# Product Specification

**（Common Application）**

**Product Name: VGM096096A8F01**

**Product Code: M02350**

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

| Designed By | Checked By | Approved By | |
| --- | --- | --- | --- |
| | | R&D | QA |
| 2022.6.10 | 6.11/22 | 2022.6.22 | 2022.6.24 |
| | | 2022.6.22 | 2022.6.[illegible] |

# CONTENT

# REVISION RECORD

| REV. | REVISION DESCRIPTION | REV. DATE | REMARK |
|---|---|---|---|
| A01 | Initial release. | 2018-04-28 | |
| A02 | Remove logo and change company name, website, email address<br>Change appearance drawing, packing drawing, application circuit. | 2022-04-20 | |
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# 1 Application filed

Common Application

# 2 Overview

VGM096096A8F01 is a full OLED display module with 96(RGB)×96 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.

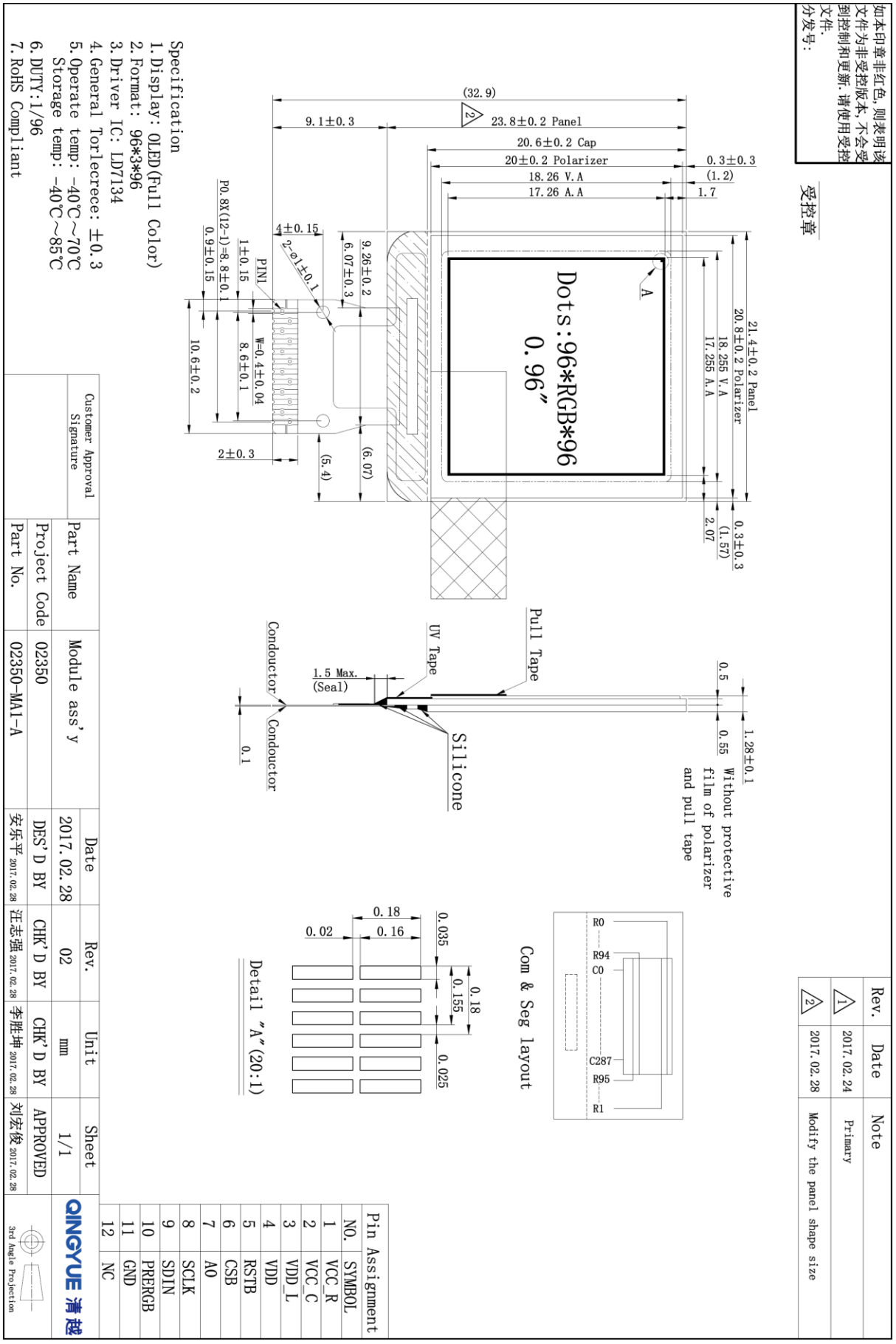
# 3 Features

- Display Color: 65k Full Color
- Dot Matrix: 96(RGB)×96
- Driver IC: LD7134
- Interface: Serial Interface
- 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 | 96(W)×96(H) | - |
