Product Specification

Product Name: VGM128064C9A06

Product Code: M01536

Customer
Approved by Customer
Approved Date:

Designed By	Checked By	Approved By	
		R&D	QA
2014.3.3	2.14.3.11	2014.3.11	3/11.14

CONTENT

REVISION RECORD

REV.	REVISION DESCRIPTION	REV. DATE	REMARK
D01	Initial release.	2014-03-03	

1 Overview

VGM128064C9A06 is an area color OLED display module with 128×64 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.

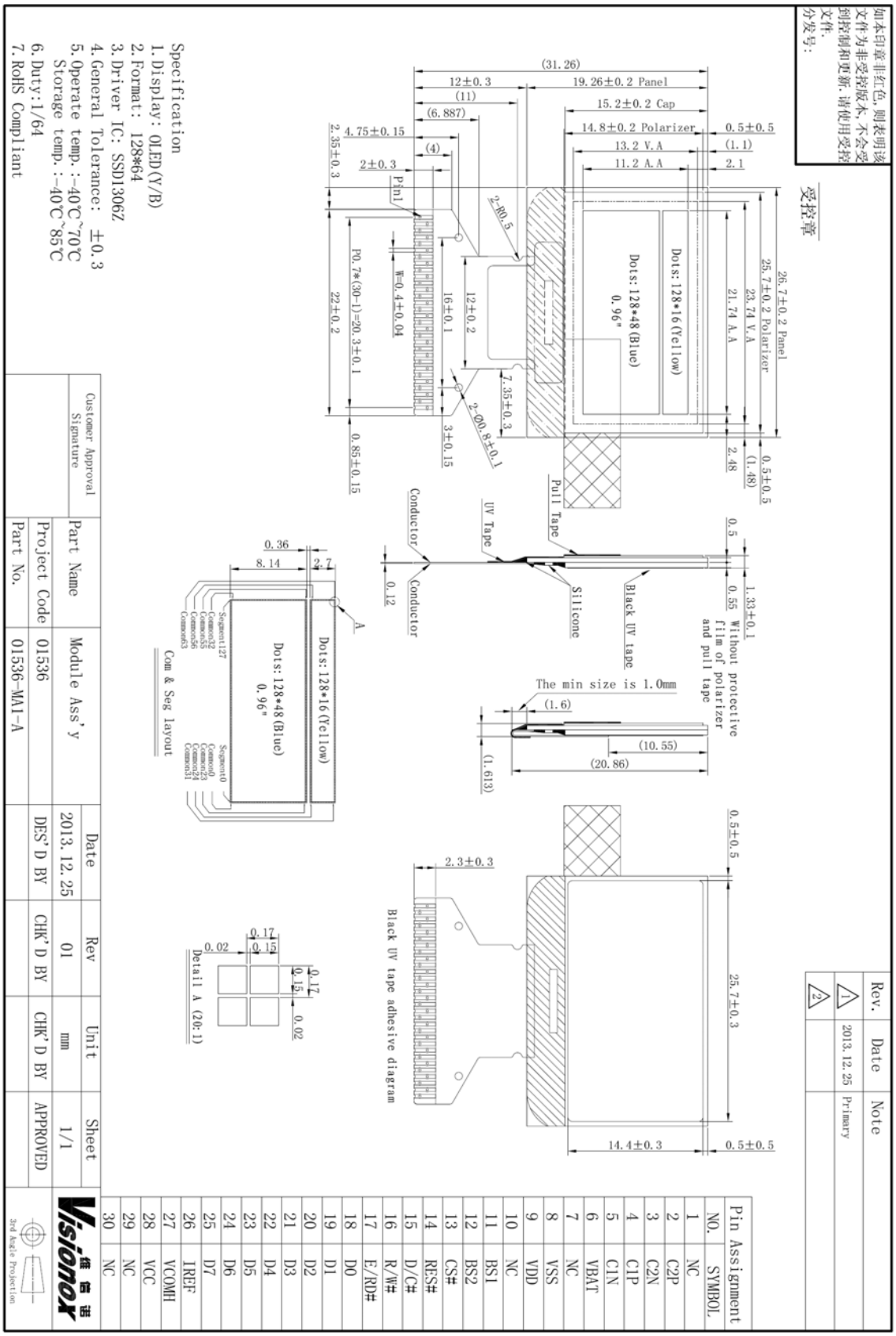
2 Features

- Display Color: Yellow & Blue
- Dot Matrix:128×64
- Driver IC: SSD1306ZC
- Interface: 8-bit 6800、8-bit 8080、I^2C 、4-Wire SPI
- Wide range of operating temperature: -40℃ to 70℃

3 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	128(W)×64(H)	-
2	Dot Size	0.15(W)×0.15 (H)	mm^2
3	Dot Pitch	0.17(W)×0.17 (H)	mm^2
4	Aperture Rate	78	%
5	Active Area	21.74(W)×11.2 (H)	mm^2
6	Panel Size	26.7(W)×19.26(H)×1.05(T)	mm^3
7	Module Size	26.7(W)×31.26(H)×1.33(T)	mm^3
8	Diagonal A/A Size	0.96	inch
9	Module Weight	1.28±10%	gram

4 Mechanical Drawing



Pin Assignment	
NO.	SYMBOL
1	NC
2	C2P
3	C2N
4	C1P
5	C1N
6	VBAT
7	NC
8	VSS
9	VDD
10	NC
11	BS1
12	BS2
13	CS#
14	RES#
15	D/C#
16	R/W#
17	E/RD#
18	D0
19	D1
20	D2
21	D3
22	D4
23	D5
24	D6
25	D7
26	IREF
27	VCOMH
28	VCC
29	NC
30	NC

