Degree

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

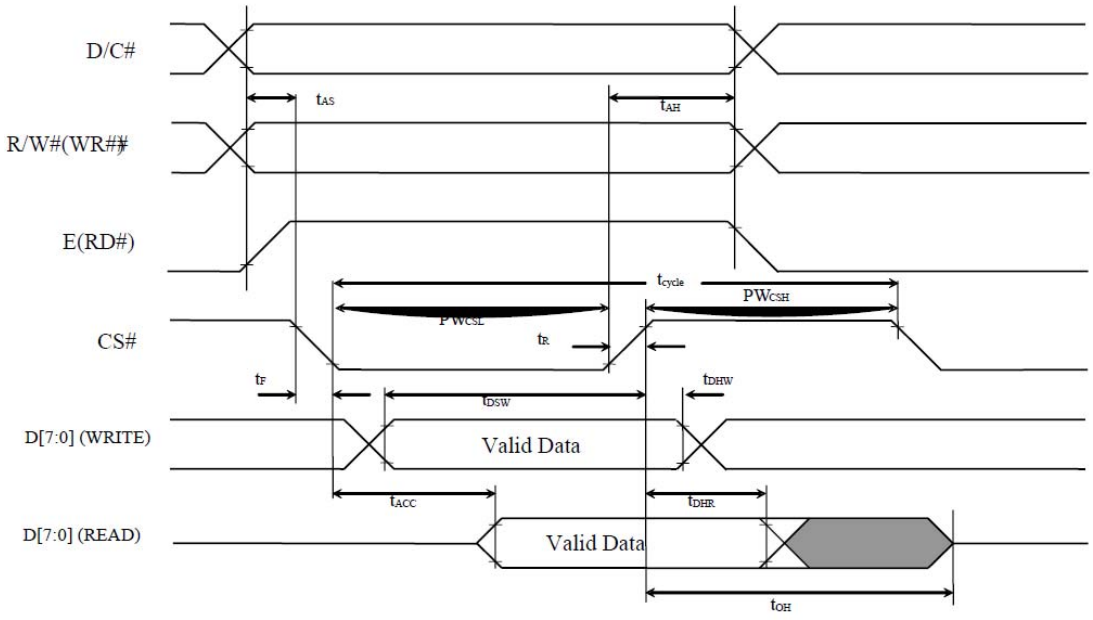
- Driving voltage: 12V
- Contrast setting: 0xC0
- Frame rate: about 110Hz
- Duty setting: 1/64

9.3 AC Electrical Characteristics

6800-Series MCU Parallel Interface Timing Characteristics

VCI=2.6~3.5V，T_A=25℃

Symbol	Parameter	Min	Typ	Max	Unit
t_{CYCLE}	Clock Cycle Time (read) Clock Cycle Time (write)	300 100	-	-	ns
t_{AS}	Address Setup Time	15	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	10	-	-	ns
t_{DHR}	Read Data Hold Time	20	-	-	ns
t_{OH}	Output Disable Time	-	-	70	ns
t_{ACC}	Access Time	-	-	140	ns
PW_{CSL}	Chip Select Low Pulse Width (read) Chip Select Low Pulse Width (write)	150 60	-	-	ns
PW_{CSH}	Chip Select High Pulse Width (read) Chip Select High Pulse Width (write)	60 60	-	-	ns
t_R	Rise Time	-	-	15	ns
t_F	Fall Time	-	-	15	ns

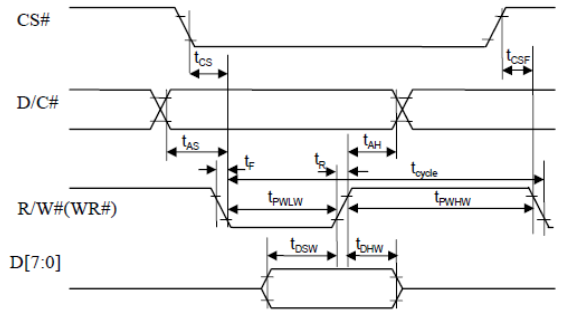


8080-Series MCU Parallel Interface Timing Characteristics

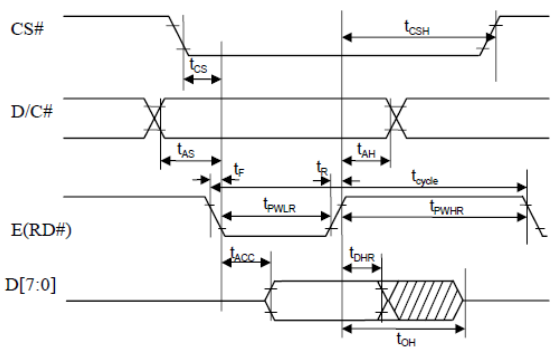
VCI=2.6~3.5V，T_A=25℃

Symbol	Parameter	Min	Typ	Max	Unit
t_{CYCLE}	Clock Cycle Time (read) Clock Cycle Time (write)	300 100	-	-	ns
t_{AS}	Address Setup Time	10	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	10	-	-	ns
t_{DHR}	Read Data Hold Time	20	-	-	ns
t_{OH}	Output Disable Time	-	-	70	ns
t_{ACC}	Access Time	-	-	140	ns
t_{PWLR}	Read Low Time	150	-	-	ns
t_{PWLW}	Write Low Time	60	-	-	ns
t_{PWHR}	Read High Time	60	-	-	ns
t_{PWHW}	Write High Time	60	-	-	ns
t_R	Rise Time	-	-	15	ns
t_F	Fall Time	-	-	15	ns
t_{CS}	Chip select setup time	0	-	-	ns
t_{CSH}	Chip select hold time to read signal	0	-	-	ns
t_{CSF}	Chip select hold time	20	-	-	ns