| 2 | Dot Size | 0.155(W)×0.16(H) | $mm^2$ |
| 3 | Dot Pitch | 0.18(W)×0.18(H) | $mm^2$ |
| 4 | Aperture Rate | 52 | % |
| 5 | Active Area | 17.255(W)×17.26(H) | $mm^2$ |
| 6 | Panel Size | 21.4(W)×23.8(H) ×1.05(T) | $mm^3$ |
| 7 | Module Size | 21.4(W)×32.9(H) ×1.28(T) | $mm^3$ |
| 8 | Diagonal A/A Size | 0.96 | inch |
| 9 | Module Weight | 2.0±10% | g |

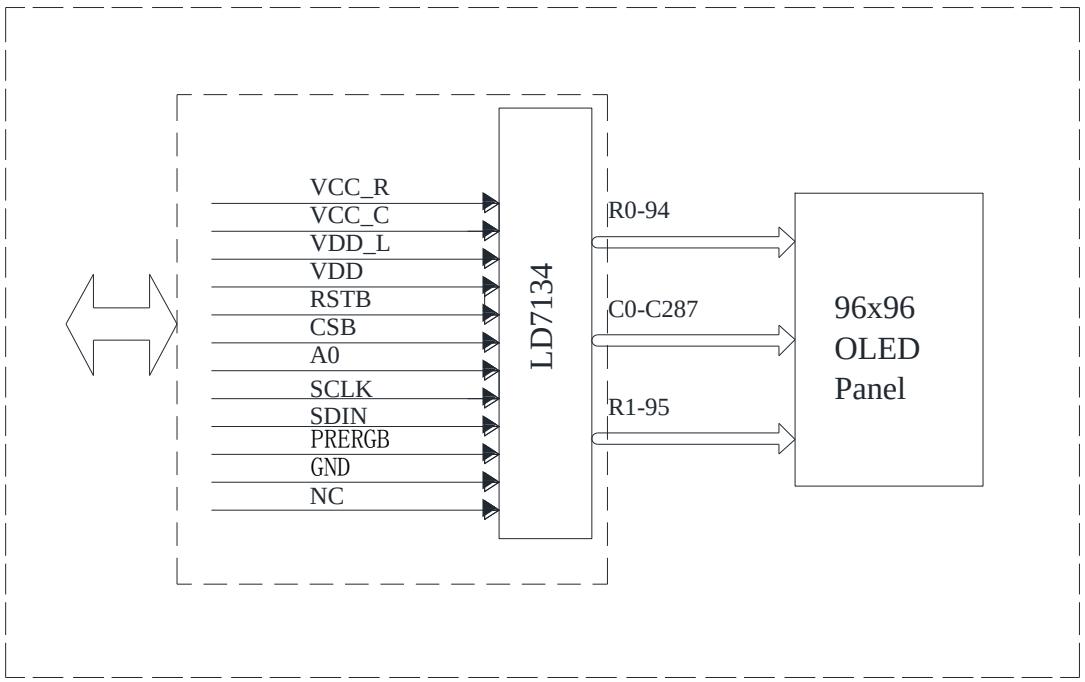
# 5 Mechanical Drawing



# 6 Module Interface

| PIN NO. | PIN NAME | DESCRIPTION |
|---|---|---|
| **1** | VCC_R | This pin is the power output pin of internal row power regulator. A 4.7uF capacitor is recommended to connect between VCC_R and GND. |
| 2 | VCC_C | Column Driver Power |
| 3 | VDD_L | Internal Logic Power. Refer to application guide. Capacitor is connected between Power - VDDL and VSSD. |
| 4 | VDD | Interface Power & Analog Power |
| 5 | RSTB | Reset (Active Low) |
| 6 | CSB | Chip Select (Active Low) |
| 7 | A0 | Address ( L: command, H: Parameter) |
| 8 | SCLK | Serial clock |
| 9 | SDIN | Serial data |
| 10 | PRERGB | Column Driver Pre-Charge Power for RGB |
| 11 | GND | Logic Ground |
| 12 | NC | No connection. |