5 Module Interface

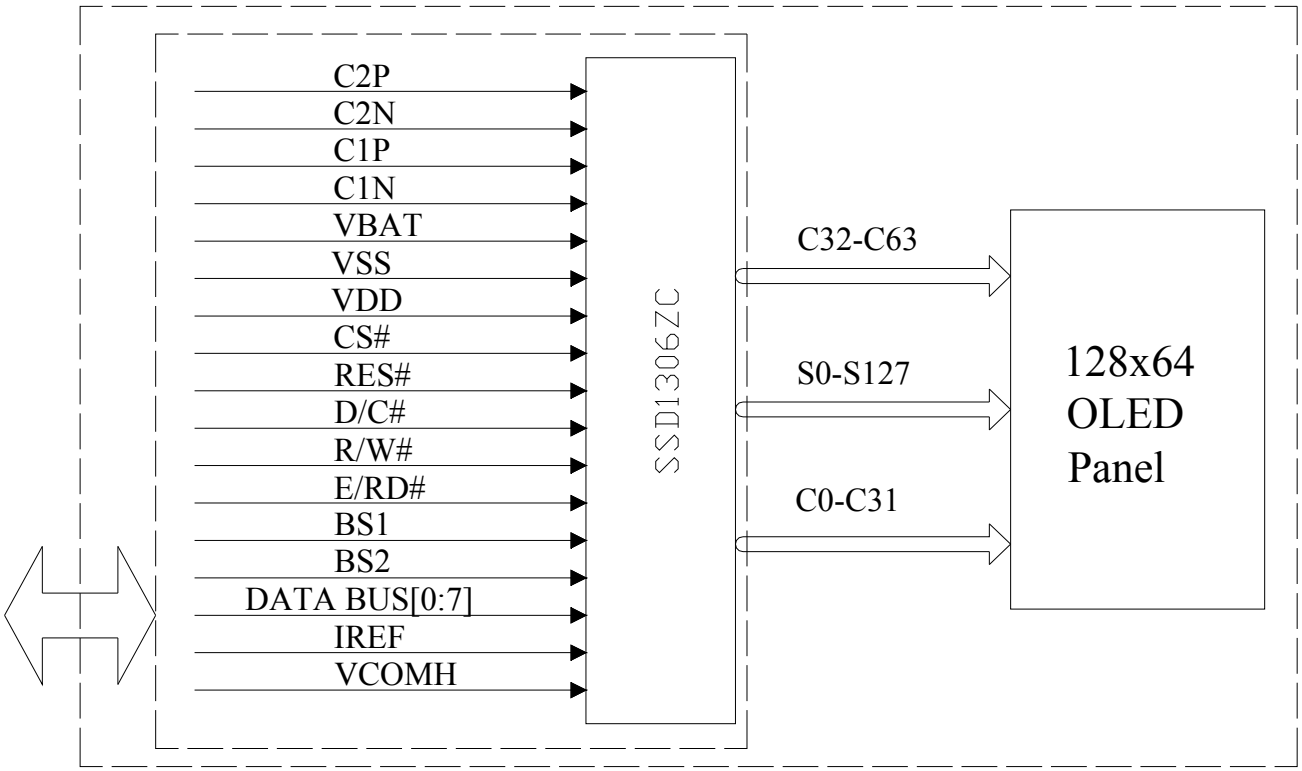
<table>
<tr><th>PIN NO.</th><th>PIN NAME</th><th>DESCRIPTION</th></tr>
<tr><td>1</td><td>NC</td><td>No Connection.</td></tr>
<tr><td>2</td><td>C2P</td><td rowspan="2">The Pin for charge pump capacitor; Connect to each other with a capacitor.</td></tr>
<tr><td>3</td><td>C2N</td></tr>
<tr><td>4</td><td>C1P</td><td rowspan="2">The Pin for charge pump capacitor; Connect to each other with a capacitor.</td></tr>
<tr><td>5</td><td>C1N</td></tr>
<tr><td>6</td><td>VBAT</td><td>Power supply for charge pump regulator circuit.
<table>
<tr><td>Status</td><td>VBAT</td><td>VDD</td><td>VCC</td></tr>
<tr><td>Enable charge pump</td><td>Connect to external VBAT source</td><td>Connect to external VCC source</td><td>A capacitor should be connected between this pin and VSS</td></tr>
<tr><td>Disable charge pump</td><td>Keep float</td><td>Connect to external VCC source</td><td>Connect to external VCC source</td></tr>
</table></td></tr>
<tr><td>7</td><td>NC</td><td>No Connection.</td></tr>
<tr><td>8</td><td>VSS</td><td>Ground.</td></tr>
<tr><td>9</td><td>VDD</td><td>Power supply pin for core logic operation.</td></tr>
<tr><td>10</td><td>NC</td><td>No Connection.</td></tr>
<tr><td>11</td><td>BS1</td><td rowspan="2">Table 5-1</td></tr>
<tr><td>12</td><td>BS2</td></tr>
<tr><td>13</td><td>CS#</td><td>Chip Select, active LOW.</td></tr>
<tr><td>14</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 HIGH (i.e. connect to VDD) during normal operation.</td></tr>
<tr><td>15</td><td>D/C#</td><td>This is Data/Command control pin. When it is pulled HIGH (i.e. connect to VDD), the data at D[7:0] is treated as data. When it is pulled LOW, the data at D[7:0] will be transferred to the command register.
In I^2C mode, this pin acts as SA0 for slave address selection.</td></tr>
<tr><td>16</td><td>R/W#</td><td>This 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 (i.e. connect to VDD) 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 or I^2C interface is selected, this pin must be connected to VSS.</td></tr>
<tr><td>17</td><td>E/RD#</td><td>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 (i.e. connect to VDD) and the chip is selected.
When connecting to an 8080-series 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 or I^2C interface is selected, this pin must be connected to VSS.</td></tr>
<tr><td>18~25</td><td>D0~D7</td><td>These are 8-bit bi-directional data bus to be connected to the microprocessor’s data bus.
When serial interface mode is selected, D0 will be the serial clock input: SCLK; D1 will be the serial data input: SDIN and D2 should be kept NC.
When I^2C mode is selected, D2, D1 should be tied together and serve as SDAout, SDAin in application and D0 is the serial clock input, SCL.</td></tr>
<tr><td>26</td><td>IREF</td><td>Segment output current reference pin</td></tr>
<tr><td>27</td><td>VCOMH</td><td>Common signal deselected voltage level. Connected a capacitor to VSS.</td></tr>
<tr><td>28</td><td>VCC</td><td>Power supply for panel driving voltage.</td></tr>
<tr><td>29~30</td><td>NC</td><td>No Connection.</td></tr>
</table>

Table 5-1: MCU Bus Interface Pin Selection

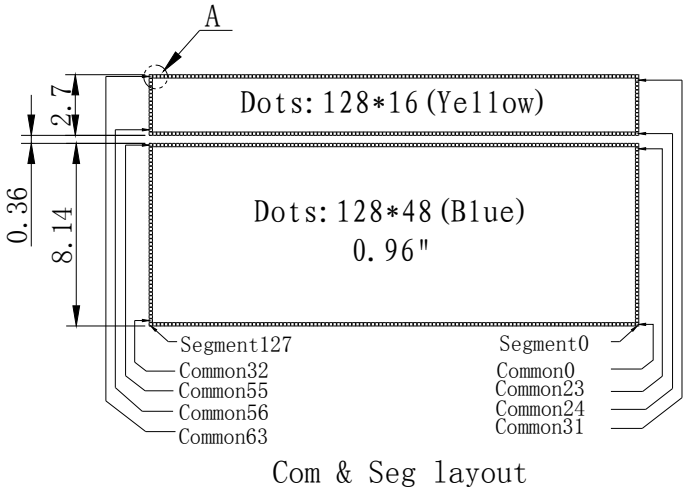
Pin Name	I^2C	6800	8080	4-SPI
BS1	1	0	1	0
BS2	0	1	1	0

6 Function Block Diagram

6.1 Function Block Diagram



6.2 Panel Layout Diagram



Com & Seg layout

7 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
Logic supply voltage	VDD	-0.3	4	V	IC maximum rating
Charge Pump Regulator Supply Voltage	VBAT	-0.3	5.0	V	IC maximum rating
OLED Operating voltage	VCC	0	16	V	IC maximum rating
Operating Temp.	Top	-40	70	℃	-
Storage Temp	Tstg	-40	85	℃	-

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

Note (2): Permanent breakage of module may occur if the module is used beyond the maximum rating. The module can be normal operated under the conditions according to Section 8 "Electrical 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	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)	VCC	22±3°C, 55±15%R.H	7	7.2	7.5	V
OLED Driver Supply Voltage (Generated by Internal DC/DC)	VCC	22±3°C, 55±15%R.H	7	7.2	7.5	V
Charge Pump Regulator Supply Voltage	VBAT	22±3°C, 55±15%R.H	3.3	3.7	4.2	V
High-level Input Voltage	V_{IH}	-	0.8×VDD	-	-	V
Low-level Input Voltage	V_{IL}	-	-	-	0.2×VDD	V
High-level Output Voltage	V_{OH}	-	0.9×VDD	-	-	V
Low-level Output Voltage	V_{OL}	-	-	-	0.1×VDD	V

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

8.2 Electro-optical Characteristics

ITEM	SYMBOL	TEST CONDITION	MIN	TYPE	MAX	UNIT
Normal Mode Brightness	L_{br}	All pixels ON(1) (VCC generated by internal DC/DC)	80	100	-	cd/m^2
ICC,Sleep mode Current	ICC,SLEEP	VDD = 1.65V~3.3V, VCC = 7V~15V Display OFF, No panel attached	-	-	20	uA
IDD,Sleep mode Current	IDD,SLEEP	VDD = 1.65V~3.3V, VCC = 7V~15V Display OFF, No panel attached	-	-	20	uA
Normal Mode Power Consumption	Pt	All pixels ON(1)	-	111	133.2	mW
C.I.E(Blue)	(x)	x,y(CIE1931)	0.13	0.16	0.19	-
	(y)		0.24	0.27	0.30	-
C.I.E(Yellow)	(x)		0.48	0.51	0.54	-
	(y)		0.45	0.48	0.51	-
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 : 7.2V(VCC Supplied Externally) or VBAT:3.7V(VCC Generated by Internal DC/DC).
- Contrast setting : 0XCF
- Frame rate : 105Hz
- Duty setting : 1/64

