# Product Specification

**（Common Application）**

**Product Name: VGM160080A1F01**

**Product Code: M03330**

| Customer |
| --- |
| |
| **Approved by Customer** |
| |
| **Approved Date:** |

| Designed By | Checked By | Approved By | |
| --- | --- | --- | --- |
| | | R&D | QA |
| 王鹏 11-11/21 | 11.12/11 | 2021.11.12 | 2021.11.12 |

# CONTENT

# REVISION RECORD

| REV. | REVISION DESCRIPTION | REV. DATE | REMARK |
|---|---|---|---|
| Y01 | Initial Release. | 2019-09-09 | |
| Y02 | Modify company name<br>Update Electrical Characteristics<br>Update Recommended Software Initialization | 2021-03-01 | All page<br>Page 8~9<br>Page 23 |
| Y03 | Remove “External DC-DC application circuit”<br>Modify pin name<br>Update Package Specification | 2021-11-15 | Page19~21<br>Page 25 |
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# 1 Application filed

Common Application

# 2 Overview

VGM160080A1F01 is a Full color OLED display module with 160×80 dot matrix. The characteristics of this display module are high brightness, self-emission, high contrast ratio, slim/thin outline, wide viewing angle, wide temperature range, and low power consumption.

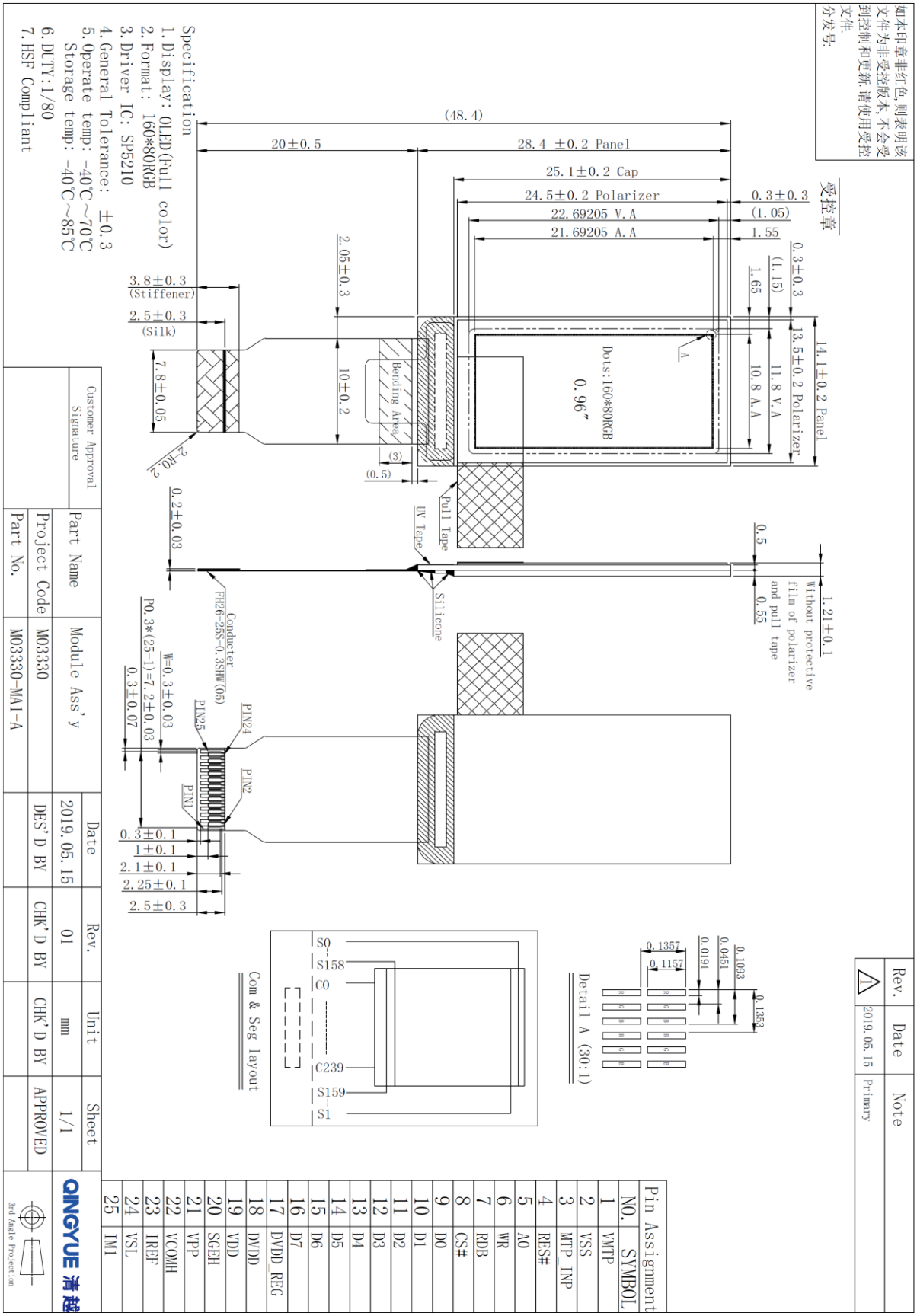
# 3 Features

- Display Color: Full color
- Dot Matrix:160×80RGB
- Driver IC: SP5210
- Interface: 8-6800,4-wire SPI
- Wide range of operating temperature: -40℃ to 70℃
- Wide range of Storage temperature: -40℃ to 85℃

# 4 Mechanical Data

| NO. | ITEM | SPECIFICATION | UNIT |
|---|---|---|---|
| 1 | Dot Matrix | 160(W)×80(H) | - |
| 2 | Dot Size | 0.1157(W)×0.0191(H) | $mm^2$ |
| 3 | Dot Pitch | 0.1357(W)×0.0451(H) | $mm^2$ |
| 4 | Aperture Rate | 36.1 | % |
| 5 | Active Area | 21.69205.(W)×10.8(H) | $mm^2$ |
| 6 | Panel Size | 28.4(W)×14.1(H) ×1.05(T) | $mm^3$ |
| 7 | Module Size | 48.4 (W)×14.1(H) ×1.21(T) | $mm^3$ |
| 8 | Diagonal A/A Size | 0.96 | inch |
| 9 | Module Weight | TBD±10% | gram |

# 5 Mechanical Drawing

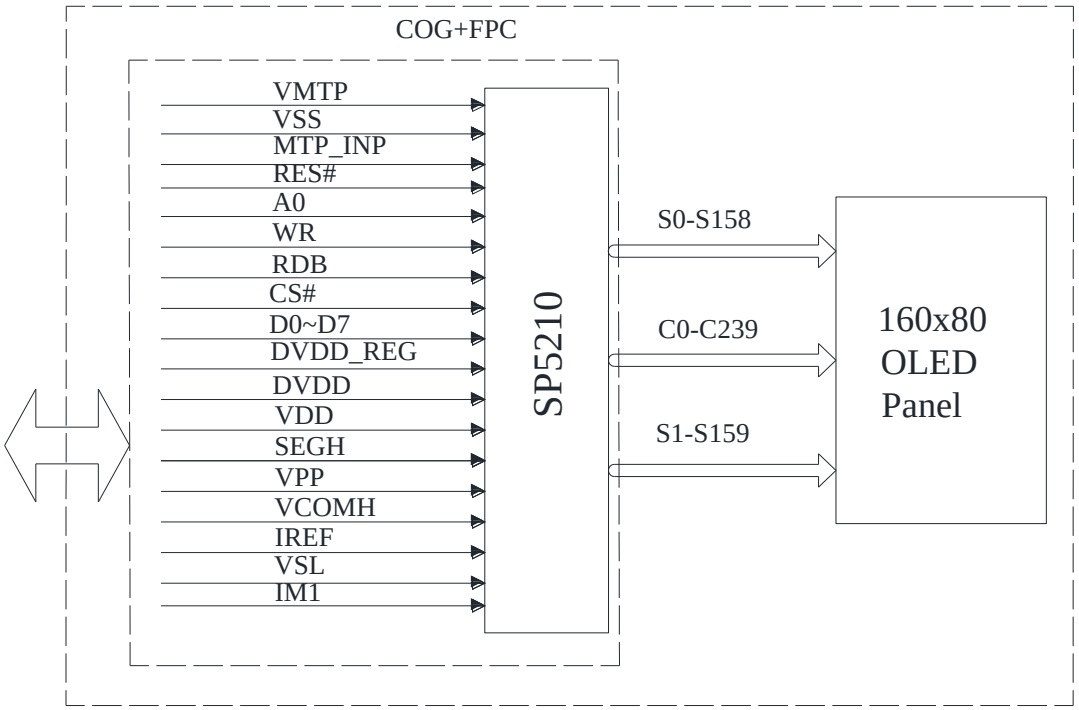



| Pin Assignment | |
|---|---|
| NO. | SYMBOL |
| 1 | VMTP |
| 2 | VSS |
| 3 | MTP_INP |
| 4 | RES# |
| 5 | A0 |
| 6 | WR |
| 7 | RDB |
| 8 | CS# |
| 9 | D0 |
| 10 | D1 |
| 11 | D2 |
| 12 | D3 |
| 13 | D4 |
| 14 | D5 |
| 15 | D6 |
| 16 | D7 |
| 17 | DVDD_REG |
| 18 | DVDD |
| 19 | VDD |
| 20 | SGEH |
| 21 | VPP |
| 22 | VCOMH |
| 23 | IREF |
| 24 | VSL |
| 25 | IM1 |