# 7 Function Block Diagram



# 8 Absolute Maximum Ratings

| ITEM | SYMBOL | MIN | MAX | UNIT | REMARK |
|---|---|---|---|---|---|
| Interface Power & Analog Power | VDD | -0.3 | +3.6 | V | IC maximum rating |
| OLED Operating voltage | VCC_C | -0.3 | +18.3 | V | IC maximum rating |
| Operating Temp. | Top | -40 | +70 | ℃ | - |
| Storage Temp | Tstg | -40 | +85 | ℃ | - |

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

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

# 9 Electrical Characteristics

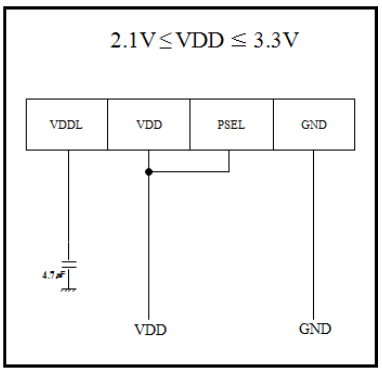
## 9.1 DC Electrical Characteristics

| ITEM | SYMBOL | TEST CONDITION | MIN | TYPE | MAX | UNIT |
|---|---|---|---|---|---|---|
| Logic Supply Voltage | VDD | VDD - VSSD | 2.1 | 2.8 | 3.3 | V |
| OLED Driver Supply Voltage (Supply Externally) | VCC | VAH - VSSA | - | 10 | - | V |
| High-level Input Voltage | $V_{IH}$ | Logic Input Terminals | 0.8×VDD | - | VDD | V |
| Low-level Input Voltage | $V_{IL}$ | Logic Input Terminals | VSS | - | 0.2× VDD | V |
| High-level Output Voltage | $V_{OH}$ | Logic Output Terminals VDD=3V (Iout = -200uA) | 0.9×VDD | - | VDD | V |
| Low-level Output Voltage | $V_{OL}$ | Logic Output Terminals VDD=3V VSS 0.1*VDD V (Iout = 200uA) | VSS | - | 0.1× VDD | V |

Note :

1. VCC_C must be kept in a stable value; ripple and noise are not allowed.

2. Application Guide for VDD & VDD_L The pin of “PSEL” that defined in the IC specification of LD7134 enable/disable internal logic power regulator. It’s tied with VDD in this module’s FPC which is showed as below: So VDD_L is Internal Generated and it doesn't support external voltage supply. A capacitor should be connected between VDD_L and GND.



## 9.2 Electro-optical Characteristics

| ITEM | SYMBOL | TEST CONDITION | MIN | TYPE | MAX | UNIT |
|---|---|---|---|---|---|---|
| Normal Mode Brightness (With Polarizer) | $L_{br}$ | All pixels ON (1) | 80 | 100 | - | $cd/m^2$ |
| Normal Mode Power Consumption | Pt | All pixels ON(1) (VPP Supply Externally) | - | 180 | 240 | mW |
| Sleep mode current consumption in VDD | $I_{SP}$ | - | - | - | 60 | uA |
| Sleep mode current consumption in VPP | | - | - | - | 10 | uA |
| C.I.E(White) | (X) | x,y(CIE1931) | 0.26 | 0.30 | 0.34 | |
| | (Y) | | 0.29 | 0.33 | 0.37 | |
| C.I.E(Red) | (X) | | 0.61 | 0.65 | 0.69 | |
| | (Y) | | 0.30 | 0.34 | 0.38 | |
| C.I.E(Green) | (X) | | 0.27 | 0.31 | 0.35 | |
| | (Y) | | 0.57 | 0.61 | 0.65 | |
| C.I.E(Blue) | (X) | | 0.10 | 0.14 | 0.18 | |
| | (Y) | | 0.13 | 0.17 | 0.21 | |
| Dark Room Contrast | CR | | 10000:1 | | | |
| Response Time | - | | - | 10 | - | μ s |
| View Angle | - | - | ＞160 | - | - | Degree |