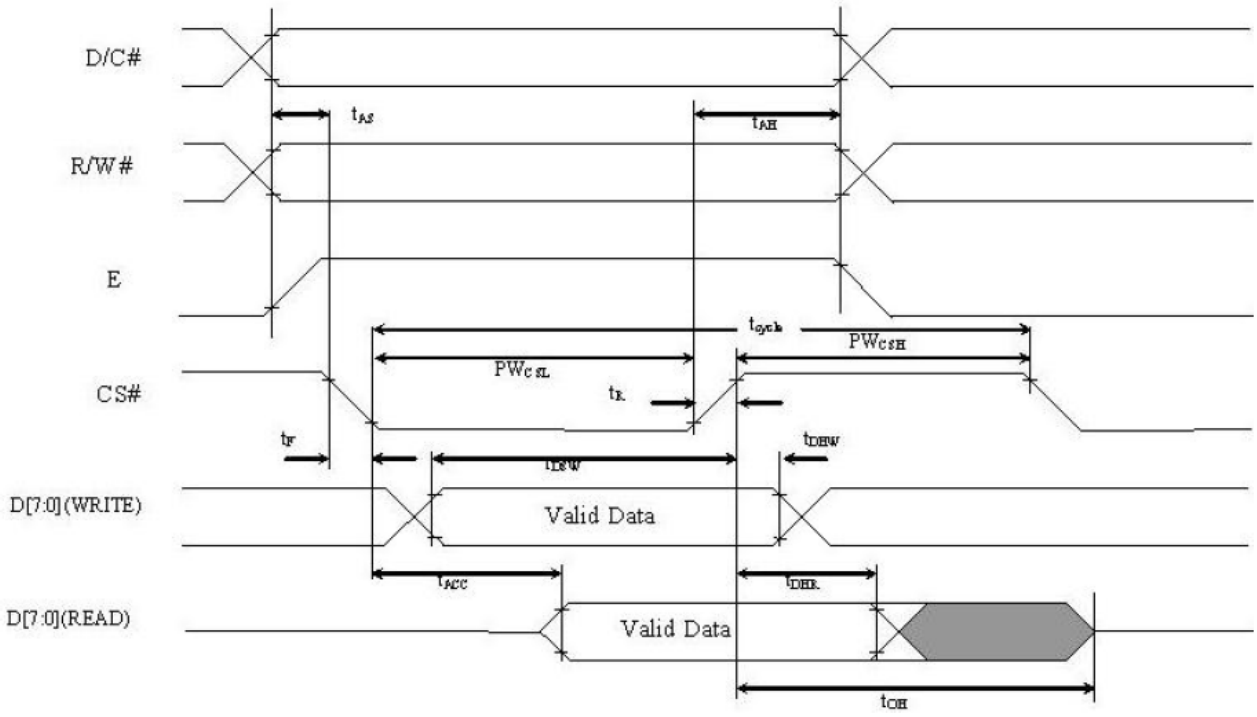
8.3 AC Electrical Characteristics

(1)6800-Series MPU Parallel Interface Timing Characteristics

(VDD - VSS = 1.65V to 3.3V, TA = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	300	-	-	ns
t_{AS}	Address Setup Time	0	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	7	-	-	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)	120 60	-	-	ns
PW_{CSH}	Chip Select High Pulse Width (read) Chip Select High Pulse Width (write)	60 60	-	-	ns
t_R	Rise Time	-	-	40	ns
t_F	Fall Time	-	-	40	ns

6800-series MCU parallel interface characteristics



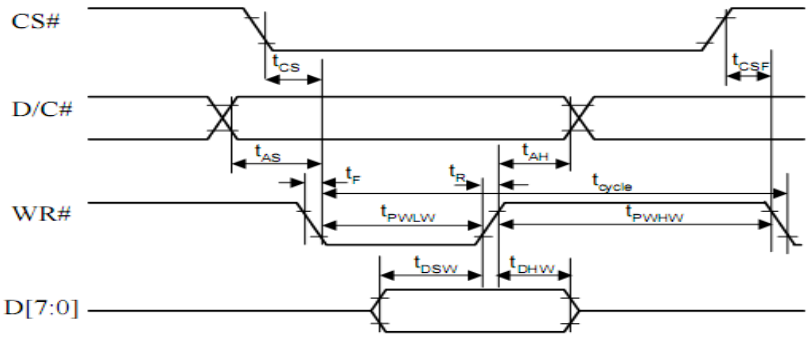
(2)8080-Series MPU Parallel Interface Timing Characteristics

(VDD - VSS = 1.65V to 3.3V, TA = 25°C)

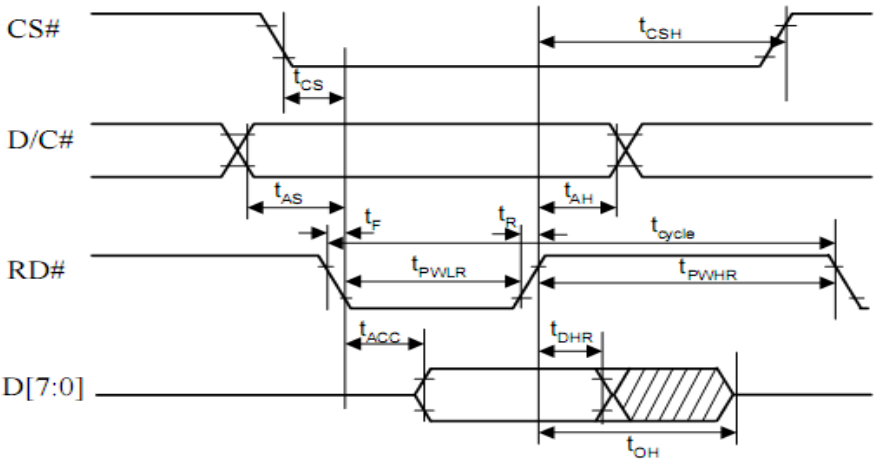
Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	300	-	-	ns
t_{AS}	Address Setup Time	10	-	-	ns
t_{AH}	Address Hold Time	0	-	-	ns
t_{DSW}	Write Data Setup Time	40	-	-	ns
t_{DHW}	Write Data Hold Time	7	-	-	ns
t_{DHR}	Read Data Hold Time	20	-	-	ns
t_{OH}	Output Disable Time	-	-	70	ns
t_{ACC}	Access Time	-	-	140	ns
t_{PWLR}	Read Low Time	120	-	-	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	-	-	40	ns
t_F	Fall Time	-	-	40	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

8080-series parallel interface characteristics

Write Cycle



Read cycle

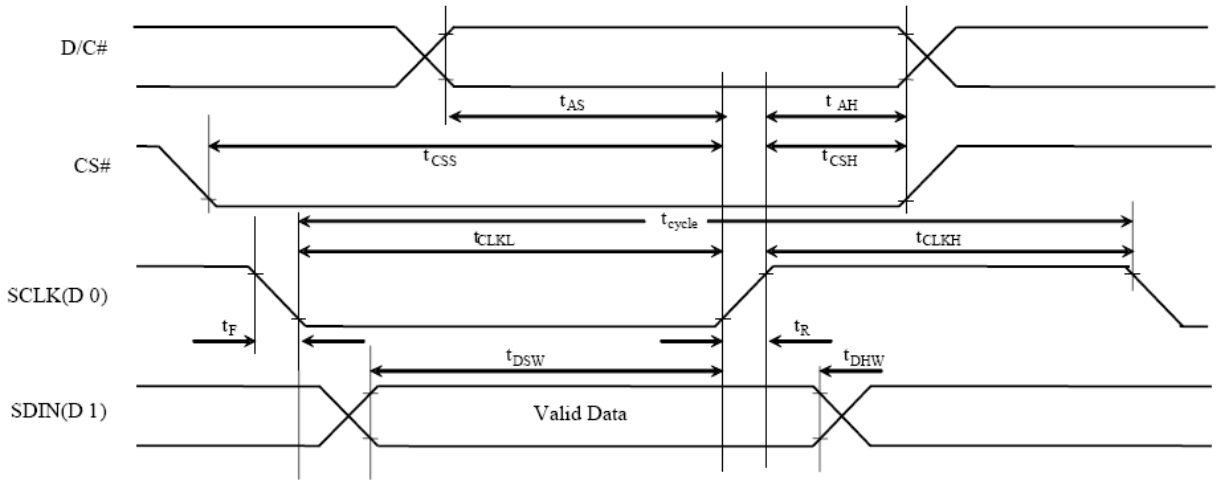


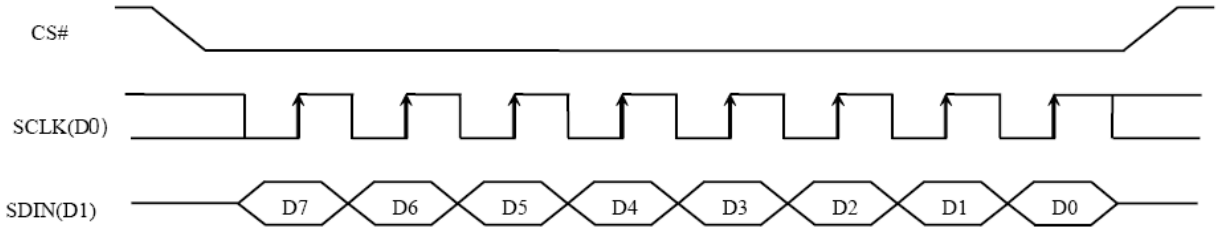
(3)4-Wire Series Interface Timing Characteristics