Write cycle



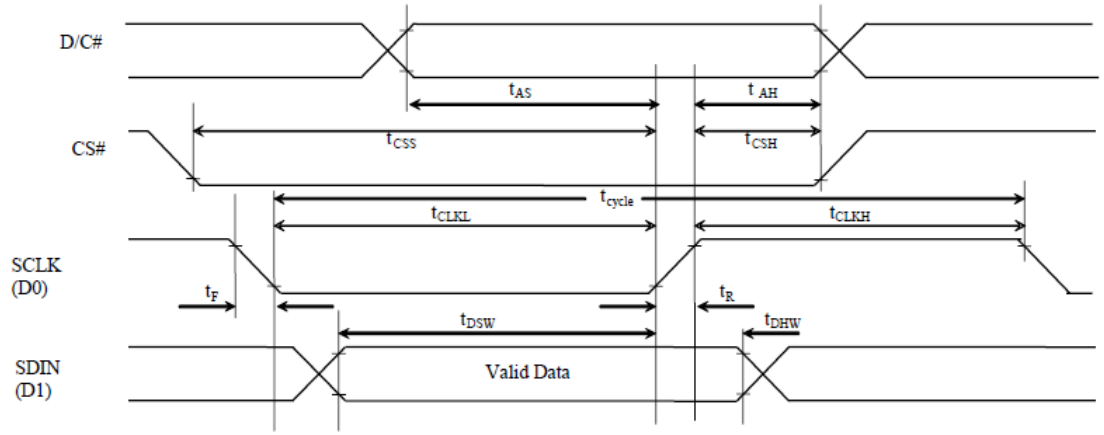
Read cycle

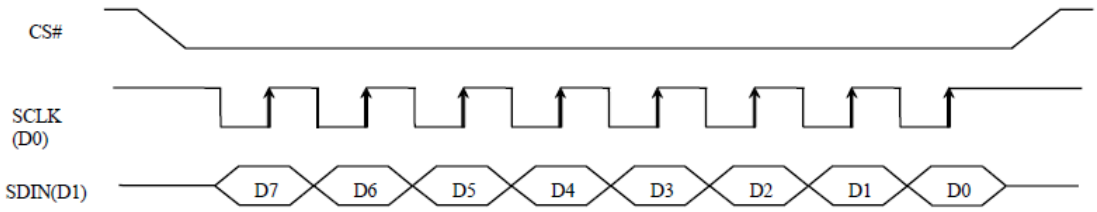


4 SPI-Serial Interface Timing Characteristics

VCI=2.6~3.5V，T_A=25℃

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	300	-	-	ns
t_{AS}	Address Setup Time	15	-	-	ns
t_{AH}	Address Hold Time	25	-	-	ns
t_{CSS}	Chip Select Setup Time	20	-	-	ns
t_{CSH}	Chip Select Hold Time	10	-	-	ns
t_{DSW}	Write Data Setup Time	15	-	-	ns
t_{DHW}	Write Data Hold Time	20	-	-	ns
t_{CLKL}	Clock Low Time	25	-	-	ns
t_{CLKH}	Clock High Time	40	-	-	ns
t_R	Rise Time	-	-	15	ns
t_F	Fall Time	-	-	15	ns