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

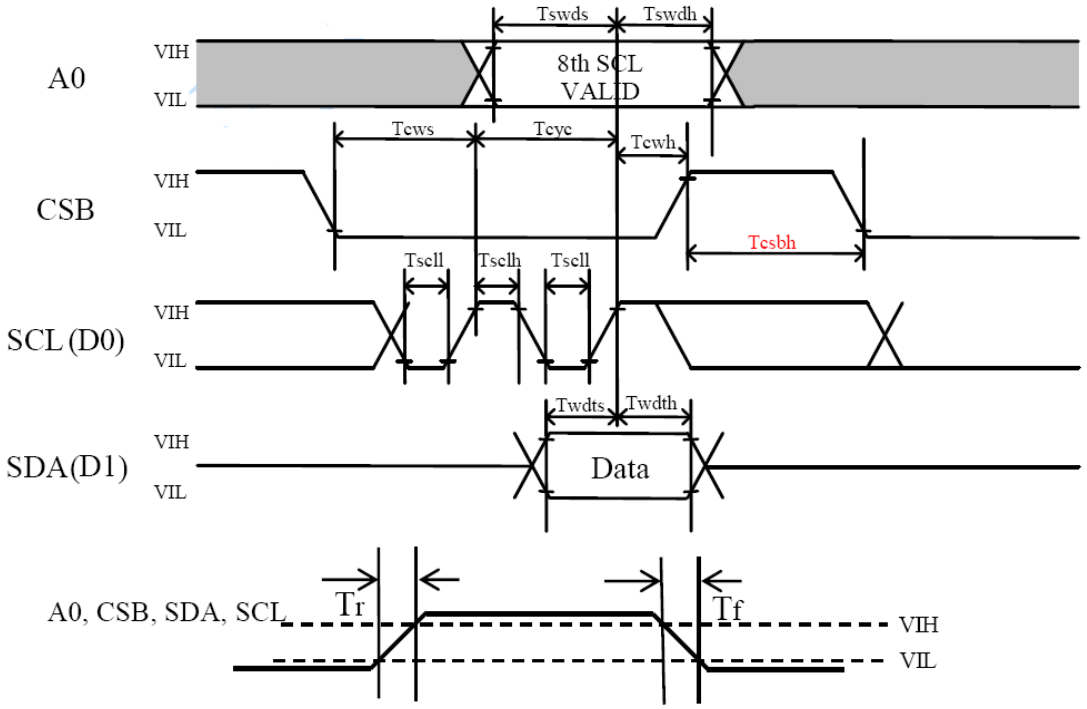
- Driving voltage: 10.0V
- Contrast setting: 0xa8、0x2e、0x35
- Frame rate: 105Hz
- Duty setting: 1/96

### 9.3 AC Electrical Characteristics

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

(Ta=-40~85℃,GND=0V, VDD=2.8V,VCC_C =10V,R/G/BPRE=0V,CL=100pF)

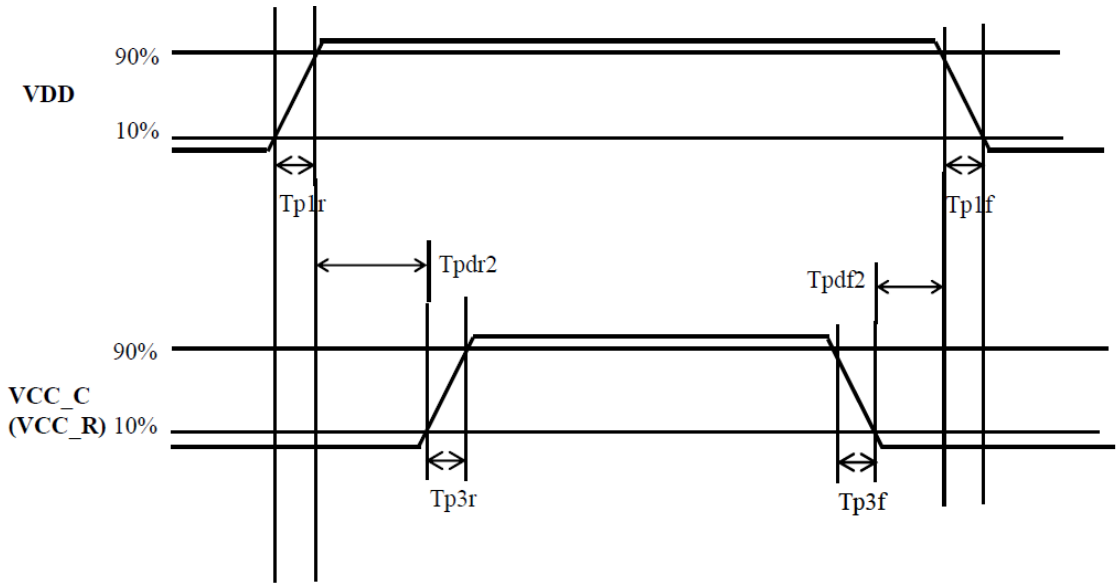
| Parameter | Symbol | Related Pins | Specification | | Unit |
|---|---|---|---|---|---|
| | | | MIN | MAX | |
| Write Cycle Time | Tcyc | SCL(D0) | 100 | - | ns |
| Address Setup Time | Tswds | A0 | 65 | | ns |
| Address Hold Time | Tswdh | A0 | 35 | | ns |
| Select Setup Time | Tcws | CSB | 65 | | ns |
| Select Hold Time | Tcwh | CSB | 35 | | ns |
| SCL Low Pulse Width | Tscll | SCL(D0) | 45 | | ns |
| Write High Pulse Width | Tsclh | SCL(D0) | 45 | | ns |
| Select High Pulse Width | Tcsbh | CSB | 30 | | ns |
| Data Setup Time | Twdts | SDA(D1) | 20 | | ns |
| Data Hold Time | Twdth | SDA(D1) | 30 | | ns |
| Rising Time | Tr | A0, CSB, SDA, SCL | - | 30 | ns |
| Falling Time | Tf | A0, CSB, SDA, SCL | - | 30 | ns |