# 6 Module Interface

| PIN NO. | PIN NAME | DESCRIPTION |
|---|---|---|
| 1 | VMTP | When using external MTP power mode, this pad is power supply input for MTP function. (2.5V~3.6V). When using internal MTP power mode, a capacitor should be connected between this pad and VSS.<br>VDD \| MTP_INP \| VMTP<br>2.5V~3.6V \| L \| VDD<br>1.65V~2.49V \| H \| Capacitor |
| 2 | VSS | Ground. |
| 3 | MTP_INP | This pin is setting for external MTP power or internal MTP power.<br>MTP_INP = "H", internal MTP power.<br>MTP_INP = "L", external MTP power. |
| 4 | RES# | 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. This pin internal pull high. |
| 5 | A0 | This is the Data/Command control pad that determines whether the data bits are data or a command.<br>A0 = "H": the inputs at D0 to D7 are treated as display data.<br>A0 = "L": the inputs at D0 to D7 are transferred to the command registers. |
| 6 | WR | This is a MPU interface input pad.<br>When connected to a 6800 Series MPU: This is the read/write control signal input terminal.<br>When R/W = "H": Read; When R/W = "L": Write.<br>When in 4-wire interface, this pin is not used, so it must be connected to "L". |
| 7 | RDB | This is a MPU interface input pad.<br>When connected to a 6800 series MPU, this is active HIGH. This is used as an enable clock input of the 6800 series MPU. When in 4-wire interface, this pin is not used, so it must be connected to "L". |
| 8 | CS# | This pad is the chip select input. When CS# = "L", then the chip select becomes active, and data/command I/O is enabled. |
| 9~16 | D0~D7 | This is an 8-bit bi-directional data bus that connects to an 8-bit standard MPU data bus.<br>When the serial interface(SPI) is selected, then D0 serves as the serial clock input pad (SCL) and D1 serves as the serial data input pad (SI). |
| 17 | DVDD_REG | When VDD >1.98V, this pin should be connected to "H" to turn on regulator for digital circuit.<br>When VDD <1.98V, this pin should be connected to "L" to turn off regulator for digital circuit. |
| 18 | DVDD | This pin is for regulator circuit.<br>A capacitor should be connected between this pad and VSS |
| 19 | VDD | Power supply input for core VDD: 1.65V-3.6V. |
| 20 | SEGH | This is a segment pre-charge voltage.<br>A capacitor should be connected between this pad and VSS. |
| 21 | VPP | OLED panel power supply.<br>Connect to capacitor. It could be supplied externally. VPP : 8-18V. |
| 22 | VCOMH | This is a pad for the voltage output high level for common signals.<br>A capacitor should be connected between this pad and VSS. |
| 23 | IREF | This pin is the segment output current reference pin. A resistor should be connected between this pin and VSS. |
| 24 | VSL | Discharge voltage level pad.<br>This pad should be connected to VSS. |
| 25 | IM1 | H: 6800; L:4-SPI |

# 7 Function Block Diagram



# 8 Absolute Maximum Ratings

| ITEM | SYMBOL | MIN | MAX | UNIT | REMARK |
|---|---|---|---|---|---|
| Supply voltage | VDD | -0.3 | 4.0 | V | IC maximum rating |
| | VPP | -0.3 | 19.0 | V | IC maximum rating |
| Operating Temp. | Top | -40 | 70 | ℃ | - |
| Storage Temp | Tstg | -40 | 85 | ℃ | - |

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

Note (2): Permanent breakage of module may occur if the module is used beyond the maximum rating. The module can be normal operated under the conditions according to Section 9 "Electrical Characteristics". Malfunctioning of the module may occur and the reliability of the module may deteriorate if the module is used beyond the conditions.

# 9 Electrical Characteristics

## 9.1 DC Electrical Characteristics (Temporary standard)

| ITEM | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Operating Voltage | VPP | - | 15.5 | 16.0 | 16.5 | V |
| Logic Supply Voltage | VDD | - | 1.65 | - | 3.6 | V |
| High-level Output voltage | $V_{OHC}$ | $I_{OH}$ = -0.5mA (D0 - D7, and CL). | 0.8×VDD | - | VDD | V |
| Low-level Output voltage | $V_{OLC}$ | $I_{oL}$=0.5mA (D0,D2 - D7, and CL) | VSS | - | 0.2×VDD | V |
| High Logic Input voltage | $V_{IHC}$ | A0, D0 - D7, RDB, WR, CS#, CLS, CL, IM1and RES# . | 0.8×VDD | - | VDD | V |
| Low Logic Input voltage | $V_{ILC}$ | | VSS | - | 0.2×VDD | V |

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

## 9.2 Electro-optical Characteristics (Temporary standard)

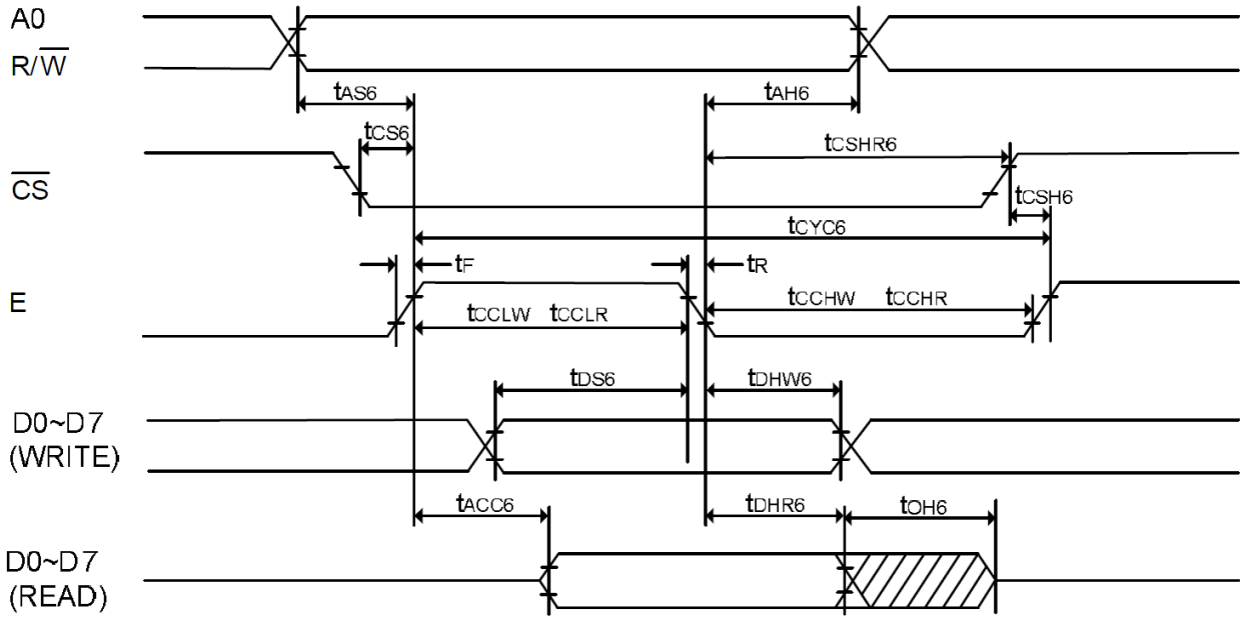
| ITEM | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| Normal Mode Brightness | $L_{br}$ | All pixels ON(1) (With polarizer) | 75 | 90 | - | $cd/m^2$ |
| VDD Sleep mode Current | (DVDD regulator off & OSC off) | During sleep, TA = +25˚C, VDD = 1.8V(SRAM power off) | - | 0.02 | 10 | uA |
| | (DVDD regulator on & OSC off) | During sleep, TA = +25˚C, VDD = 2~3.6V (SRAM power off) | - | 100 | 120 | |
| VPP Sleep mode Current | ISP_VPP | During sleep, TA = +25˚C, VPP = 15V (External ) | - | 0.02 | 10 | uA |
| Normal Mode Power Consumption | Pt | All pixels ON(1) | - | 240 | 312 | mW |
| C.I.E(White) | (x) | x,y(CIE1931) | 0.22 | 0.26 | 0.30 | - |
| | (y) | | 0.26 | 0.30 | 0.34 | - |
| C.I.E(Red) | (x) | | 0.58 | 0.62 | 0.66 | |
| | (y) | | 0.30 | 0.34 | 0.39 | |
| C.I.E(Green) | (x) | | 0.27 | 0.31 | 0.35 | |
| | (y) | | 0.57 | 0.61 | 0.65 | |
| C.I.E(Blue) | (x) | | 0.19 | 0.13 | 0.17 | |
| | (y) | | 0.08 | 0.12 | 0.16 | |
| Dark Room Contrast | CR | - | ≥10000:1 | - | - | - |
| Response Time | - | - | - | 10 | - | μ s |
| View Angle | - | - | ≥160 | - | - | Degree |