(VDD - VSS = 1.65V to 3.3V, TA = 25°C)

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	10	-	-	ns
t_{DSW}	Write Data Setup Time	15	-	-	ns
t_{DHW}	Write Data Hold Time	15	-	-	ns
t_{CLKL}	Clock Low Time	20	-	-	ns
t_{CLKH}	Clock High Time	20	-	-	ns
t_R	Rise Time	-	-	40	ns
t_F	Fall Time	-	-	40	ns

4-wire Serial interface characteristics



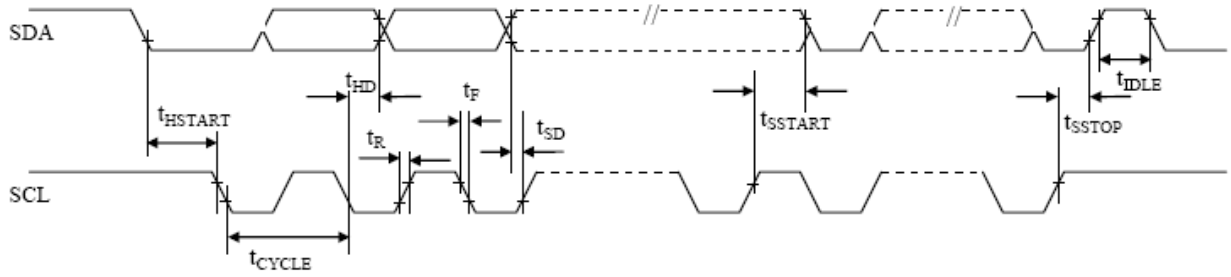


(4) I^2C Interface Timing Characteristics

(VDD - VSS = 1.65V to 3.3V, TA = 25°C)

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	2.5	-	-	us
t_{HSTART}	Start condition Hold Time	0.6	-	-	us
t_{HD}	Data Hold Time (for "SDA_{OUT}" pin)	0	-	-	ns
	Data Hold Time (for "SDA_{IN}" pin)	300	-	-	ns
t_{SD}	Data Setup Time	100	-	-	ns
t_{SSTART}	Start condition Setup Time (Only relevant for a repeated Start condition)	0.6	-	-	us
t_{SSTOP}	Stop condition Setup Time	0.6	-	-	us
t_R	Rise Time for data and clock pin	-	-	300	ns
t_F	Fall Time for data and clock pin	-	-	300	ns
t_{IDLE}	Idle Time before a new transmission can start	1.3	-	-	us

I^2C Interface Timing Characteristics

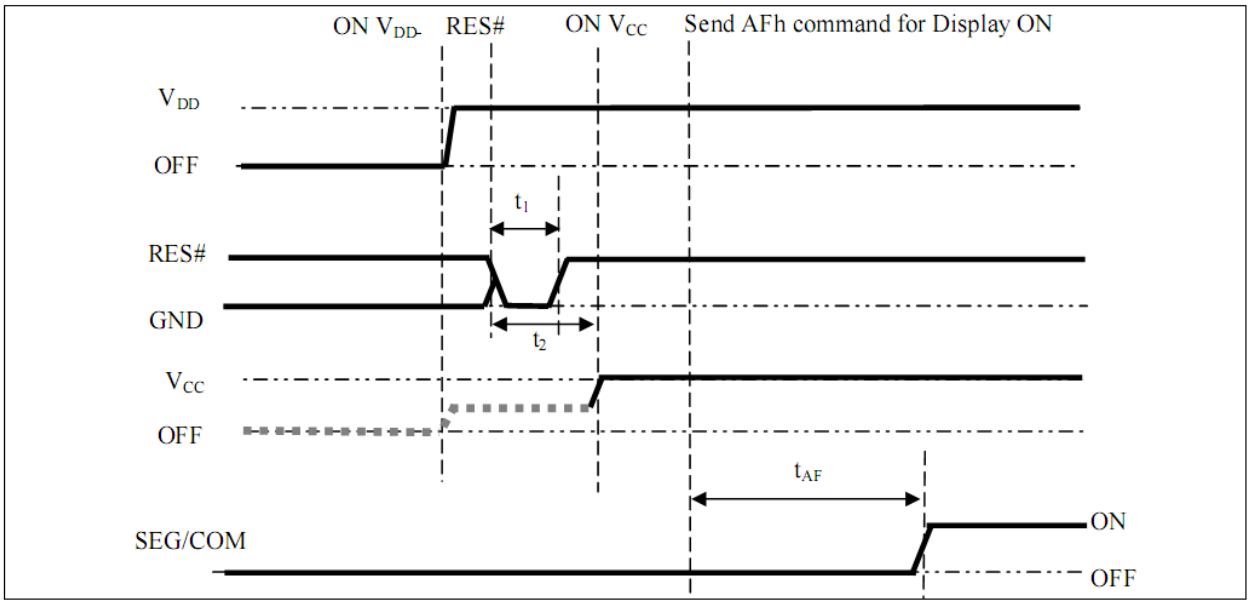


9 Functional Specification and Application Circuit

9.1 Power ON and Power OFF Sequence with External VCC

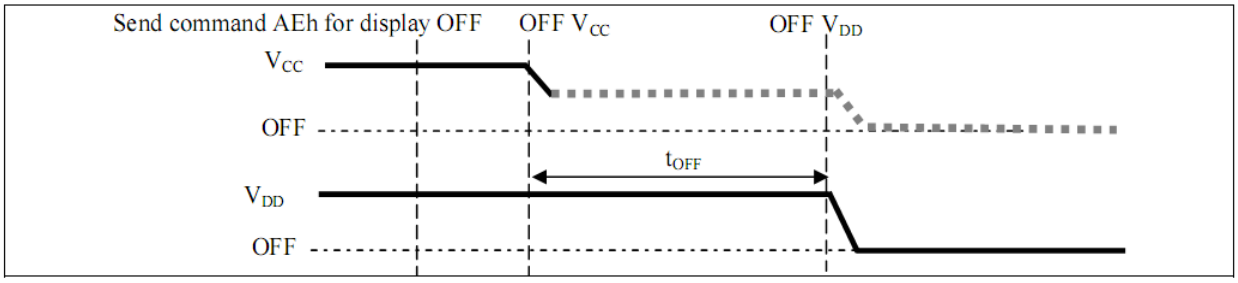
Power ON Sequence:

1. Power ON VDD
2. After VDD become stable, set RES# pin LOW (logic low) for at least 3us (t_1)[4] and then HIGH (logic high).
3. After set RES# pin LOW (logic low), wait for at least 3us (t_2). Then Power ON VCC[1].
4. After VCC become stable, send command AFh for display ON. SEG/COM will be ON after 100ms(t_{AF}).



Power OFF Sequence:

1. Send command AEh for display OFF.
2. Power OFF VCC[1],[2],[3].
3. Power OFF VDD after t_{OFF}. [5] (Typical t_{OFF}=100ms)



Note:

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

(2) V_{CC} should be kept float (disable) when it is OFF.