# 10 Functional Specification and Application Circuit

## 10.1 Power ON and Power OFF Sequence

**Power Sequence PSEL = VDD, $C_{VDDL}$ = 2uF**

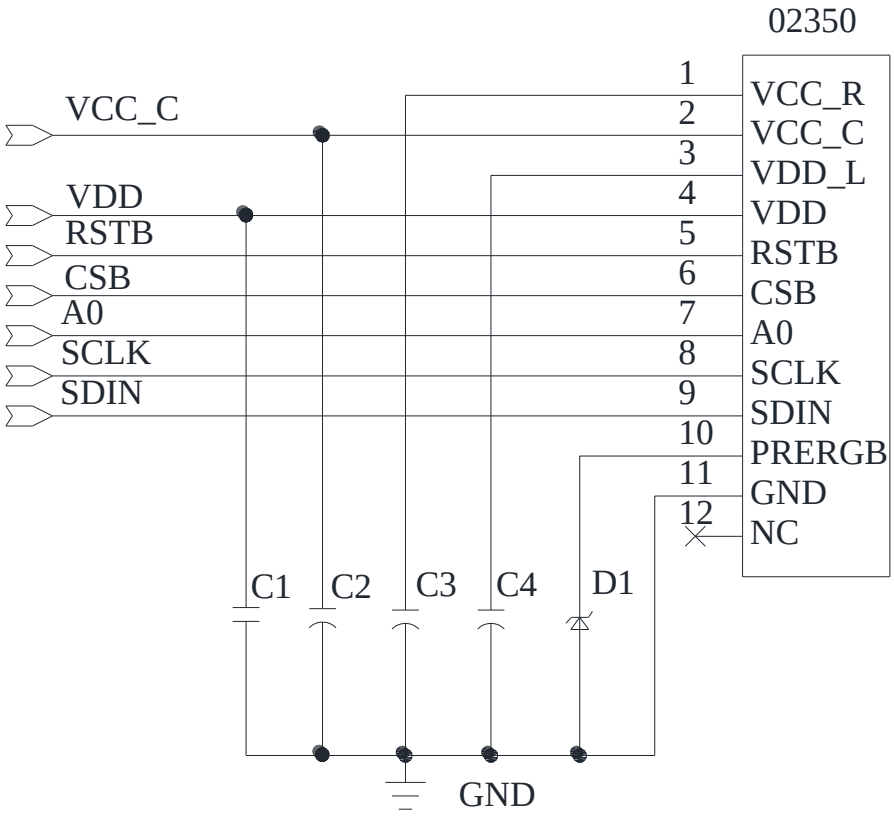



(Ta=-40~85℃,VSS=0V, VDD=2.8V,VCC_C =10V,R/G/BPRE=0V,CL=100pF)

| Parameter | Symbol | Related Pins | Specification | | | Unit |
|---|---|---|---|---|---|---|
| | | | MIN | TYP | MAX | |
| VDD On Slope<br>Vdd Off Slope | Tplr<br>Tplf | VDD | 0.2 | 1 | 5 | ms/V |
| VCC_C(VCC_R)On Slope<br>VCC_C(VCC_R)Off Slope | Tp3r<br>Tp3f | VCC_C(VCC_R) | 0.2 | 1 | 5 | ms/V |
| From VDD to<br>VCC_C(VCC_R) Delay | Tpdr2 | VDD,<br>VCC_C(VCC_R) | 2 | - | - | ms |
| From VCC_C(VCC_R)<br>To VDD Delay | Tpdf2 | VDD,<br>VCC_C(VCC_R) | 2 | - | - | ms |

## 10.2 Application Circuit

10.2.1 The configuration for SPI interface mode is shown in the following diagram:




Pin connected to MCU interface: SCLK,SDIN,CSB,RSTB,A0.