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

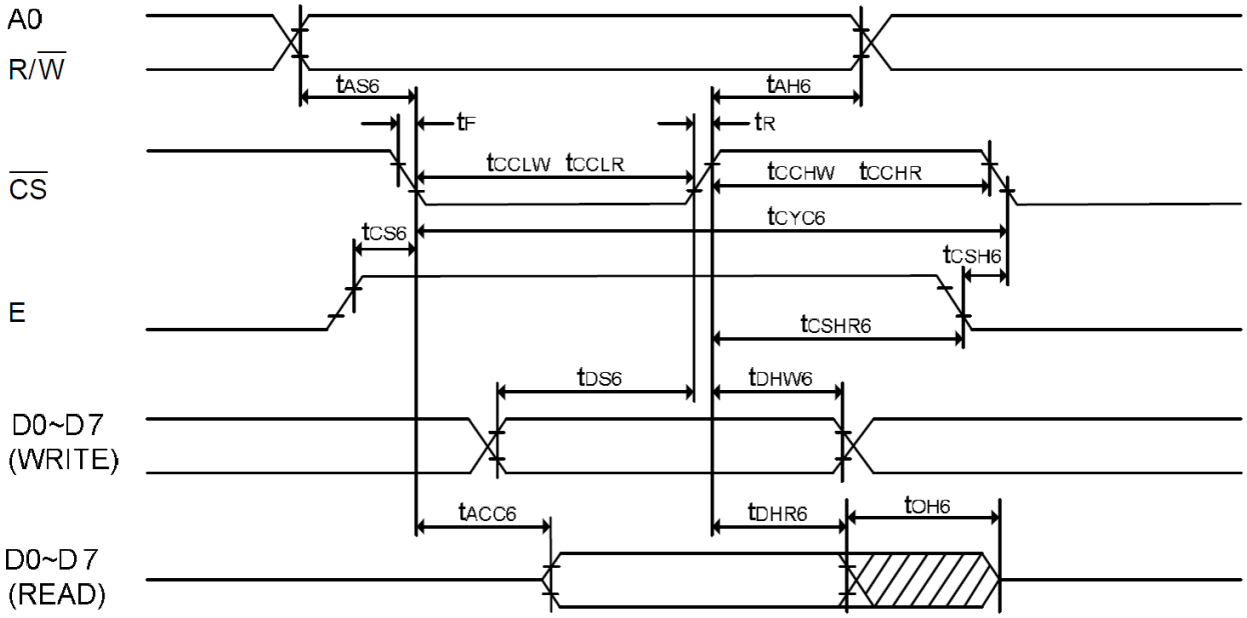
- Driving voltage : 16V
- Contrast setting : TBD
- Frame rate : TBD
- Duty setting : 1/80

## 9.3 AC Electrical Characteristics

### (1) System buses Read/Write Characteristics (For the 6800 Series Interface)




6800-series parallel interface cycle (Form1)

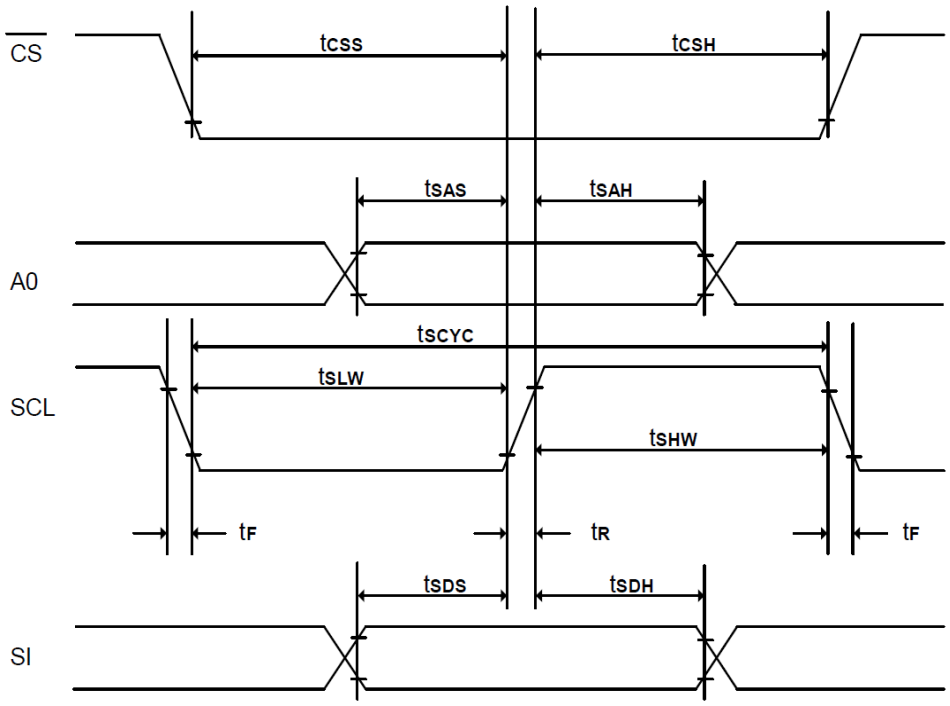



6800-series parallel interface cycle (Form2)

(VDD = 1.65 – 3.6V, T**A** = +25℃)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| $t_{CYC6}$ | System cycle time | 200 | - | - | ns | |
| $t_{AS6}$ | Address setup time | 0 | - | - | ns | |
| $t_{AH6}$ | Address hold time | 0 | - | - | ns | |
| $t_{DS6}$ | Data setup time | 40 | - | - | ns | |
| $t_{DHW6}$ | Write Data hold time | 10 | - | - | ns | |
| $t_{DHR6}$ | Read Data hold time | 10 | - | - | ns | |
| $t_{OH6}$ | Output disable time | - | - | 70 | ns | $C_L$ = 100pF |
| $t_{ACC6}$ | Access time | - | - | 140 | ns | $C_L$ = 100pF |
| $t_{EWHW}$ | Enable H pulse width (Write) | 150 | - | - | ns | |
| $t_{EWHR}$ | Enable H pulse width (Read) | 150 | - | - | ns | |
| $t_{EWLW}$ | Enable L pulse width (Write) | 150 | - | - | ns | |
| $t_{EWLR}$ | Enable L pulse width (Read) | 150 | - | - | ns | |
| $t_R$ | Rise time | - | - | 15 | ns | |
| $t_F$ | Fall time | - | - | 15 | ns | |
| $t_{CS6}$ | Chip select setup time | 0 | - | - | ns | |
| $t_{CSH6}$ | Chip select hold time | 20 | - | - | ns | |
| $t_{CSHR6}$ | Chip select hold time to read signal | 20 | - | - | ns | |