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

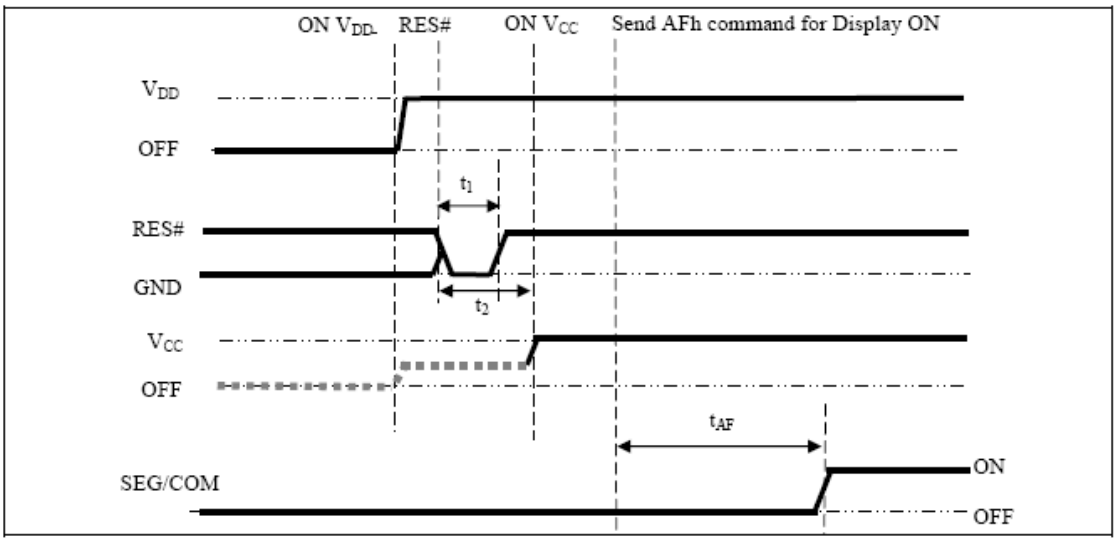
(4) The register values are reset after t_1.

(5) VDD should not be Power OFF before VCC Power OFF

9.2 Power ON and OFF sequence with Charge Pump Application

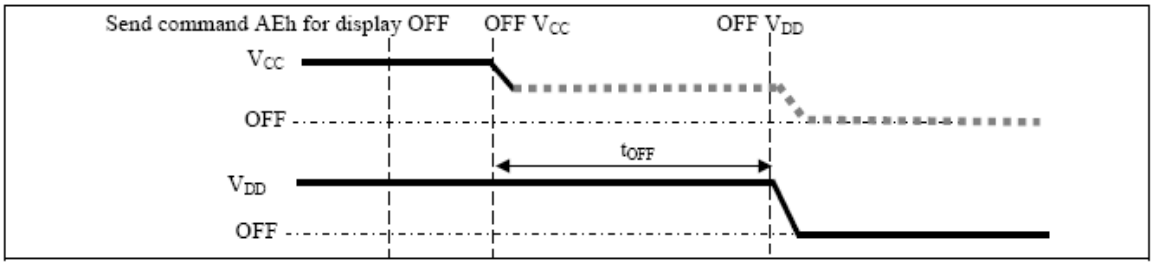
Power ON sequence:

1. Power ON VDD
2. After VDD become stable, 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 VCC.[1]
4. After VCC 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 VCC.[1], [2], [3]
3. Power OFF VDD after tOFF. [5] (Typical tOFF=100ms)



Note:

(1) Since an ESD protection circuit is connected between VDD and VCC, VCC becomes lower than VDD whenever VDD is

ON and VCC is OFF as shown in the dotted line of VCC in above figures.[2]

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

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

(4) The register values are reset after t1.

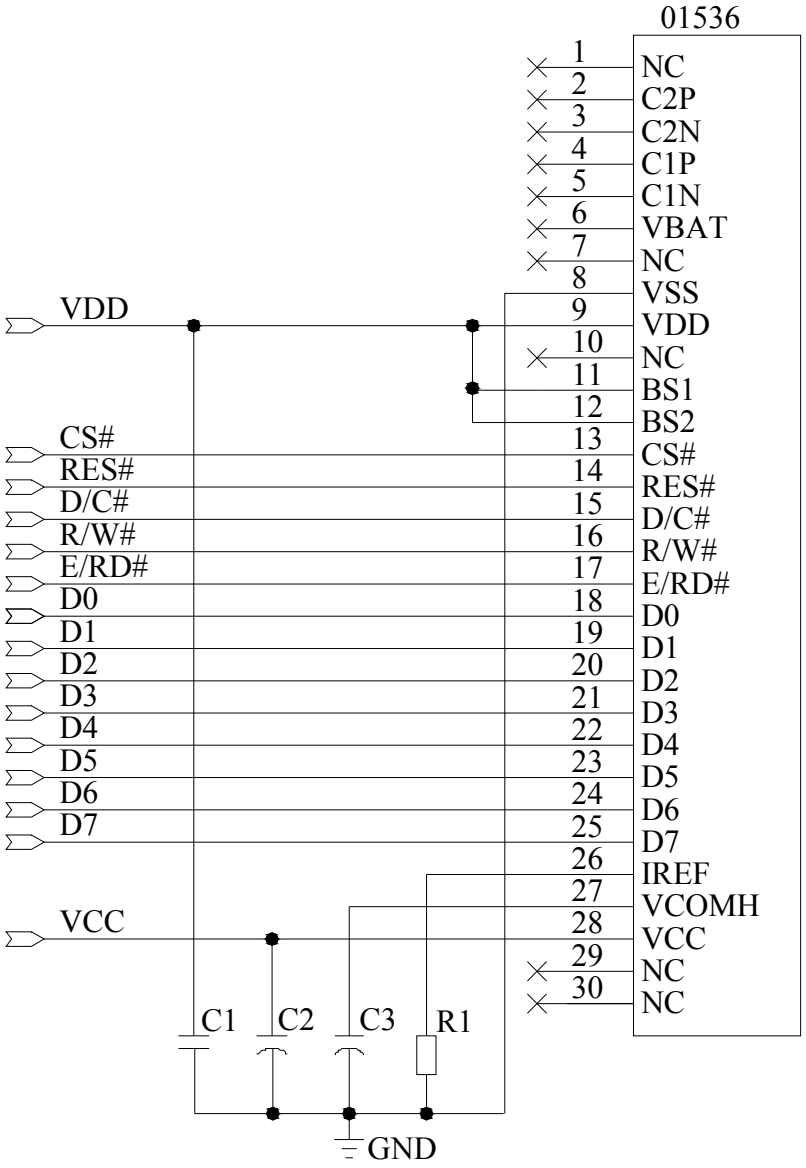
(5) VDD should not be Power OFF before VCC Power OFF.