**write_com(0x3c); //Set VDD Selection**

**write_dat(0x00); //0x00:VDD=2.8V; 0x01:VDD=1.8V**

**Recommended components**

C1: 1uF-0603-X7R±10%.RoHS

C2,C3,C4 : 4.7μF/16V.RoHS (Tantalum Capacitors)

D1: KDZSTE-172.7B (zener diode)

## 10.3 Display Control Instruction

Refer to LD7134 IC Specification.

## 10.4 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()
{
    CS=0;
    RES=0;
    delay_ms(50);
    RES=1;
    write_com(0x02);
    write_dat(0x00);        //turn OFF
    write_com(0x01);        //software reset The OSC.is stopped.
    write_com(0x03);
    write_dat(0x00);        //Ste Dot Matrix Display Stand-by OFF
    write_com(0x04);        //Set OSC Control
    write_dat(0x03);        //105Hz
    write_com(0x05);        //Set Graphic RAM Writing Direction
    write_dat(0x01);        //RGB       0x08 BGR
    write_com(0x06);        //Set Row Scan Direction
    write_dat(0x01);
    write_com(0x07);        //Set Diplay Size
    write_dat(0x00);        //X start 1
    write_dat(0x00);        //X start 2
    write_dat(0x04);        //X end 1
    write_dat(0x1f);        //X end 2
    write_dat(0x00);        //Y start 1
    write_dat(0x00);        //Y start 2
    write_dat(0x05);        //Y end 1
    write_dat(0x0f);        //Y end 2
    write_com(0x08);        //Set Interface Bus Type
    write_dat(0x01);        //8Bit IF Bus
    write_com(0x09);        //Set Masking Data
    write_dat(0x07);        //Data AND Pallet(R,G,B) --Output Data
    write_com(0x0a);        //Set Read Write Box Data
    write_dat(0x00);        //X start 1
    write_dat(0x00);        //X start 2
```

```
write_dat(0x05);      //X end 1
write_dat(0x0f);      //X end 2
write_dat(0x00);      //Y start 1
write_dat(0x00);      //Y start 2
write_dat(0x05);      //Y end 1
write_dat(0x0f);      //Y end 2
write_com(0x0b);      //Set Diplay Start Address
write_dat(0x00);      //1st Parameter
write_dat(0x00);      //2st Parameter
write_dat(0x00);      //3st Parameter
write_dat(0x00);      //4st Parameter
write_com(0x0e);      //Set Dot Matrix Current Level
write_dat(0x0a);      //1st Paramenter R[74]      3
write_dat(0x08);      //2st Paramenter R[30]      f
write_dat(0x02);      //3st Paramenter G[74]       2
write_dat(0x0e);      //4st Paramenter G[30]       4
write_dat(0x03);      //5st Paramenter B[74]      3
write_dat(0x05);      //6st Paramenter B[30]      8
write_com(0x0f);      //Set Dot Matrix Peak Current Level
write_dat(0x13);      //PR[50]   16uA Step
write_dat(0x10);      //PG[50]   16uA Step
write_dat(0x13);      //PB[50]   16uA Step
write_com(0x1c);      //Set Pre-Charge Width
write_dat(0x08);      //0x08      Parameter Range 01h-3fh
write_com(0x1d);      //Set Peak Pulse Width;Parameter Range 01h-3fh
write_dat(0x00);      //for Red
write_dat(0x00);      //for Green
write_dat(0x00);      //for Blue
write_com(0x1e);      //Set Peak Pulse Delay
write_dat(0x05);      //01h-0fh
write_com(0x1f);      //Set Row Scan Operation
write_dat(0x00);
write_com(0x30);      //Set Internal Regulator for Row Scan
write_dat(0x10);      //VCC_R =0.85 VCC_C
write_com(0x3c);      //Set VDD Selection
write_dat(0x00);      //VDD=2.8V; 0x01VDD=1.8V
write_com(0x3d);      //Set DMODE Selection
write_dat(0x00);      //Resolution=9696,65k Color
write_com(0x3a);      //Set Gamma Correction Table
```