(2). **System buses Write characteristics 2 (For 4 wire SPI)**



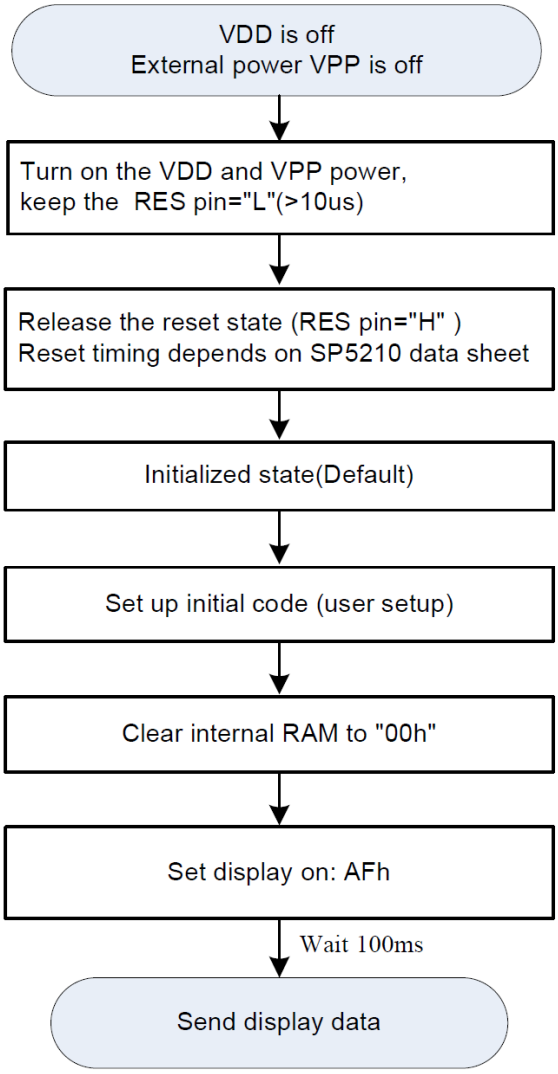

(VDD = 1.65 – 3.6V, T**A** = +25℃)

| Symbol | Parameter | Min. | Typ. | Max. | Unit | Condition |
|---|---|---|---|---|---|---|
| tSCYC | Serial clock cycle | 50 | - | - | ns | |
| tSAS | Address setup time | 30 | - | - | ns | |
| tSAH | Address hold time | 30 | - | - | ns | |
| tSDS | Data setup time | 20 | - | - | ns | |
| tSDH | Data hold time | 20 | - | - | ns | |
| tCSS | $\overline{CS}$ setup time | 45 | - | - | ns | |
| tCSH | $\overline{CS}$ hold time time | 12 | - | - | ns | |
| tSHW | Serial clock H pulse width | 20 | - | - | ns | |
| tSLW | Serial clock L pulse width | 20 | - | - | ns | |
| tR | Rise time | - | - | 3 | ns | |
| tF | Fall time | - | - | 3 | ns | |

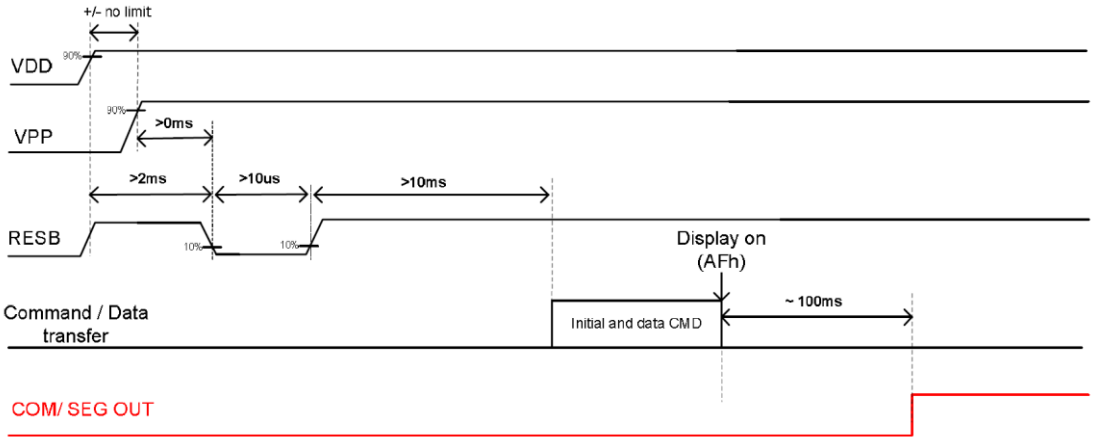
# 10 Functional Specification and Application Circuit

## 10.1 Power ON and Power OFF Sequence

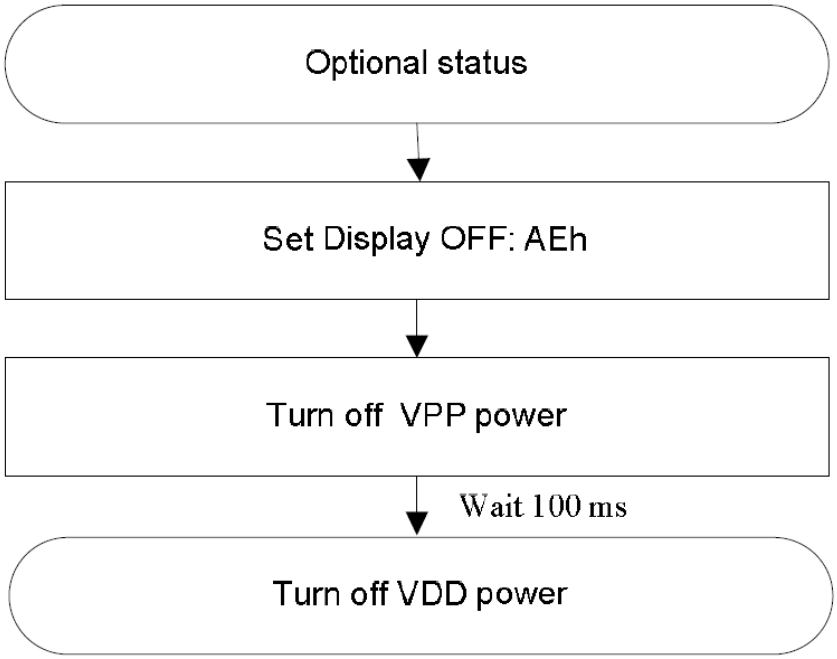
External power is being used immediately after turning on the power:



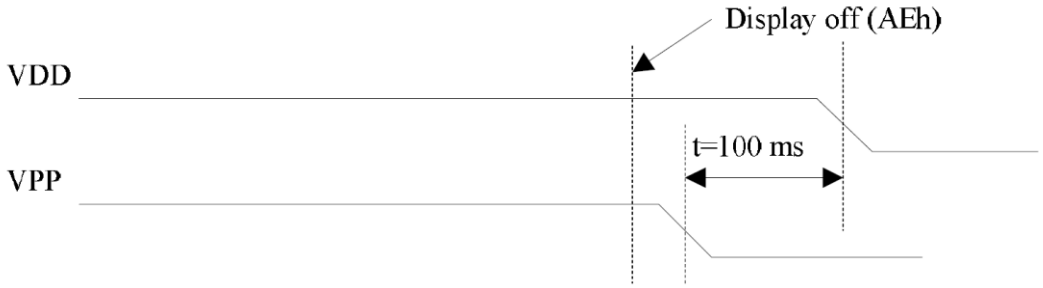

**Power ON Sequence:**



**Power OFF:**

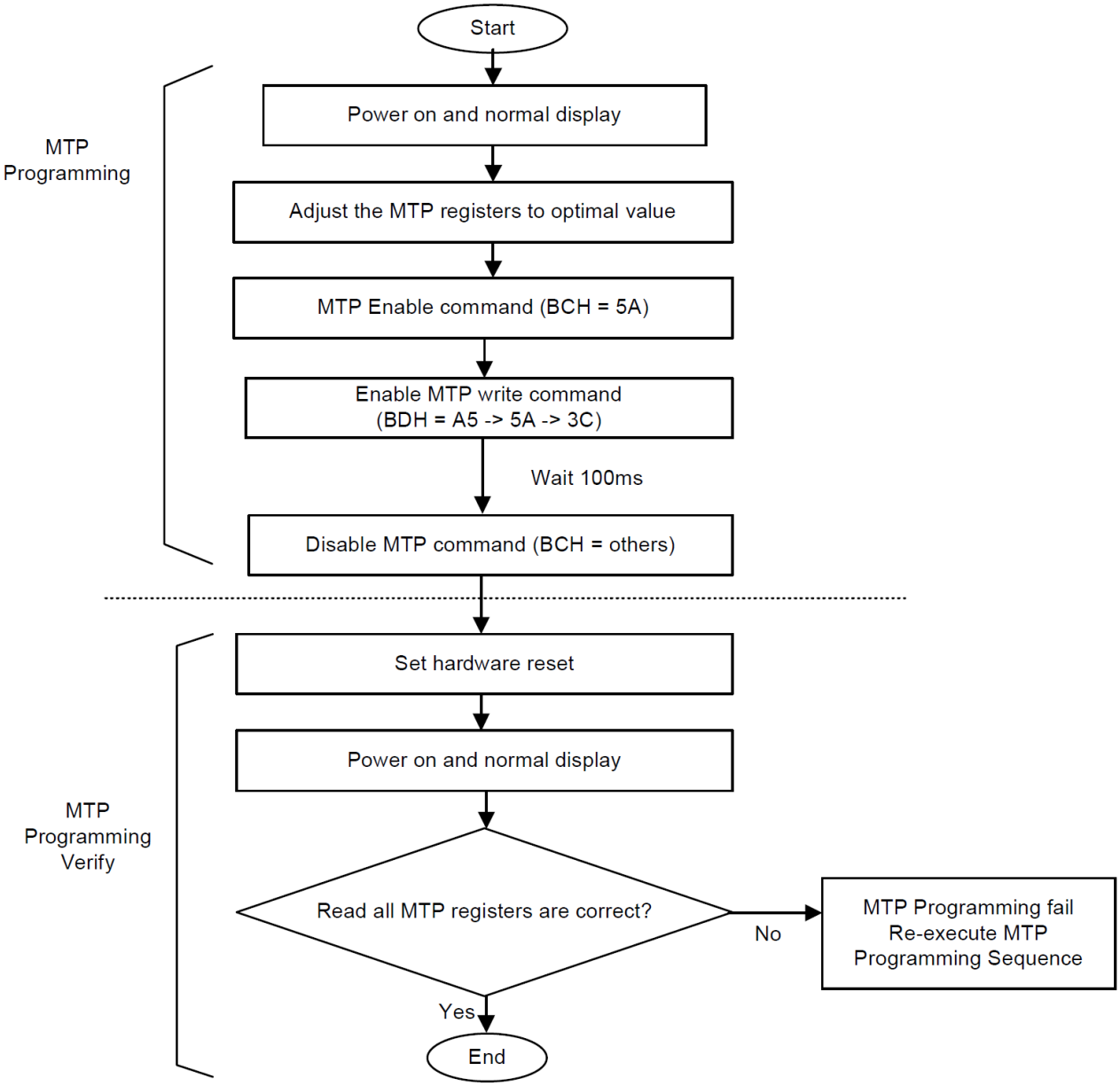



**Power OFF Sequence:**



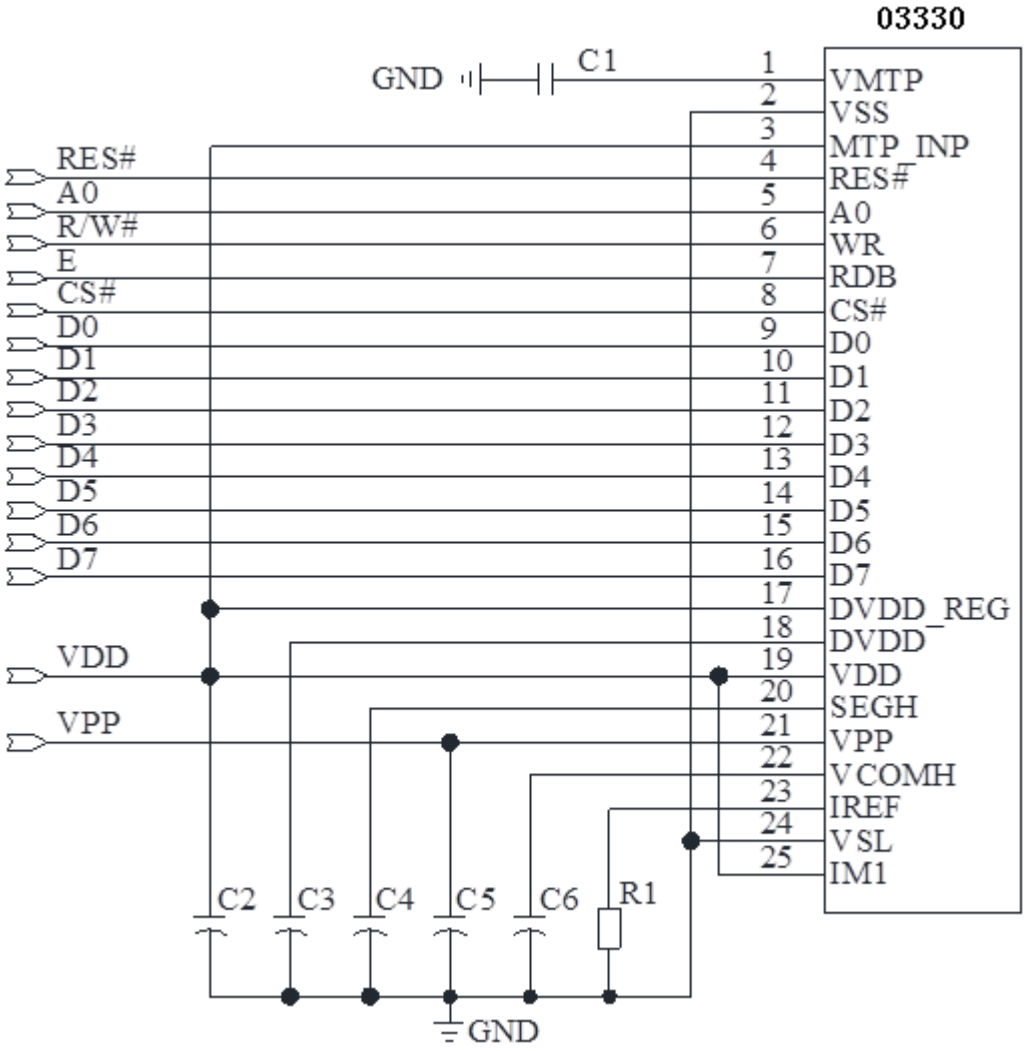

Note：There will be no damages to the display module if the power sequences are not met.

## 10.2 MTP Write Sequence



## 10.3 Application Circuit

10.3.1 The configuration for 8 bit 6800 interface mode, When VDD＞1.98V, VPP supply by external is shown in the following diagram:




Pin connected to MCU interface: D0~D7, CS#,E,R/W#,A0,RES#

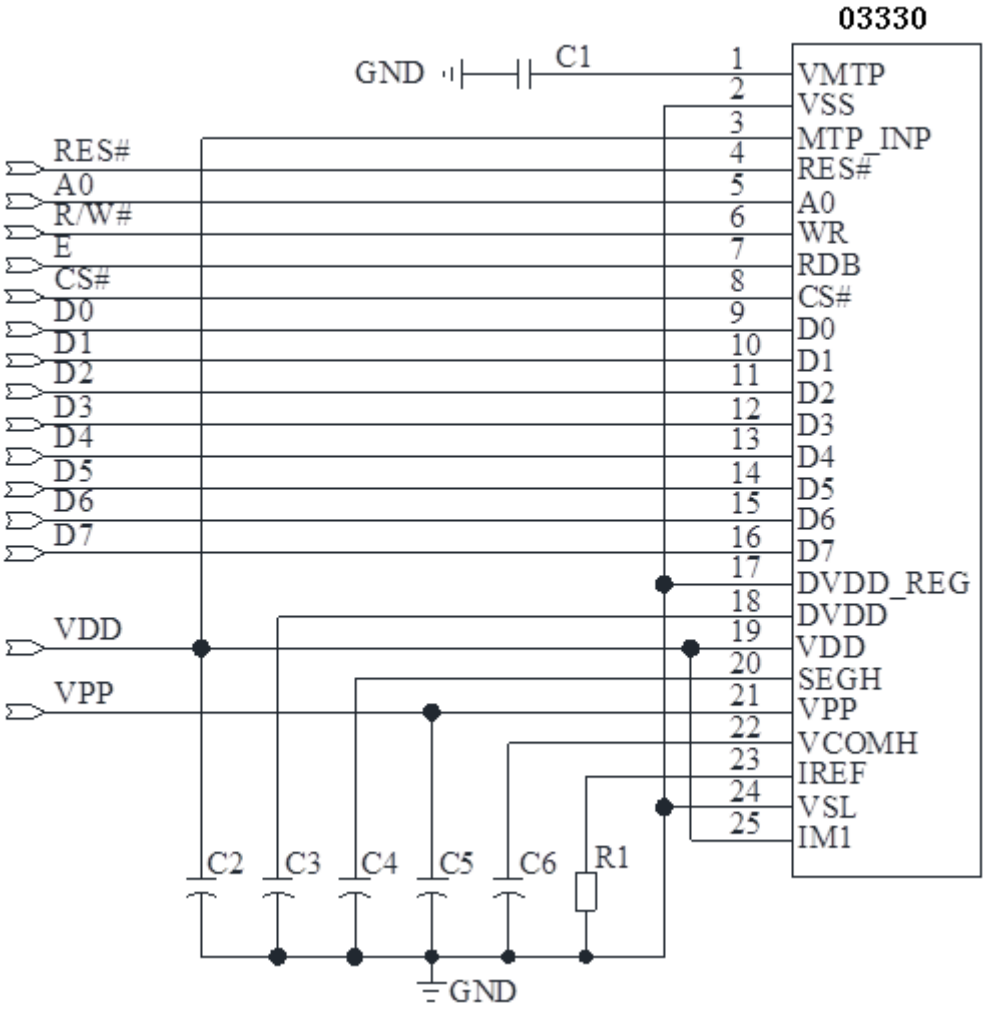
### Recommended components

C1: 1uF-0603-X7R±10%.RoHS

C2~C6: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

10.3.2 The configuration for 8 bit 6800 interface mode, When VDD＜1.98V, VPP supply by external is shown in the following diagram:




Pin connected to MCU interface: D0~D7, CS#,E,R/W#,A0,RES#

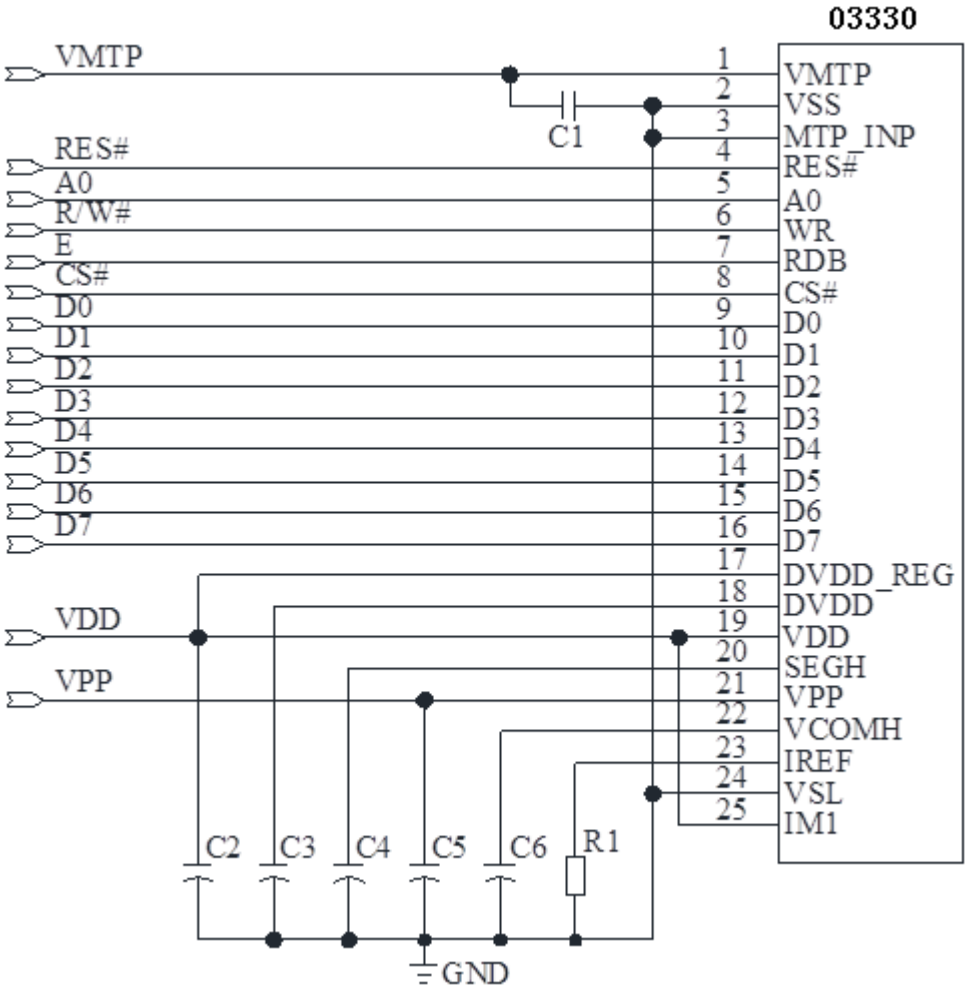
### Recommended components

C1: 1uF-0603-X7R±10%.RoHS

C2~C6: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

10.3.3 The configuration for 8 bit 6800 interface mode, When VDD＞1.98V ,VMTP supply by external is shown in the following diagram:




Pin connected to MCU interface: D0~D7, CS#,E,R/W#,A0,RES#

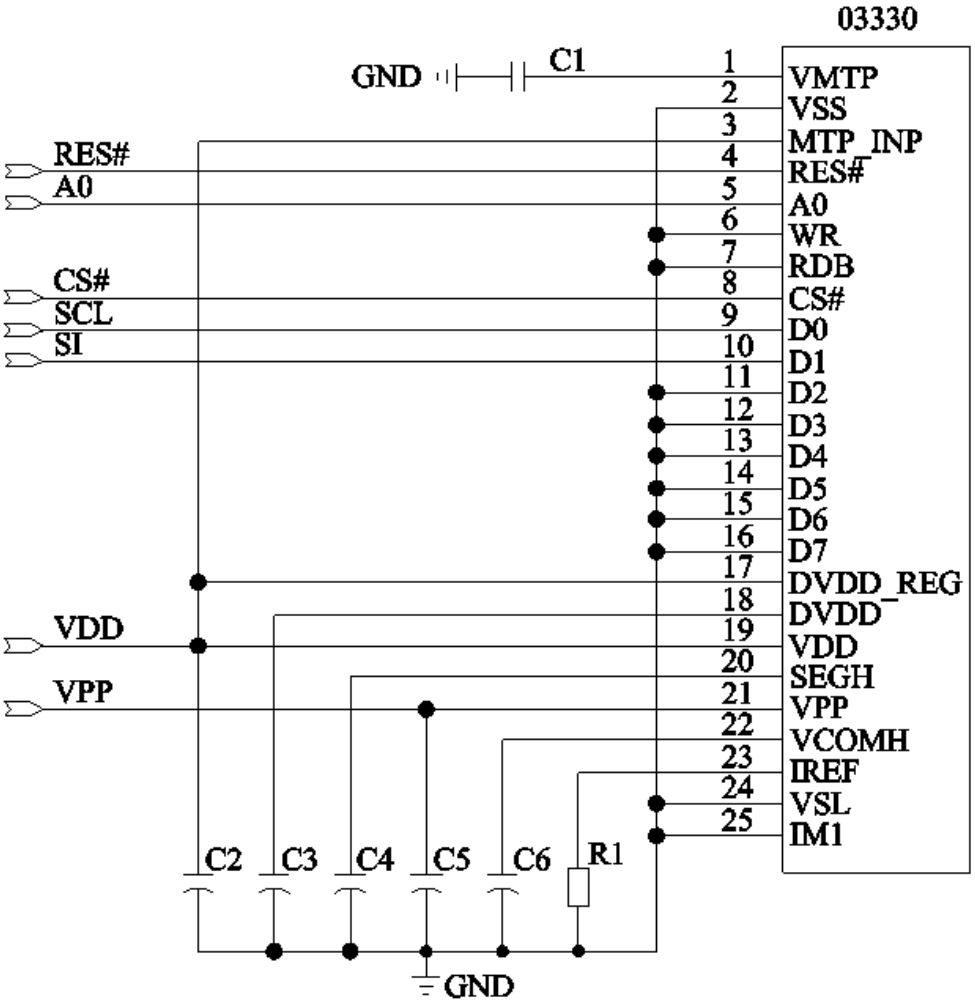
## Recommended components

C1: 1uF-0603-X7R±10%.RoHS

C2~C6: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

10.3.4 The configuration for 4-SPI interface mode, When VDD＞1.98V, VPP supply by external is shown in the following diagram:




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

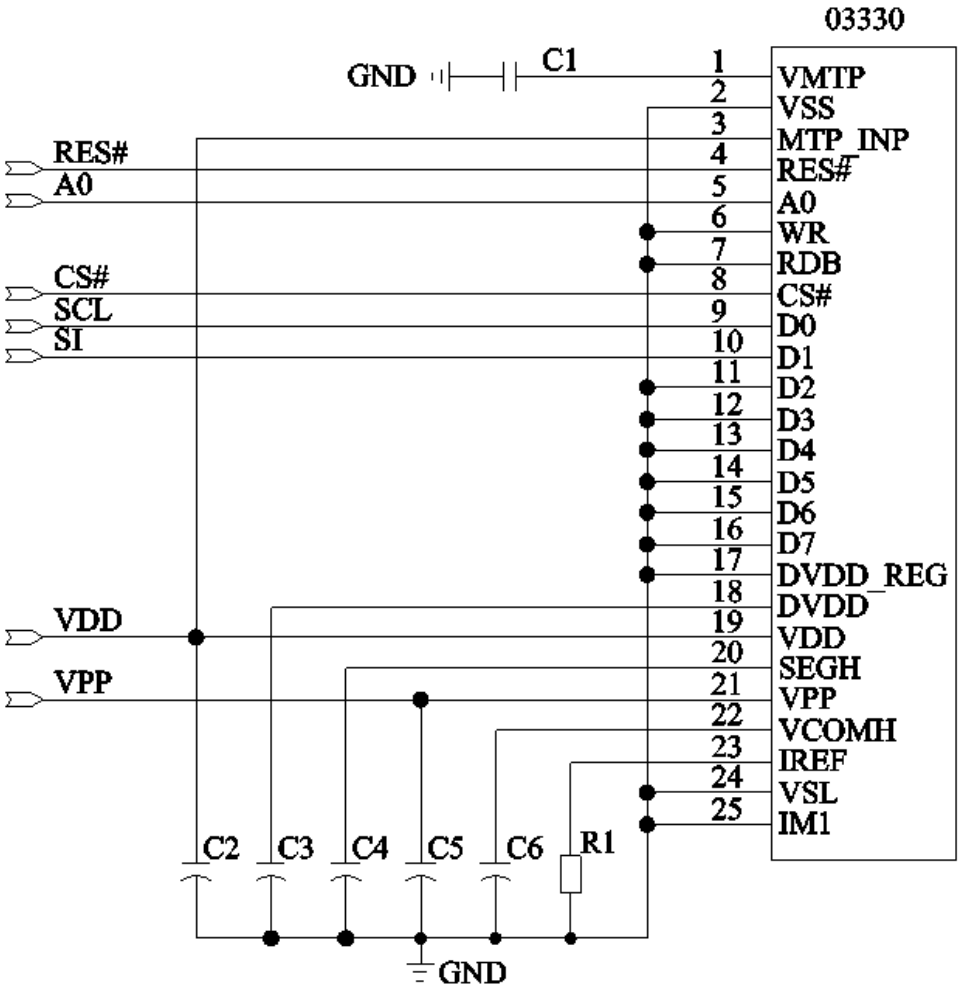
**Recommended components**

C1: 1uF-0603-X7R ±10%.RoHS

C2~C6: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

10.3.5 The configuration for 4-SPI interface mode, When VDD＜1.98V, VPP supply by external is shown in the following diagram:




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

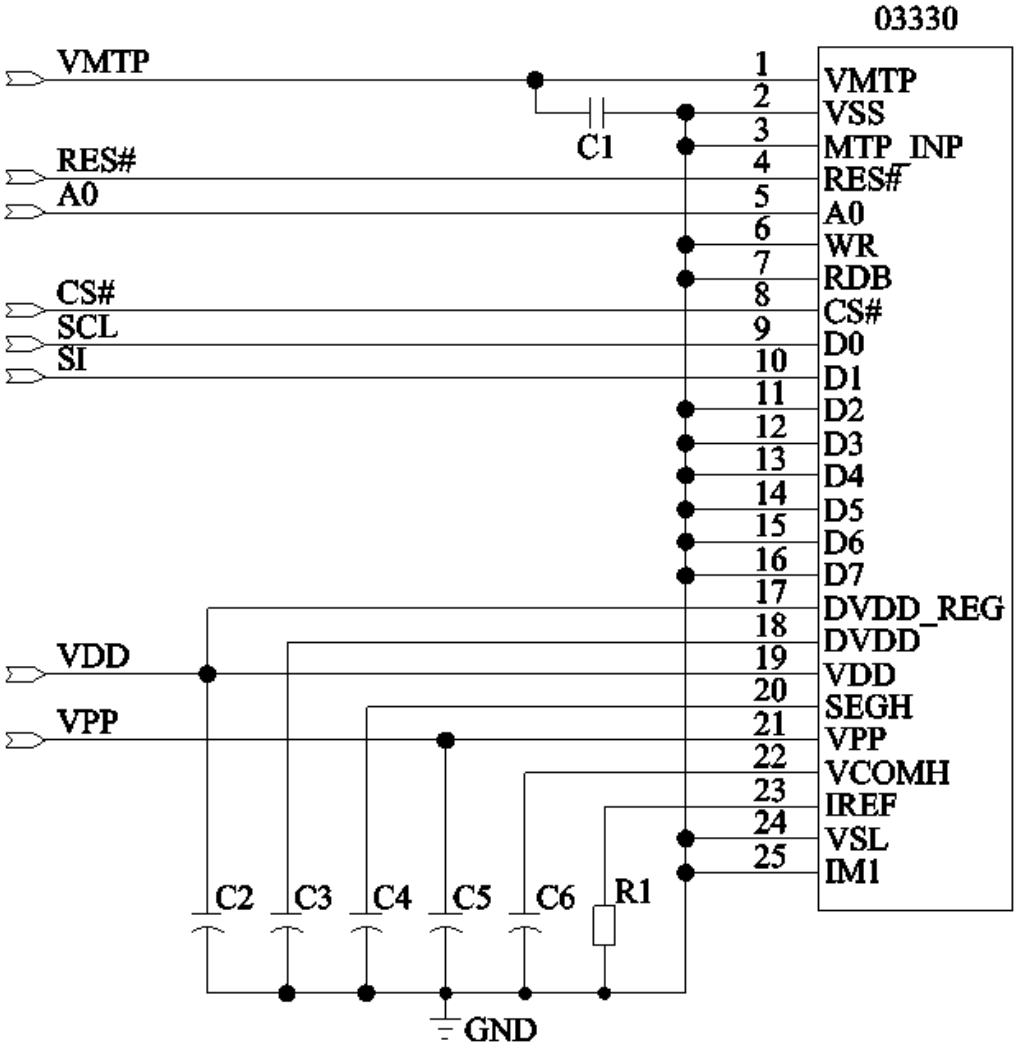
**Recommended components**

C1: 1uF-0603-X7R ±10%.RoHS

C2~C6: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

10.3.6 The configuration for 4-SPI interface mode, When VDD＞1.98V ,VMTP supply by external is shown in the following diagram:




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

### Recommended components

C1: 1uF-0603-X7R±10%.RoHS

C2~C6: 4.7μF/25V.RoHS (Tantalum Capacitors)

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

## 10.4 Display Control Instruction

Refer to SP5210 IC Specification.