9.3 Application Circuit

9.3.1 Under external VCC Mode,the charge Pump Setting (8Dh) must be set as follow:

8Dh:Charge Pump Setting 10h:Disable Charge Pump

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



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

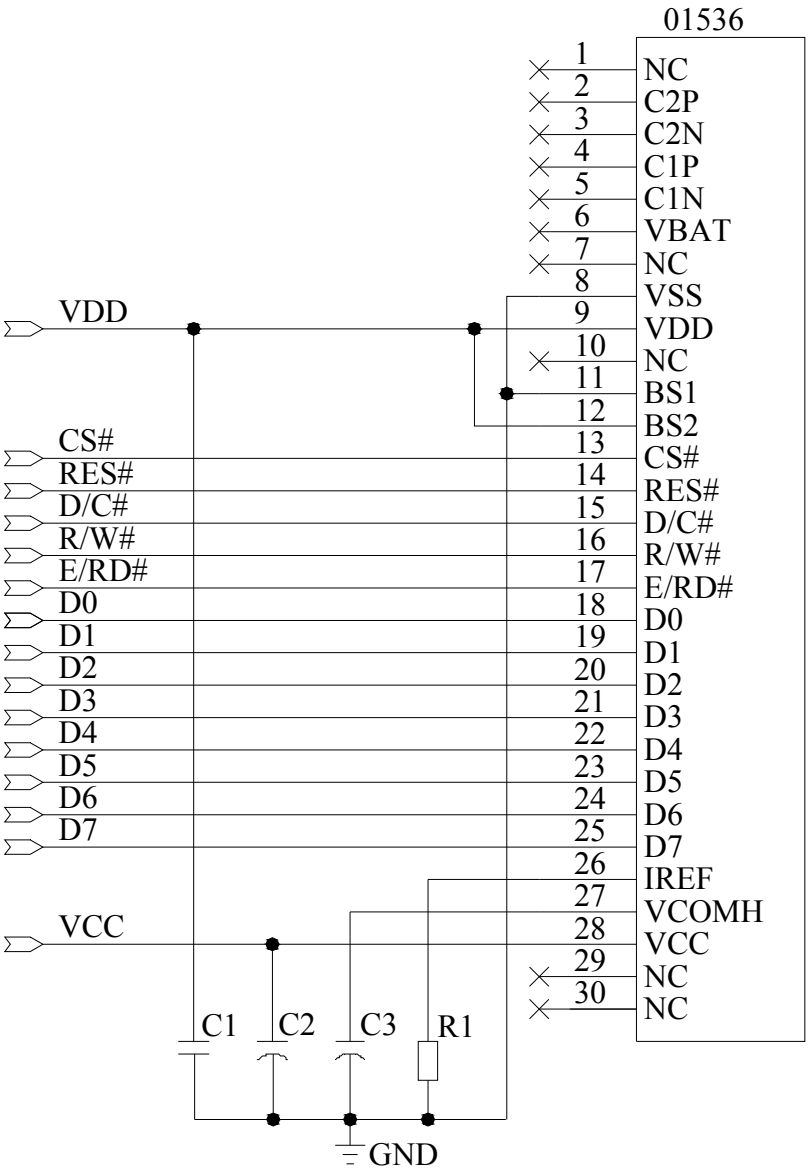
Recommended components

C1 : 0.1uF-0603-X7R±10%.RoHS

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

R1: 0603 1/10W +/-5% 390K ohm.RoHS

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



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

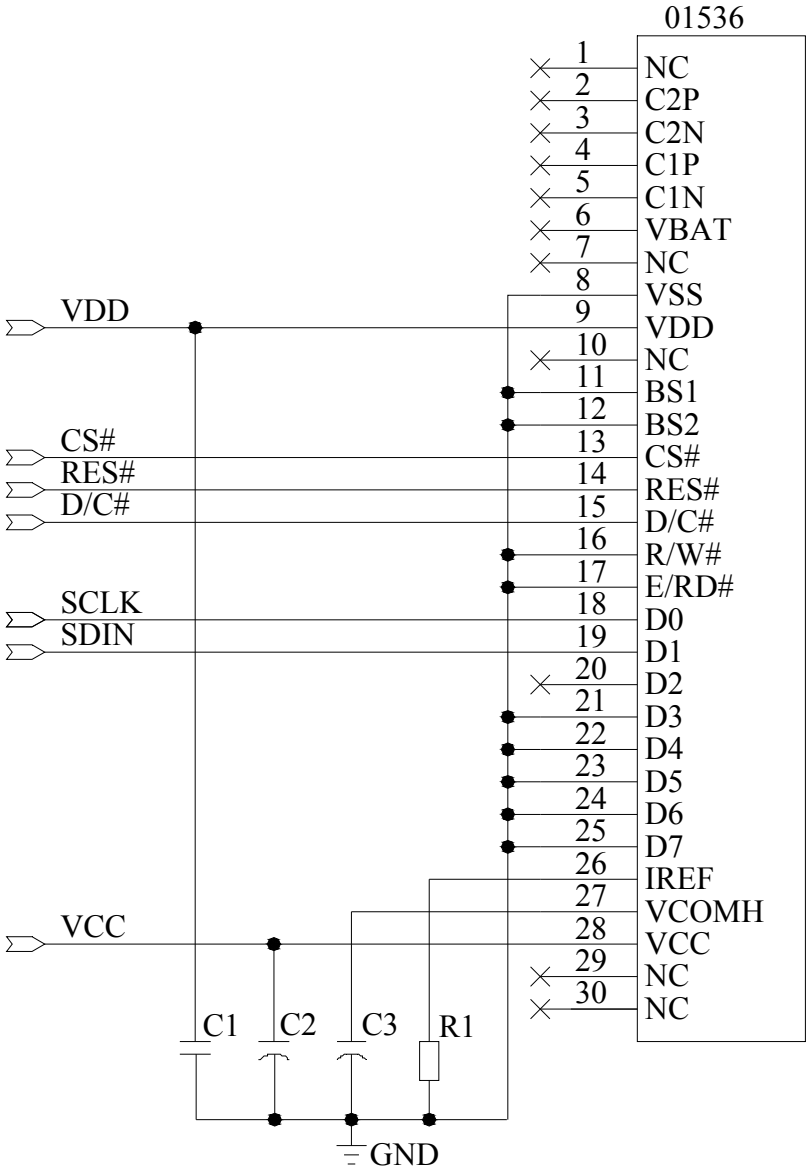
Recommended components

C1 : 0.1uF-0603-X7R±10%.RoHS

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

R1: 0603 1/10W +/-5% 390K ohm.RoHS

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



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

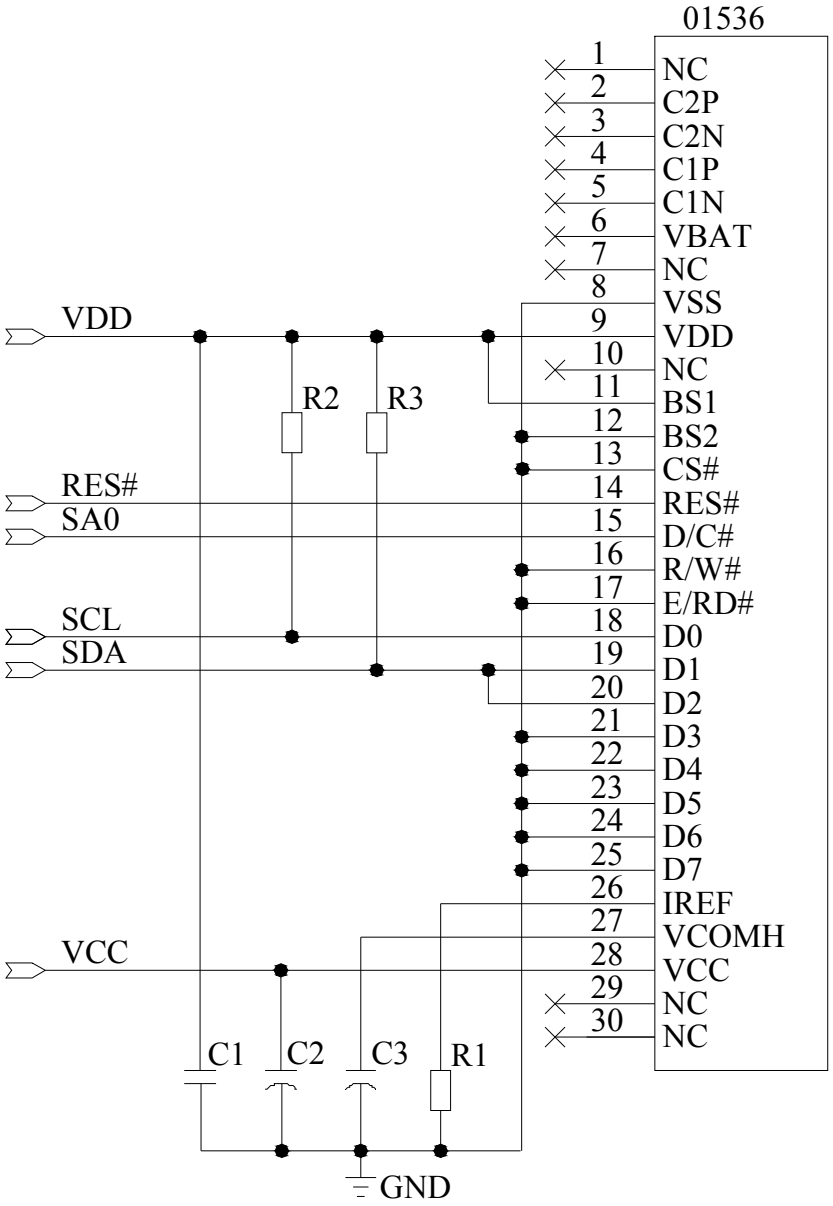
Recommended components

C1 : 0.1uF-0603-X7R±10%.RoHS

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

R1: 0603 1/10W +/-5% 390K ohm.RoHS

(4).The configuration for I²C interface mode, external VCC is shown in the following diagram



