

Product Specification

Product Name: LH128128L146K

Product Code: 00390

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

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PRODUCT SPECIFICATION

REVISION RECORD

| REV. | REVISION DESCRIPTION | REV. DATE | REMARK |
|------|--|------------|---|
| Y01 | Initial Release | 2010-03-02 | |
| A01 | Update the Mechanical Data Update the Mechanical Drawing Update the Operating Voltage Update the electro-optical Characteristics Update the Application Circuit Add the External DC-DC application circuit Update the Recommended Software Initialization Update the Lifetime | 2010-09-30 | Page 4 Page 5 Page 8 Page 9 Page 15~18 Page 19 Page 20 Page 23 |
| A02 | Update the Mechanical Drawing Update the DC Electrical Characteristics Update the AC Electrical Characteristics Update the Power ON and Power OFF Sequence Update the Package Specification Update the Lifetime condition | 2010-11-06 | Page 5 Page 8 Page 10~16 Page 17 Page 26 Page 27 |
| A03 | Update the Electro-optical Characteristics Update the AC Electrical Characteristics Update the Power ON and Power OFF Sequence Update the Reliability Test Update the Lifetime condition | 2010-12-12 | Page 9 Page 10~13 Page 14 Page 24 Page 24 |
| A04 | Update the AC Electrical Characteristics Update the Package Specification | 2011-08-10 | Page 10~14 Page 25 |
| A05 | Update the Electro-optical Characteristics Update the External DC-DC application circuit Update the Lifetime | 2012-03-12 | Page 9 Page 22 Page 26 |
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PRODUCT SPECIFICATION

1 Overview

LH128128L146K is a gray scale OLED display module with 128×128 dot matrix. The characteristics of this display module are high brightness, self-emission, high contrast ratio, slim/thin outline, wide viewing angle, wide temperature range, and low power consumption.

2 Features

- Display Color: White
- Dot Matrix:128×128
- Driver IC: SSD1327Z
- Interface: 8-bit 8080,8-bit 6800,SPI,I² C
- Wide range of operating temperature: -40°C to 70°C

3 Mechanical Data

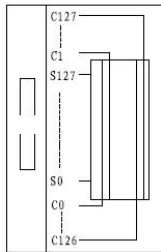
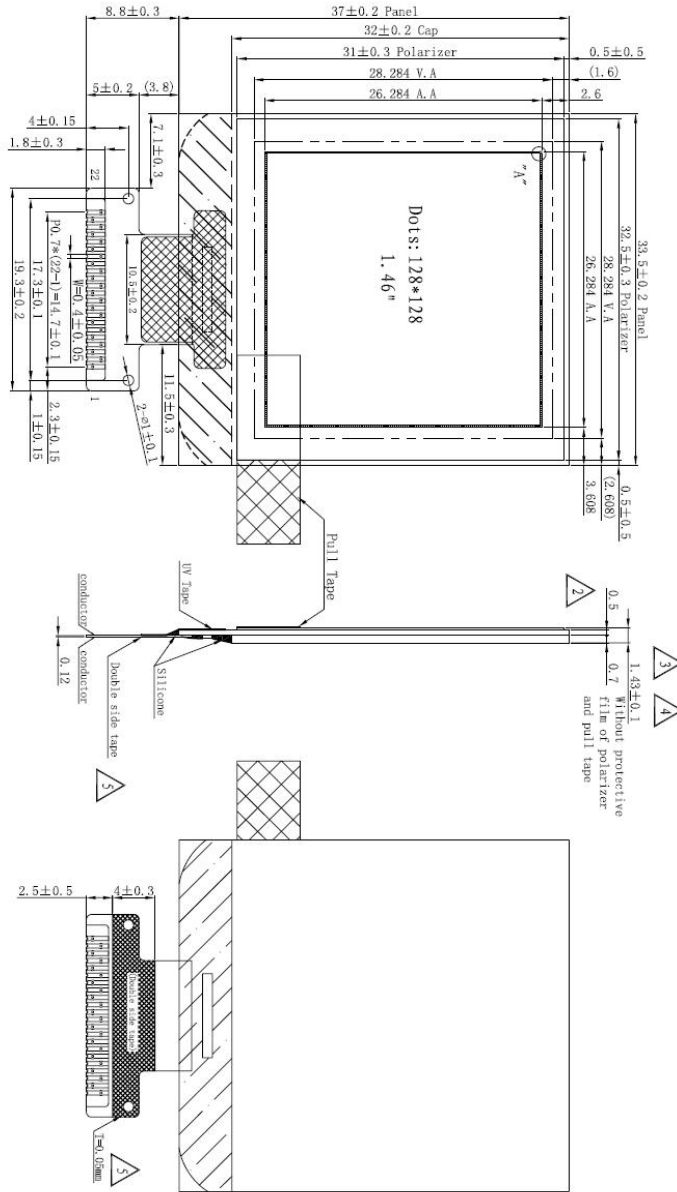
| NO. | ITEM | SPECIFICATION | UNIT |
|-----|-------------------|----------------------------|-----------------|
| 1 | Dot Matrix | 128(W)×128(H) | - |
| 2 | Dot Size | 0.1855(W)×0.1855(H) | mm ² |
| 3 | Dot Pitch | 0.2055(W)×0.2055(H) | mm ² |
| 4 | Aperture Rate | 81 | % |
| 5 | Active Area | 26.284(W)×26.284(H) | mm ² |
| 6 | Panel Size | 33.5(W) ×37.0(H) × 1.2(T) | mm ³ |
| 7 | Module Size | 33.5(W) ×45.8(H) × 1.43(T) | mm ³ |
| 8 | Diagonal A/A Size | 1.46 | inch |
| 9 | Module Weight | 3.38±10% | gram |