## 10.5 Recommended Software Initialization (Temporary standard)

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_com(0xAE,1);
    write_com(0xAC,0);
    write_com(0x00,1);    //01：GARY mode，00：color mode
    write_com(0xDF,1);    //0xDE：MLA OFF，0xDF：MLA ON
    write_com(0x5B,0);    //5B
    write_com(0x00,1);    //80:MLA on      00:MLA OFF
    write_com(0xD6,1);    //ADPS on
    write_com(0x20,0);    //Set Memory addressing mode
    write_com(0x00,1);
    write_com(0xD5,0);    //Set Display Clock Divide Ratio/Oscillator Frequency
    write_com(0x0F,1);
    write_com(0x80,0);    //contrast
    write_com(0xFF,1);
    write_com(0xA2,0);    //Set Display Start Line
    write_com(0x00,0);
    write_com(0x00,1);
    write_com(0xA8,0);    //Set Multiplex Ratio
    write_com(0x4F,1);    //80
    write_com(0xAD,0);    //Set External or Internal IREF
    write_com(0x00,1);    //00:External ; 04:1.3M ; 05:910K ; 06:750K ; 07:560K
    write_com(0xDD,0);    //Current Level pre-charge control and VSEGH Level control
    write_com(0x1F,1);
    write_com(0xC0,1);      //Set Common Output Scan Direction:COM0 to COM [N -1].
    write_com(0xD9,0);    //Set Discharge/Pre-charge Period
    write_com(0x07,0);
    write_com(0x0A,0);
    write_com(0x0D,0);
    write_com(0x0D,0);
    write_com(0x0D,0);
```

```
        write_com(0x0D,0);
        write_com(0x29,1);
        write_com(0xA4,1);    //Set Entire Display OFF/ON
        write_com(0xA6,1);    //Set Normal/Reverse Display
         clear_screen();
        write_com(0xAF,1); //display on
        delay_ms(20);
}
```

# 11 Package Specification

Controlled Seal

Packing Process(1)~(9)

(1) Tray Type: 03330-MT5-A




(2)



② 180° revers

① normal

TRAY

(3) order①、②、①、② fix trays with tape
880 pcs of 1 small carton
1 tray contain 44 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

(8)




2 small cartons in 1 big carton

(9) 44 contained trays, 2 empty trays,
Package quantity products: 1760 pcs of 1 big carton




Package finished

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 ⓔ.

4、Packaging materials are not recommended for recycling .

# 12 Reliability

## 12.1 Reliability Test

| NO. | ITEM | CONDITION | QUANTITY |
|---|---|---|---|
| 1 | High Temperature (Non-operation) | 85℃,240hrs | 5 |
| 2 | Low Temperature (Non-operation) | -40℃,240hrs | 5 |
| 3 | High Temperature (Operation) | 70℃,240hrs | 5 |
| 4 | Low Temperature (Operation) | -40℃,240hrs | 5 |
| 5 | High Temperature / High Humidity (Operation) | 60℃,90%RH,240hrs | 5 |
| 6 | Thermal shock (Non-operation) | -40 ℃ ~85 ℃ (-40 ℃ /30min;transit/5min;85 ℃ /30min;transit/5min) 1cycle: 70min,30cycles | 5 |
| 7 | ESD Air discharge (Non-operation) | ±8kV, Test 9 point; Each point discharge 10 times. Time interval is not less than 1 second. | 5 |

**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 | TBD | - | hrs | 90 cd/m$^2$, 50% alternating checkerboard, 22±3℃, 55±15% RH |

## 12.3 Failure Check Standard

After the completion of the described reliability test, the samples were left at room temperature for 2 hrs prior to conducting the failure test at 22±3℃; 55±15% RH.

## 13 Illustration of OLED Product Name

□ □ □ □□□□□□ □□ □ □□

**Flow No. :**

01~99

**Display Color :**

R—red

G—green

B—blue

Y—yellow

M—amber

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

Mixed—pixel number

**Product Type :**

P—panel

M—module

**Display Type :**

G—graphic

C—character

S—segment

I—Icon

M—mixed

**Company :**

V—QingYue

# 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

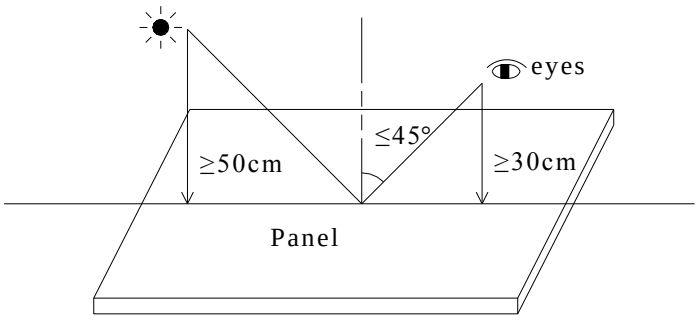
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: ≥50cm

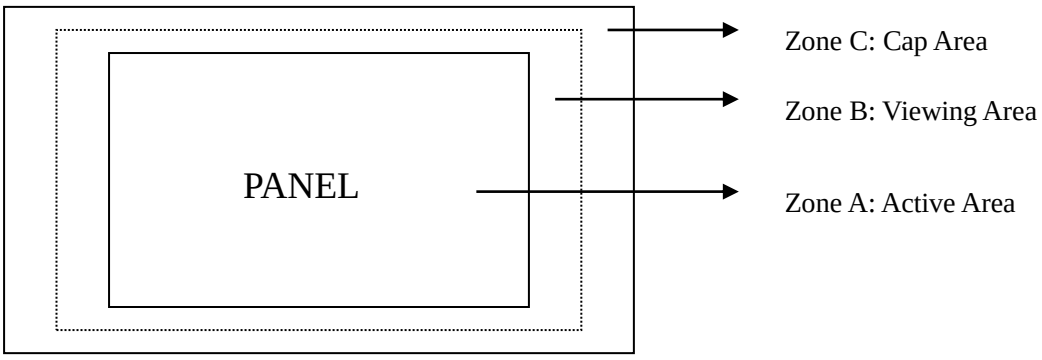
Distance between the Panel & Eyes: ≥30cm

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

*(See the sketch below)*

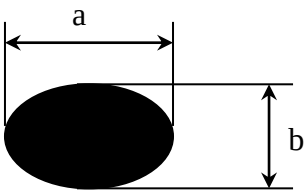



## 14.3 Quality Assurance Zones

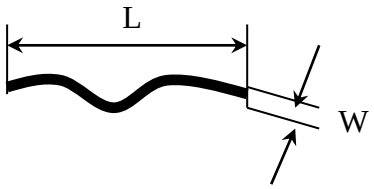


### 14.4 Inspection Standard

Definition of Φ&L&W (Unit: mm)

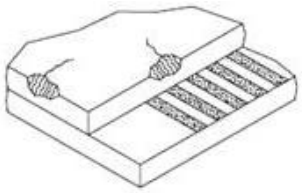
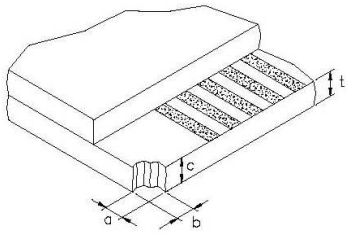
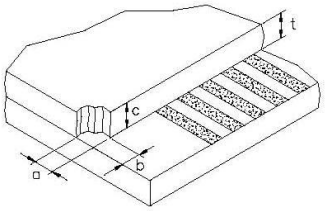
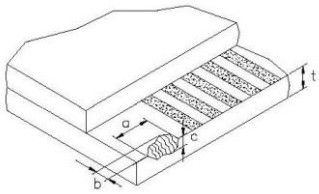
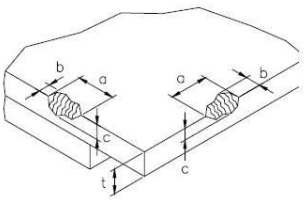
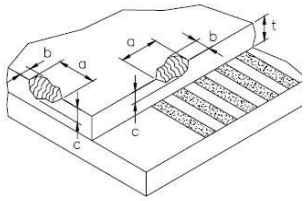



Φ=(a+b)/2




## 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<br>Accept<br>a≤2.0mm or b≤2.0mm, c≤t | Minor |
| 8 | Corner Chip on Cap Glass |  t= Glass thickness<br>Accept<br>a≤1.5mm or b≤1.5mm, c≤t | Minor |
| 9 | Chip on Contact Pad |  t= Glass thickness<br>Accept<br>a≤3.0mm or b≤0.8mm, c≤t<br>(on the contact pin)<br>a≤3.0mm or b≤2.0mm, c≤t<br>(outside of the contact pin) | Minor |
| 10 | Chip on Face of Display |  t= Glass thickness<br>Accept<br>a≤1.5mm or b≤1.5mm, c≤t | Minor |
| 11 | Chip on Cap Glass |  t= Glass thickness<br>Accept<br>a≤2.0mm or b≤2.0mm, c≤t/2<br>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.<br>(2) Terminal lead twisted or broken is not allowable.<br>(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<br>Dirty spot<br>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<br>(row or column)</td><td>Not allowable.</td><td>Major</td></tr>
<tr><td>5</td><td>Abnormal Color</td><td>Refer to the SPEC.</td><td>Major</td></tr>
<tr><td>6</td><td>Luminance NG</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

QingYue warrants for a period of 12 months from the shipping date when stored or used under normal condition. In addition to 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.