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

SA0	Slave address
0	0X78
1	0X7A

Recommended components

C1 : 0.1uF-0603-X7R±10%.RoHS

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

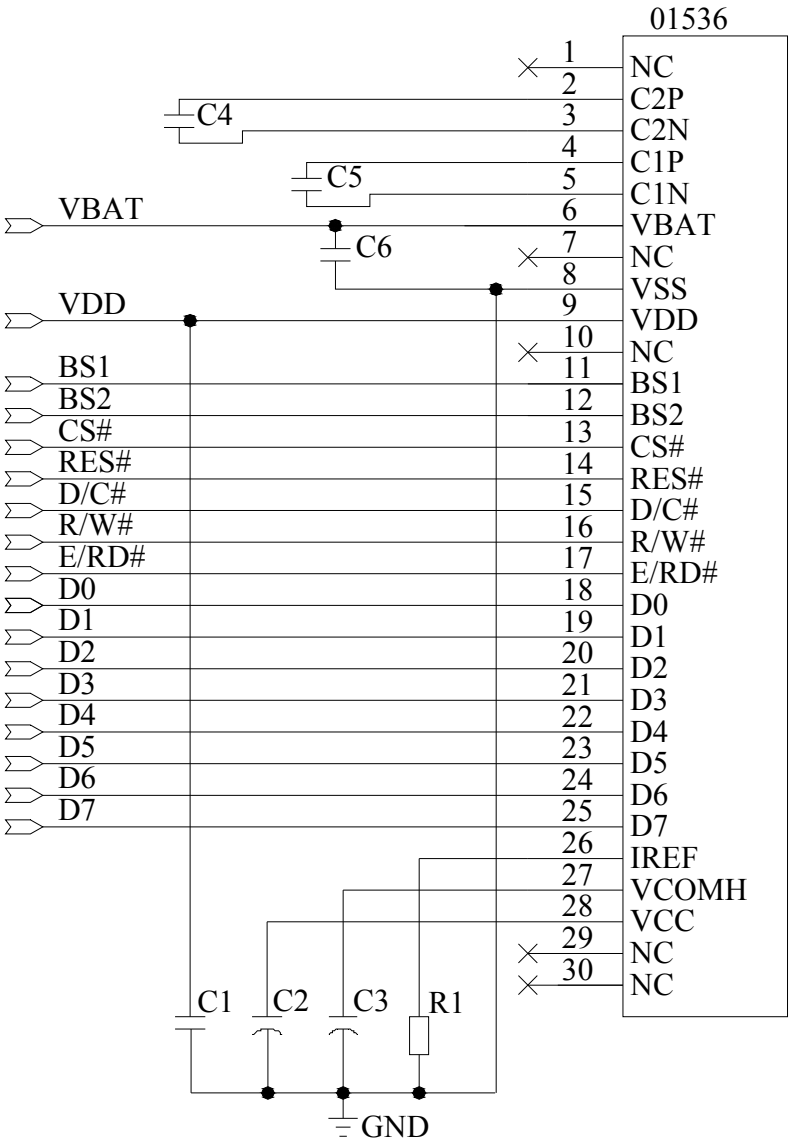
R1: 0603 1/10W +/-5% 390K ohm.RoHS

R2,R3: 0603 1/10W +/-5% 10K ohm.RoHS

9.3.2 Under Internal DC/DC Mode,the charge Pump Setting (8Dh) must be set as follow:

8Dh:Charge Pump Setting 14h:Enable Charge Pump

The configuration for VCC Generated by Internal DC/DC Circuit is shown in the following diagram:



MCU interface Selection : BS1,BS2

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

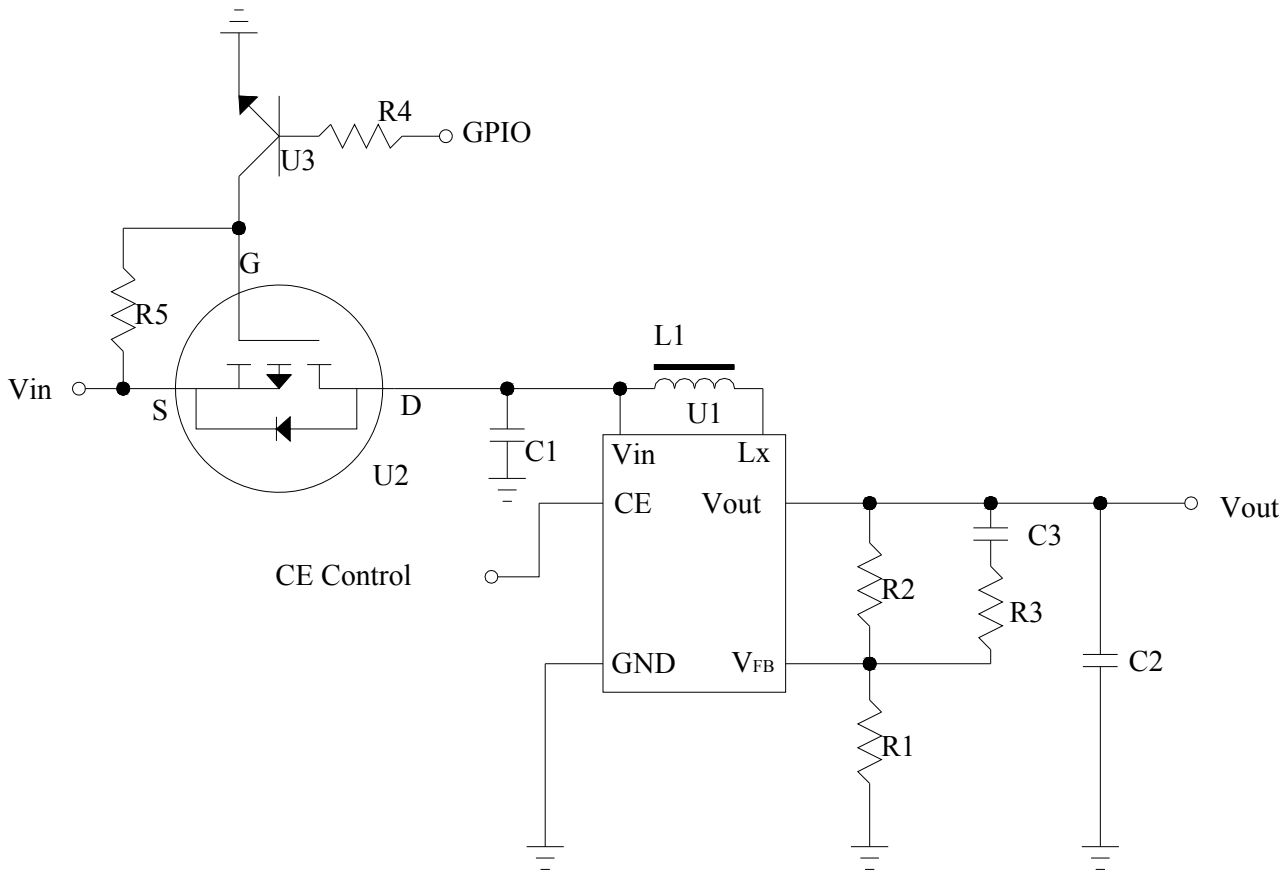
Recommended components

C1, C4, C5, C6: 1uF-0603-X7R±10%.RoHS

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

R1: 0603 1/10W +/-5% 390K ohm.RoHS

9.4 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% 62Kohm.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

9.5 Display Control Instruction

Refer to SSD1306ZC IC Specification.