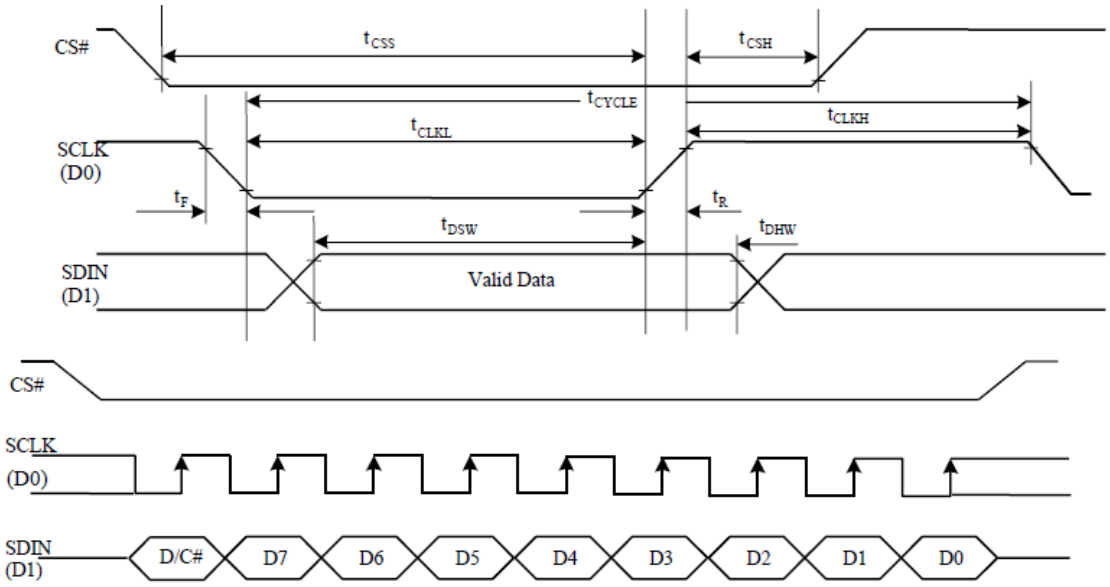




3 SPI-Serial Interface Timing Characteristics

VCI=2.6~3.5V，T_A=25℃

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	300	-	-	ns
t_{CSS}	Chip Select Setup Time	20	-	-	ns
t_{CSH}	Chip Select Hold Time	25	-	-	ns
t_{DSW}	Write Data Setup Time	15	-	-	ns
t_{DHW}	Write Data Hold Time	20	-	-	ns
t_{CLKL}	Clock Low Time	25	-	-	ns
t_{CLKH}	Clock High Time	25	-	-	ns
t_R	Rise Time	-	-	15	ns
t_F	Fall Time	-	-	15	ns

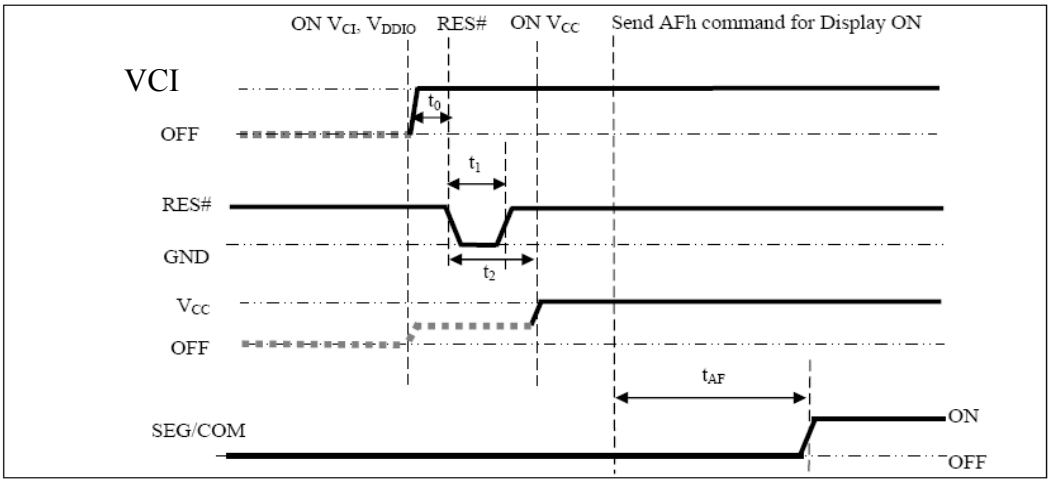


10 Functional Specification and Application Circuit

10.1 Power ON and Power OFF Sequence

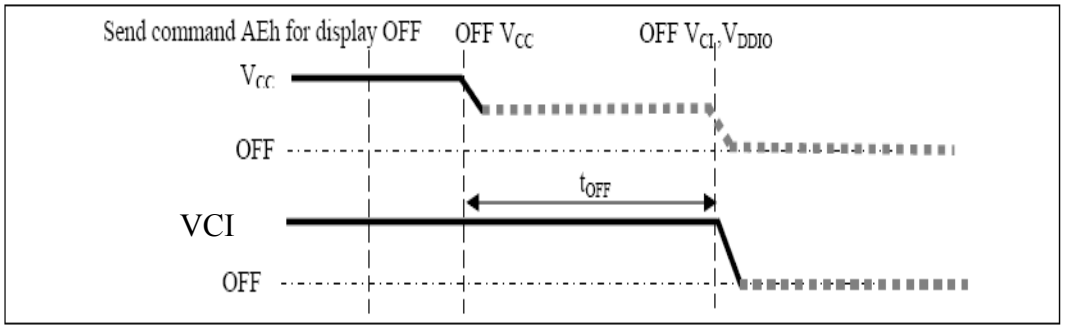
Power ON Sequence:

1. Power ON VCI.
2. After VCI become stable, set wait time at least 1ms (t0) for internal VDD become stable. Then set RES# pin LOW (logic low) for at least 100us (t_1) (4) and then HIGH (logic high).
3. After set RES# pin LOW (logic low), wait for at least 100us (t_2). Then Power ON VCC.(1)
4. After VCC become stable, send command AFh for display ON. SEG/COM will be ON after 200ms(tAF).
5. After VCI become stable, wait for at least 300ms to send command.