```
//R
write_dat1(0);
write_dat1(5);
write_dat1(10);
write_dat1(15);
write_dat1(20);
write_dat1(25);
write_dat1(30);
write_dat1(35);
write_dat1(39);
write_dat1(43);
write_dat1(47);
write_dat1(51);
write_dat1(55);
write_dat1(59);
write_dat1(63);
write_dat1(67);
write_dat1(71);
write_dat1(75);
write_dat1(79);
write_dat1(83);
write_dat1(87);
write_dat1(91);
write_dat1(95);
write_dat1(99);
write_dat1(103);
write_dat1(105);
write_dat1(109);
write_dat1(113);
write_dat1(117);
write_dat1(121);
write_dat1(123);
write_dat1(127);
      //G
write_dat1(0);
write_dat1(3);
write_dat1(6);
write_dat1(9);
write_dat1(12);
```

```
write_dat1(15);
write_dat1(18);
write_dat1(21);
write_dat1(24);
write_dat1(27);
write_dat1(30);
write_dat1(33);
write_dat1(36);
write_dat1(39);
write_dat1(42);
write_dat1(45);
write_dat1(48);
write_dat1(51);
write_dat1(54);
write_dat1(57);
write_dat1(60);
write_dat1(63);
write_dat1(66);
write_dat1(69);
write_dat1(72);
write_dat1(75);
write_dat1(78);
write_dat1(81);
write_dat1(82);
write_dat1(83);
write_dat1(84);
write_dat1(85);
write_dat1(86);
write_dat1(87);
write_dat1(88);
write_dat1(89);
write_dat1(90);
write_dat1(92);
write_dat1(94);
write_dat1(96);
write_dat1(98);
write_dat1(100);
write_dat1(102);
write_dat1(104);
```

```
write_dat1(106);
write_dat1(108);
write_dat1(110);
write_dat1(111);
write_dat1(112);
write_dat1(113);
write_dat1(114);
write_dat1(115);
write_dat1(116);
write_dat1(117);
write_dat1(118);
write_dat1(119);
write_dat1(120);
write_dat1(121);
write_dat1(122);
write_dat1(123);
write_dat1(124);
write_dat1(125);
write_dat1(126);
write_dat1(127);
//B
write_dat1(0);
write_dat1(5);
write_dat1(10);
write_dat1(15);
write_dat1(20);
write_dat1(25);
write_dat1(30);
write_dat1(35);
write_dat1(39);
write_dat1(43);
write_dat1(47);
write_dat1(51);
write_dat1(55);
write_dat1(59);
write_dat1(63);
write_dat1(67);
write_dat1(71);
write_dat1(75);
```

```
        write_dat1(79);
        write_dat1(83);
        write_dat1(87);
        write_dat1(91);
        write_dat1(93);
        write_dat1(97);
        write_dat1(101);
        write_dat1(105);
        write_dat1(109);
        write_dat1(113);
        write_dat1(117);
        write_dat1(121);
        write_dat1(124);
        write_dat1(127);
        write_com(0x02);
       clear_screen();
        write_dat(0x01);        //turn ON