PRODUCT SPECIFICATION

4 Mechanical Drawing

如本印章非红色, 则表明该文件为非受控版本, 不会受到控制和更新, 请使用受控文件。
分发号:

受控章



Pin Assignment

| NO. | SYMBOL |
|-----|--------|
| 1 | NC |
| 2 | VSS |
| 3 | D7 |
| 4 | D6 |
| 5 | D5 |
| 6 | D4 |
| 7 | D3 |
| 8 | D2 |
| 9 | D1 |
| 10 | D0 |
| 11 | RD# |
| 12 | WR# |
| 13 | D/C# |
| 14 | RES# |
| 15 | CS# |
| 16 | REF |
| 17 | BS2 |
| 18 | BS1 |
| 19 | VDD |
| 20 | VCI |
| 21 | VCOMH |
| 22 | VCC |

- Specification:
- 1. Display: OLED(White)
 - 2. Format: 128*128
 - 3. Driver IC: SS01371Z
 - 4. General Tolerance: ±0.3
 - 5. Storage Temp: -40°C~85°C
 - 6. DMT: 1/138
 - 7. RoHS Compliant

| | | | | | | |
|--------------------------------|--------------|--------------|------------|----------|----------|-----------------------------|
| Customer Approval Signature | Part Name | Module Ass'y | Date | Rev. | Unit | Sheet |
| | Project Code | | 2010.11.03 | | mm | |
| Part No. | 00390 | DES/D BY | CHK/D BY | CHK/D BY | APPROVED | <p>3rd Angle Projection</p> |
| | | | | | | |

| Rev. | Date | Note |
|------|------------|--|
| 1 | 2009.06.24 | Primary |
| 2 | 2009.12.02 | Modify glass thickness |
| 3 | 2010.02.25 | Modify Polarizer thickness |
| 4 | 2010.09.26 | Modify the thickness of Polarizer (0.285mm → 0.25mm) |
| 5 | 2010.11.03 | 1. Add Double side tape 2. Take out sketch map of bending |