Power OFF Sequence:

1. Send command AEh for display OFF.
2. Power OFF VCC. (1), (2)
3. Wait for t_{OFF}. Power OFF VCI . (where Minimum t_{OFF}=0ms(3), Typical t_{OFF}=100ms)



Note:

(1) Since an ESD protection circuit is connected between VCI, VDDIO and VCC, VCC becomes lower than VCI whenever VCI, VDDIO is ON and VCC is OFF as shown in the dotted line of VCC in above Figure.

(2)VCC should be kept float (disable) when it is OFF.

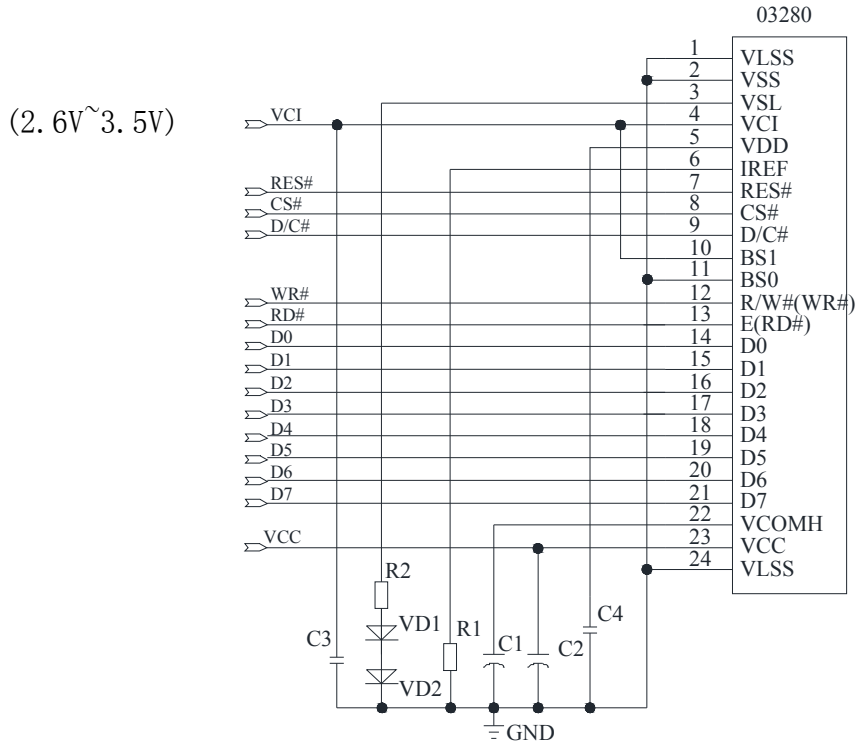
(3) VCI, VDDIO should not be Power OFF before VCC Power OFF.

(4) The register values are reset after t_1.

(5) Power pins (VDD, VCC) can never be pulled to ground under any circumstance.

10.2 Application Circuit

The configuration for 8080 interface mode, external VCC is shown in the following diagram:



Pin connected to MCU interface:RES#、CS#、D/C#、WR#、RD#、D[0:7].

write_c(0xAB);// Function Selection

write_d(0x01);// Enable internal VDD regulator

Recommended components

C3, C4: 1uF-0603-X7R±10%.RoHS

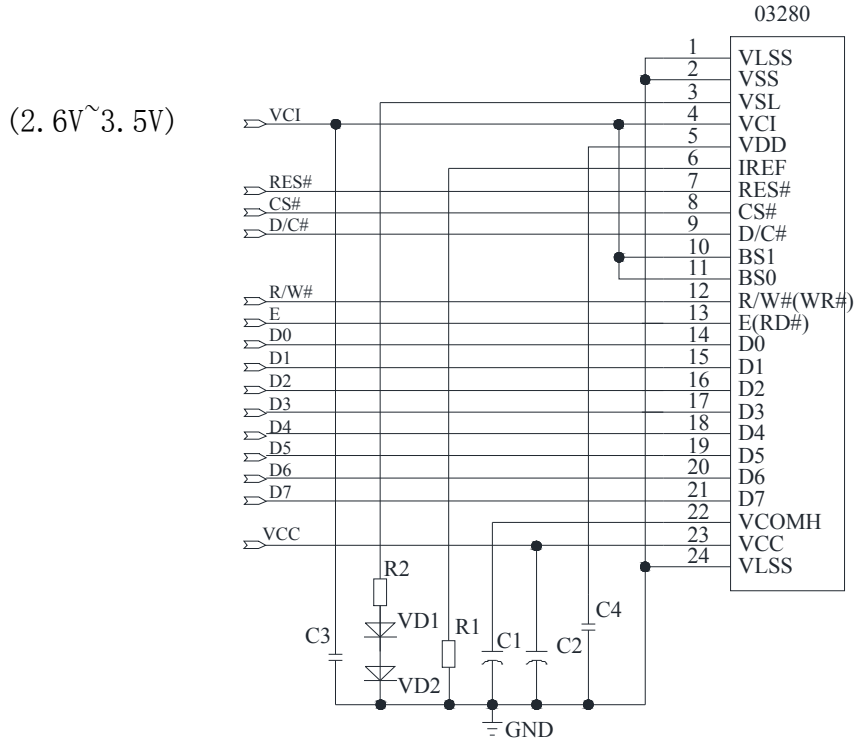
C1, C2: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