9.6 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(0x80);
    Write_Command(0xA8);      //Multiplex ration mode:63
    Write_Command(0x3F);
    Write_Command(0xD3);      //Set Display Offset
    Write_Command(0x00);
    Write_Command(0x40);      //Set Display Start Line
    Write_Command(0x8D);      //Charge Pump Setting
    Write_Command(0x14);      //Enable charge pump during display on
    //Write_Command(0x10);    //Disable charge pump(RESET)
    Write_Command(0xA1);      //Segment Remap
    Write_Command(0xC8);      //Set COM Output Scan Direction
    Write_Command(0xDA);      //Common pads hardware: alternative
    Write_Command(0x12);
    Write_Command(0x81);      //Contrast control
    Write_Command(0xCF);
    Write_Command(0xD9);      //Set pre-charge period
    Write_Command(0xF1);
    Write_Command(0xDB);      //VCOM deselect level mode
    Write_Command(0x40);      //Set Vcomh
    Write_Command(0xA4);      //Set Entire Display On/Off
    Write_Command(0xA6);      //Set Normal Display
    Clear_Screen();
    Write_Command(0xAF);      //Set Display On
}
```

10 Package Specification

Controlled Seal

Packing Process(1)~(9)

(1) Tray Type:0019A-MT6-A

(2)

(3) order①、②、①、② fix trays with tape
660 pcs of 1 small carton
1 tray contain 30 pcs
22 contained trays, 1 empty tray

(4) Use vaccum bag to package the tray and add 5 bags of desiccant into the vacuum bag

(5) After tray be packaged, wrap the package in a bubble bag and seal with scoth tape.

(6)

(7)

small carton package
L390*W290*L120 mm

(8)

2 small cartons in 1 big carton

(9) 44 contained trays, 2 empty trays,
Package quantity products:
1320 pcs of 1 big carton

Package finished
L410*W310*L272 mm

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

2、Fill up the gap with tray.

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	Vibration	Frequency: 5~50Hz,0.5G Scan rate: 1 oct/min Time: 2 hrs/axis Test axis: X,Y, Z	1 Carton
8	Drop	Height: 100 cm Sequence: 1 angle, 3 edges and 6 faces	1 Carton

Test and measurement conditions

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

Evaluation criteria

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

11.2 Lifetime

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

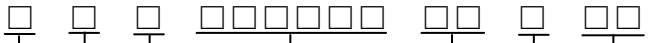
ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	20,000	-	hrs	100 cd/m^2, 50% alternating checkerboard, 22±3°C, 55±15% RH

Note:The lifetime of yellow is 40,000 hours. The lifetime of blue is 20,000 hours.

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°C; 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

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 2828.1-2003/ISO2859-1：1999, 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

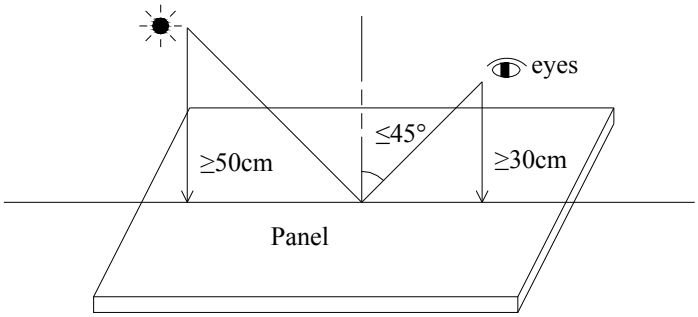
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: ≥50cm

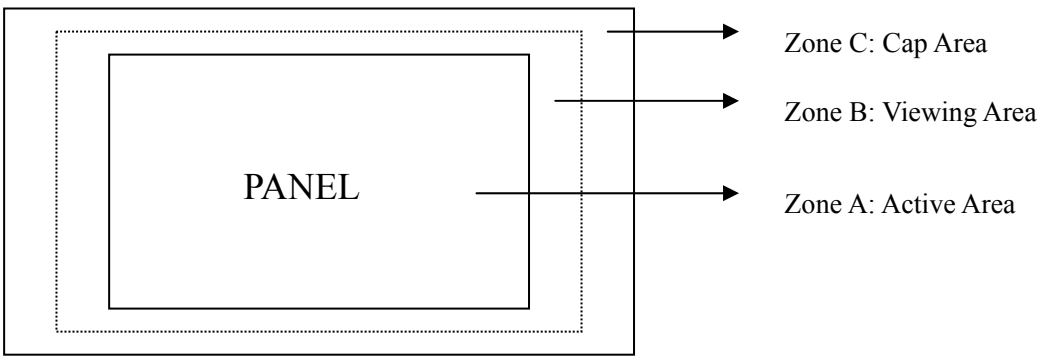
Distance between the Panel & Eyes: ≥30cm

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

(See the sketch below)

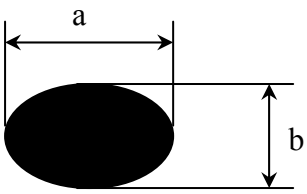


13.3 Quality Assurance Zones

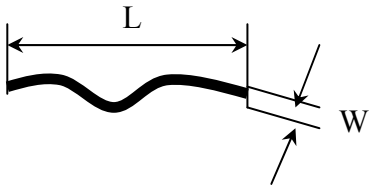


13.4 Inspection Standard

Definition of Φ&L&W (Unit: mm)

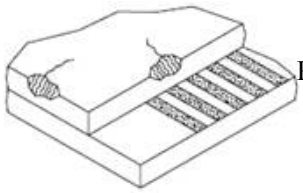
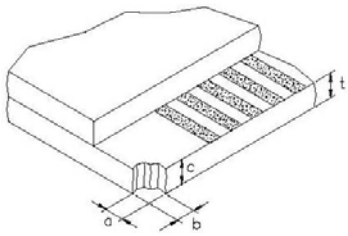
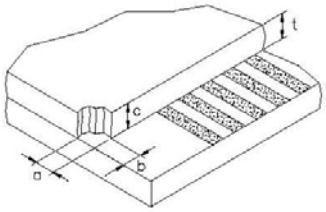
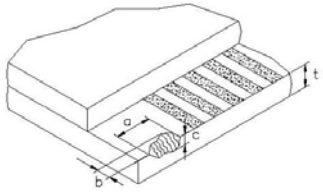
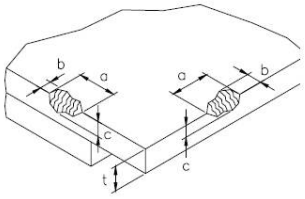
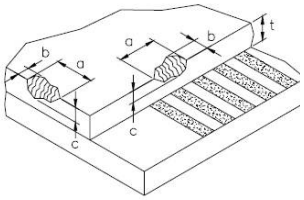


Φ=(a+b)/2



Ⅰ. Appearance Defects

NO.	ITEM	CRITERIA	CLASSIFICATION
1	Polarizer Black or White spot, Dirty spot, Foreign matter, Dent on the polarizer	<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>	Minor
2	Scratch/line on the glass/Polarizer	<table><tr><td rowspan="2">Width (mm)</td><td rowspan="2">Length (mm)</td><td colspan="2">Acceptable Number</td></tr><tr><td>Zone A,B</td><td>Zone C</td></tr><tr><td>W≤0.03</td><td>---</td><td>Ignore</td><td rowspan="3">Ignore</td></tr><tr><td>0.03<W≤0.08</td><td>L≤5.0</td><td>3</td></tr><tr><td>W>0.08</td><td>---</td><td>0</td></tr></table>	Minor
3	Polarizer Bubble	<table><tr><td rowspan="2">Average Diameter (mm)</td><td colspan="2">Acceptable Number</td></tr><tr><td>Zone A,B</td><td>Zone C</td></tr><tr><td>Φ>0.5</td><td>0</td><td rowspan="3">Ignore</td></tr><tr><td>0.2<Φ≤0.5</td><td>3</td></tr><tr><td>Φ≤0.2</td><td>Ignore</td></tr></table>	Minor
4	Any Dirt & Scratch on Polarizer's Protective Film	Ignore for not affect the polarizer.	Minor
5	Any Dirt on Cap Glass	<table><tr><td>Average Diameter (mm)</td><td>Acceptable Number</td></tr><tr><td>Φ≤0.5</td><td>Ignore</td></tr><tr><td>0.5<Φ≤1.0</td><td>3</td></tr><tr><td>Φ>1.0</td><td>0</td></tr></table>	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: no higher than 300℃ and 3~4 sec during soldering.

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.