}
```

# 11 Package Specification

Controlled Seal

Packing Process (1)~(9)

(1) Tray Type:02360-MT5-A




(2)




(3) order①、②、①、② fix trays with tape
990 pcs of 1 small carton
1 tray contain 45 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
a small carton package's net weight is 1.5kg,
Rough weight is 3.0kg.

(8)




2 small cartons in 1 big carton

(9)44 contained trays, 2 empty trays, Package quantity products: 1980 pcs of 1 big carton




Package finished
L410*W310*L272 mm
a big carton Package's Rough weight is 7.0kg.

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℃,240h | 5 |
| 2 | Low Temperature (Non-operation) | -40℃,240h | 5 |
| 3 | High Temperature (Operation) | 70℃,240h | 5 |
| 4 | Low Temperature (Operation) | -40℃,240h | 5 |
| 5 | High Temperature / High Humidity (Operation) | 60℃,90%RH,240h | 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

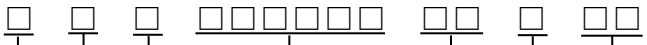
End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

| ITEM | MIN | MAX | UNIT | CONDITION |
|---|---|---|---|---|
| Operation Life Time | 6000 | - | h | 100 cd/m$^2$, 50% alternating checkerboard, 22±3℃, 55±15% RH |

## 12.3 Failure Check Standard

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

## 13 Illustration of OLED Product Name



**Flow No. :**

01~99

**Display Color :**

R—red

G—green

B—blue

Y—yellow

W—white

A—area color

F—full color

M—amber

**Panel Flow No. :**

A0~A9, B0~B9…Z0~Z9

**Display Format :**

Graphic—columns and rows

Character—characters and line number

Segment—segment number

Icon—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

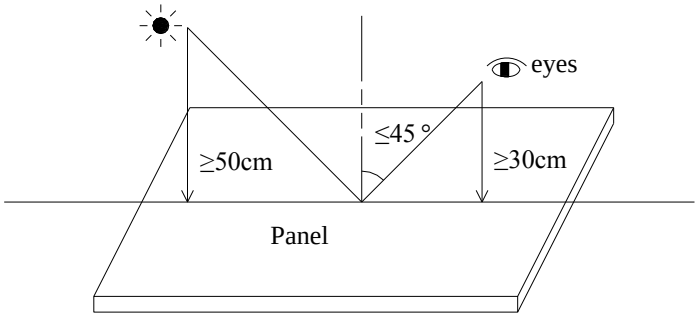
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: ≥50cm

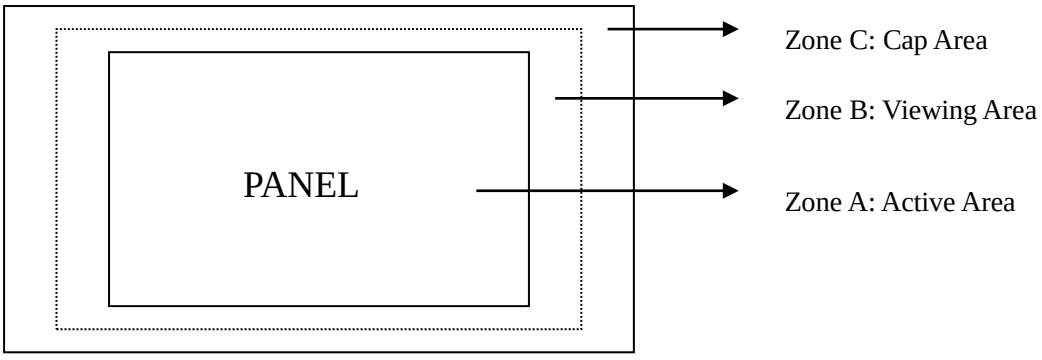
Distance between the Panel & Eyes: ≥30cm

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

*(See the sketch below)*

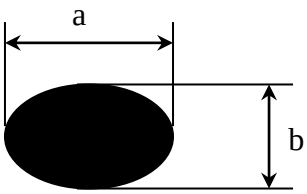



## 14.3 Quality Assurance Zones

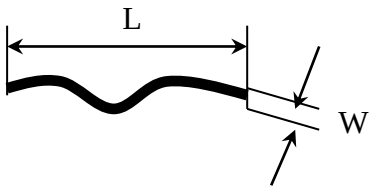


### 14.4 Inspection Standard

Definition of Φ&L&W (Unit: mm)

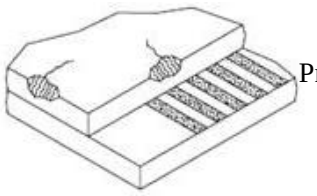
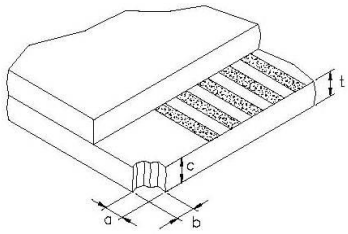
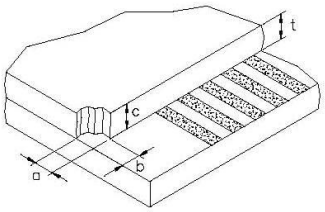
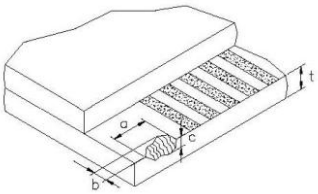
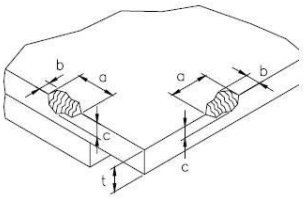
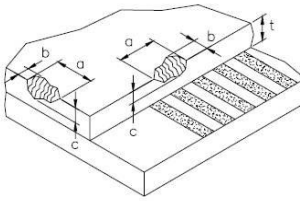



Φ=(a+b)/2




## Ⅰ. Appearance Defects

| 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≤0.05</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> | 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≤0.2</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> | Minor |
| 4 | Any Dirt & Scratch on Polarizer's Protective Film | Ignore for not affect the polarizer. | Minor |
| 5 | Any Dirt on Cap Glass | Inside the Cap， Ignore the dirt without moving. | Minor |

| | | | |
|---|---|---|---|
| 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≤3.0mm or b≤3.0mm, 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 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.