R2: 0603 1/10W +/-5% 51ohm.RoHS

VD1, VD2: 1N4148

The configuration for 6800 interface mode, external VCC is shown in the following diagram:



Pin connected to MCU interface:RES#、CS#、D/C#、R/W#、E、D[0:7].

write_c(0xAB);// Function Selection

write_d(0x01);// Enable internal VDD regulator

Recommended components

C3, C4: 1uF-0603-X7R±10%.RoHS

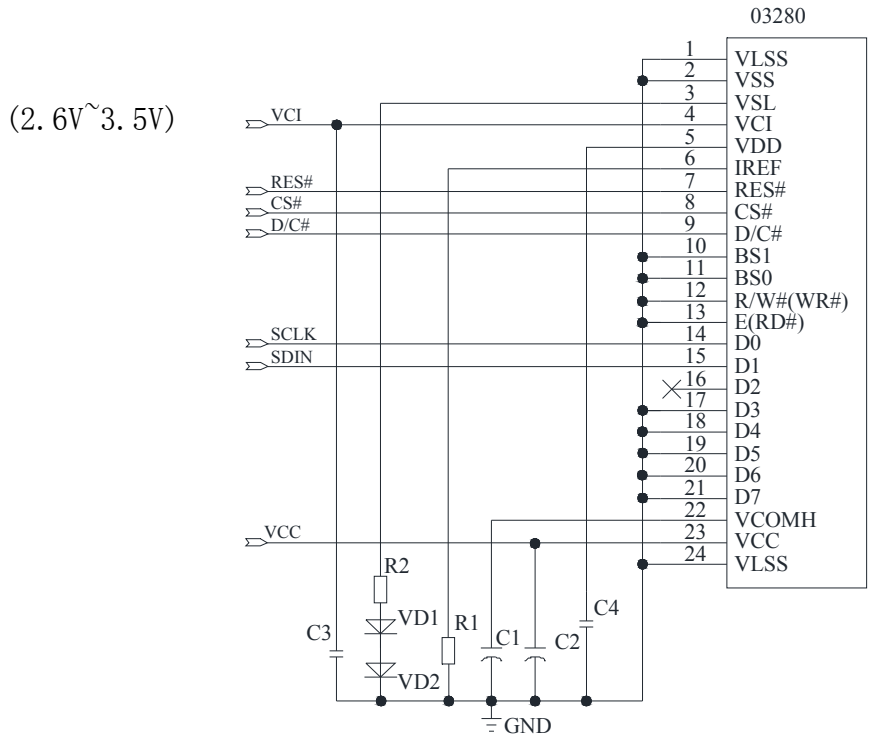
C1, C2: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

R2: 0603 1/10W +/-5% 51ohm.RoHS

VD1, VD2: 1N4148

The configuration for 4-SPI interface mode, external VCC is shown in the following diagram:



Pin connected to MCU interface:RES#、CS#、D/C#、SCLK、SDIN.

write_c(0xAB);// Function Selection

write_d(0x01);// Enable internal VDD regulator

Recommended components

C3, C4: 1uF-0603-X7R±10%.RoHS

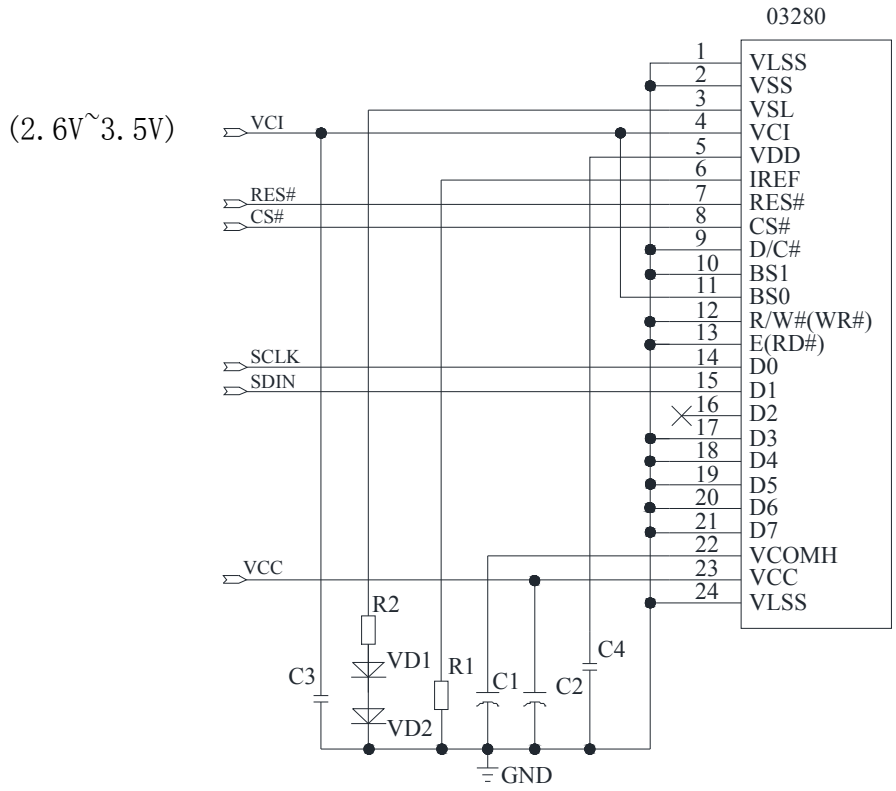
C1, C2: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

R2: 0603 1/10W +/-5% 51ohm.RoHS

VD1, VD2: 1N4148

The configuration for 3-SPI interface mode, external VCC is shown in the following diagram:



Pin connected to MCU interface:RES#、CS#、SCLK、SDIN.

write_c(0xAB);// Function Selection

write_d(0x01);// Enable internal VDD regulator

Recommended components

C3, C4: 1uF-0603-X7R±10%.RoHS

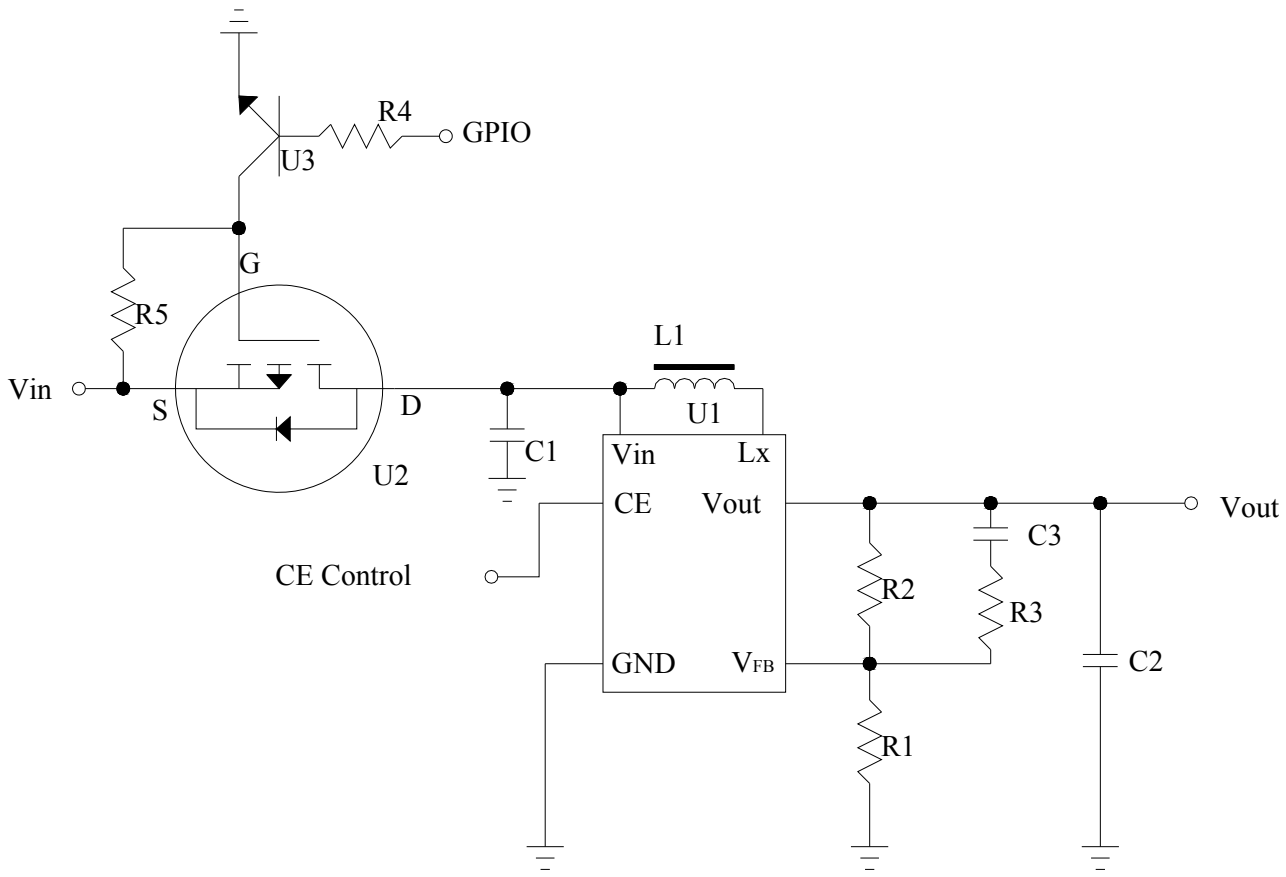
C1, C2: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

R2: 0603 1/10W +/-5% 51ohm.RoHS

VD1, VD2: 1N4148

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% 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

10.4 Display Control Instruction

Refer to SP8110 IC Specification.

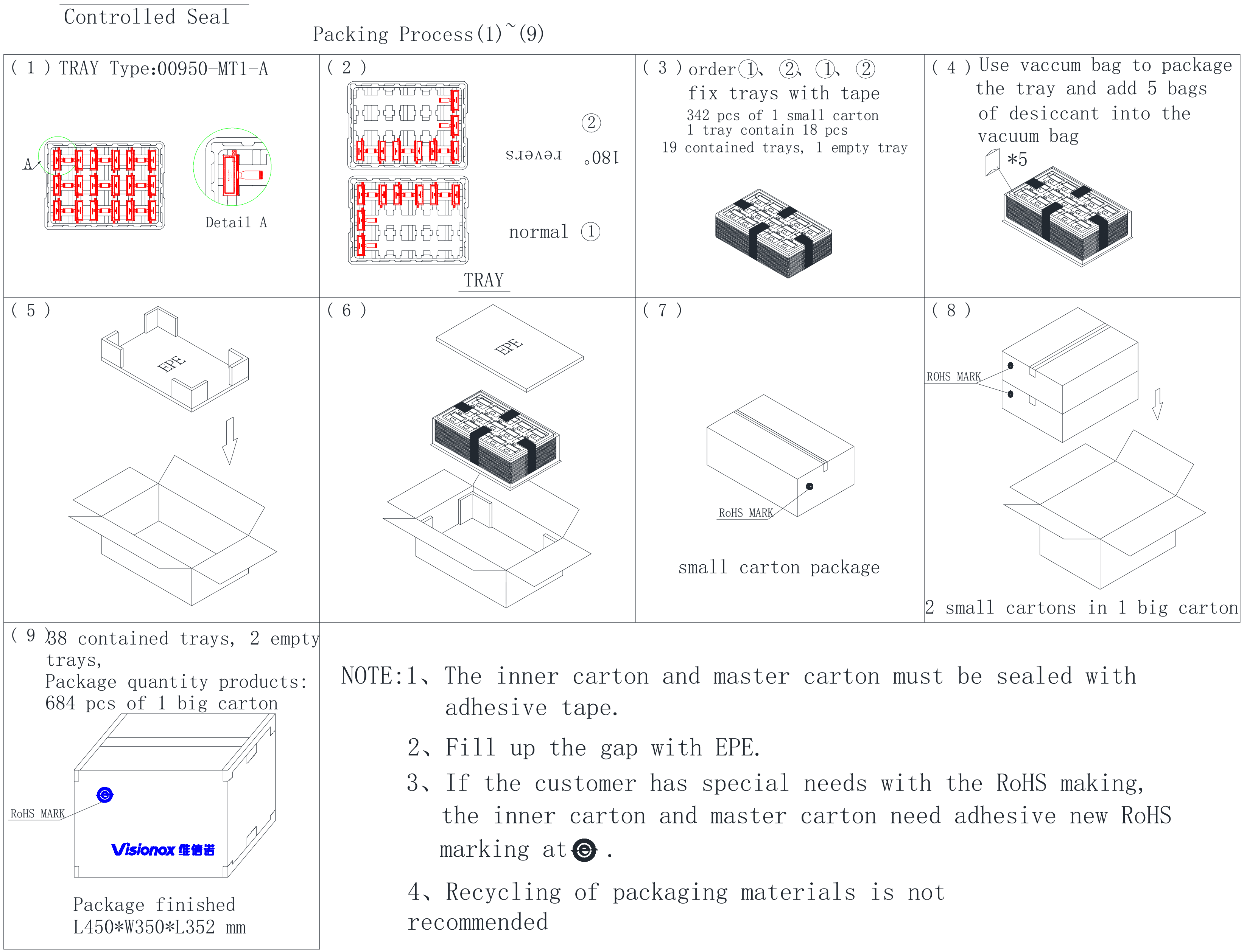
10.5 Recommended Software Initialization

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(0xFD);        //lock OLED driver IC MCU interface from entering command
    Write_Data(0x12);
    Write_Command(0xAE);         //Set Display Off
    Write_Command(0x15);        //Set Column start and end address
    Write_Data(0x1C);
    Write_Data(0x5B);
    Write_Command(0x75);        //Set Row start and end address
    Write_Data(0x00);
    Write_Data(0x3F);
    Write_Command(0xA0);
    Write_Data(0x04);
    Write_Data(0x11);
    Write_Command(0xA1);        //Set Display Start Line
    Write_Data(0x00);
    Write_Command(0xA2);        //Set Display Offset
    Write_Data(0x00);
    Write_Command(0xAB);        //Function Selection
    Write_Data(0x01);           //Enable internal VDD regulator
    Write_Command(0xB1);        //Set Phase length
    Write_Data(0x42);
    Write_Command(0xB3);        //Set Front Clock Divider/Oscillator Frequency
    Write_Data(0xC1);
    Write_Command(0xB4);        //Display Enhancement A
    Write_Data(0xA0);           //Enable external VSL
    Write_Data(0xFD);           //Normal    FD
    Write_Command(0xB5);        //GPIO
    Write_Data(0x00);
    Write_Command(0xB6);        //Set Phase length
    Write_Data(0x08);
```

```
        Write_Command(0xB9);          //Select Default Linear Gray Scale table
        Write_Command(0xBB);          //Set Pre-charge voltage
        Write_Data(0x1F);
        Write_Command(0xBE);          //Set Vcomh
        Write_Data(0x01);
        Write_Command(0xC1);          //Set_Contrast
        Write_Data(0xC0);
        Write_Command(0xC7);          //Master_Contrast
        Write_Data(0x0F);
        Write_Command(0xCA);          //Set MUX Ratio
        Write_Data(0x3F);
        Write_Command(0xD1);          //Display_En_B
        Write_Data(0xA2);
        Write_Data(0x20);
        Write_Command(0xA6);          //Normal Display
         Clear_Screen();
        Write_Command(0xAF);        //Set Display On
}
```

11 Package Specification



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 ⓔ .

4、Recycling of packaging materials is not recommended

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

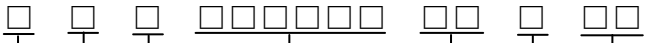
End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	9,000	-	hrs	130 cd/m^2, 50% alternating checkerboard, 22±3°C, 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°C; 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

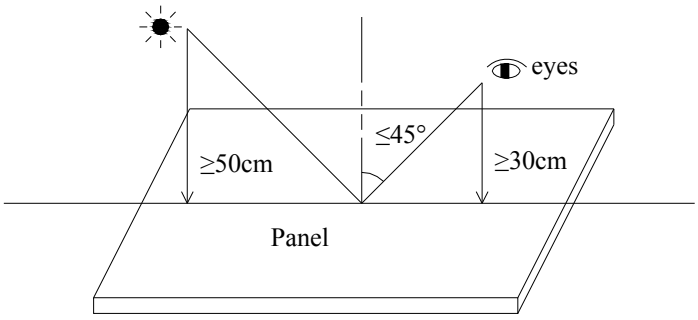
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: ≥50cm

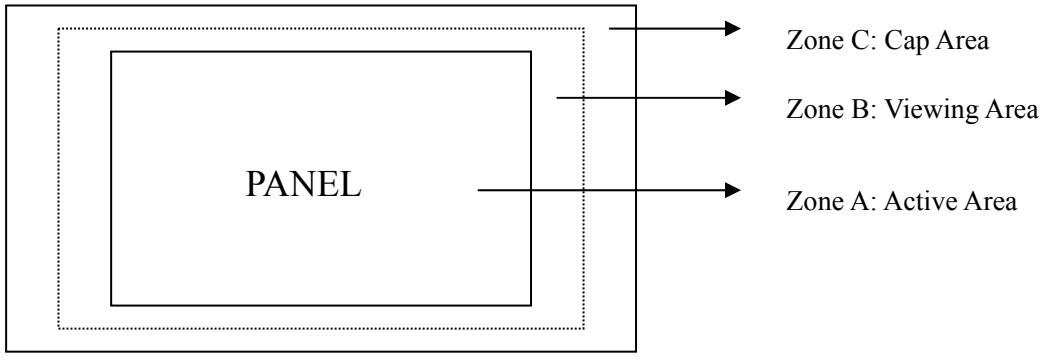
Distance between the Panel & Eyes: ≥30cm

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

(See the sketch below)

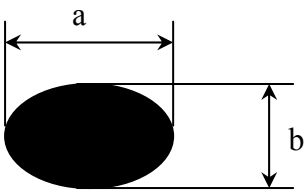


14.3 Quality Assurance Zones

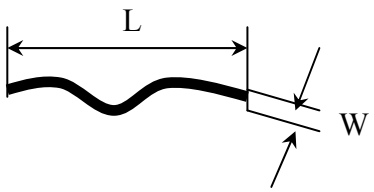


14.4 Inspection Standard

Definition of Φ&L&W (Unit: mm)

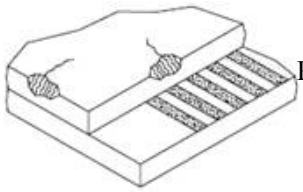
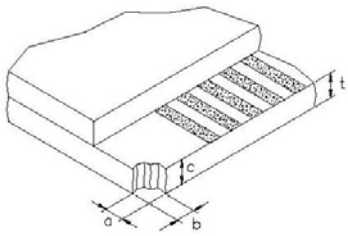
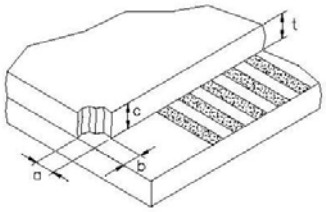
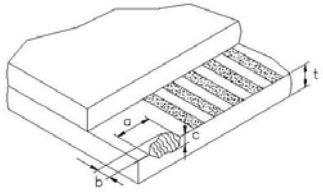
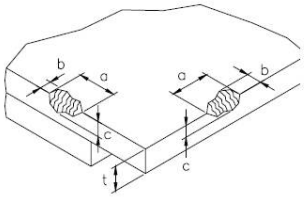
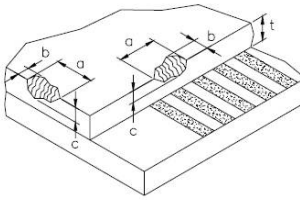


Φ=(a+b)/2



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.