PRODUCT SPECIFICATION

5 Module Interface

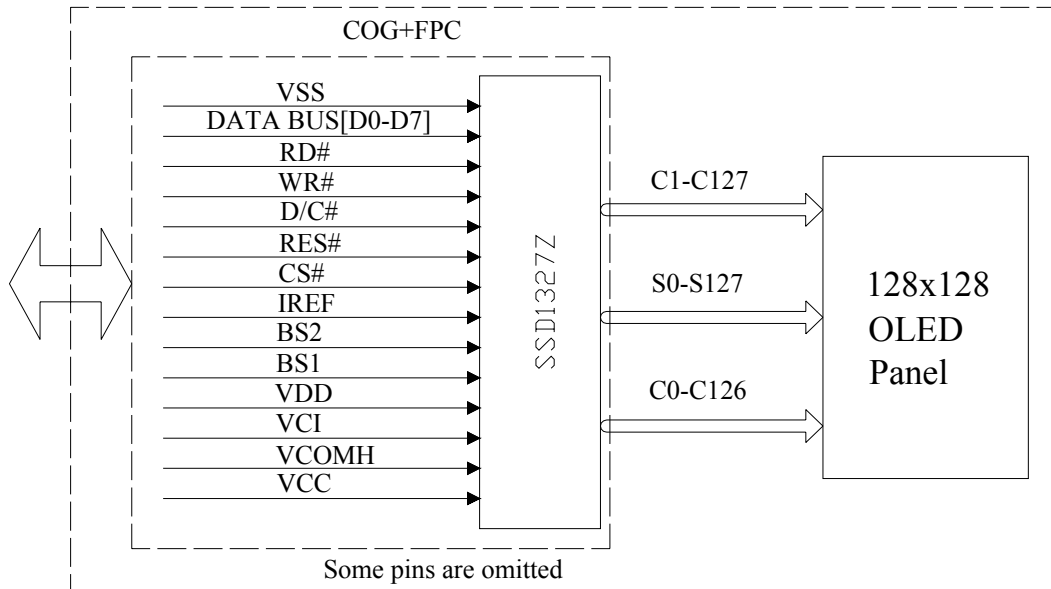
| PIN NO. | PIN NAME | DESCRIPTION |
|---------|----------|---|
| 1 | NC | No Connection. |
| 2 | VSS | Ground pin.It must be connected to external ground. |
| 3 | D7 | These pins are bi-directional data bus connecting to the MCU data bus. Unused pins are recommended to tie LOW. When serial interface mode is selected,D0 will be the serial colck input:SCLK;D1 Will be the serial data input:SDIN and D2 should be kept NC. When I ² C mode is selected, D2,D1 should be tied together and serve as SDAout, SDAin in application and D0 is the serial clock input,SCL. |
| 4 | D6 | |
| 5 | D5 | |
| 6 | D4 | |
| 7 | D3 | |
| 8 | D2 | |
| 9 | D1 | |
| 10 | D0 | |
| 11 | RD# | This pin is MCU interface input. When 6800 interface mode is selected, this pin will be used as the Enable(E) signal.. Read/write operation is initiated when this pin is pulled HIGH and the chip is selected. When 8080 interface mode is selected, 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 ² C interface is selected,this pin must be connected to Vss. |
| 12 | WR# | This pin is read/write control input pin connecting to the MCU Interface. When 6800 interface mode is selected, this pin will be used as Read/Write (R/W#) Selection input. Read mode will be carried out when this pin is pulled HIGH and Write mode when LOW. When 8080 interface mode is selected, this pin will be the Write (WR#) input.Data Write operation is initiated when this pin is pulled LOW and the chip is selected. When serial or I ² C interface is selected, this pin must be connected to Vss. |
| 13 | D/C# | This pin is Data/Command control pin connecting to the MCU. |
| 14 | RES# | This pin is reset signal input. |
| 15 | CS# | This pin is the chip select input connecting to the MCU. |
| 16 | IREF | This pin is the segment output current reference pin. A resistor should be connected between this pin and Vss to maintain the current around 10uA. |
| 17 | BS2 | MCU bus interface selection pins.Table 5-1 |
| 18 | BS1 | |
| 19 | VDD | Power supply pin for core logic operation. |
| 20 | VCI | VCI must always set to be equivalent to or higher than VDD. |
| 21 | VCOMH | COM signal deselcted voltage level. A capacitor should be connected between this pin and Vss. No external power supply is allowed to connect to this pin. |
| 22 | VCC | Power supply for panel driving voltage. |

Table 5-1:

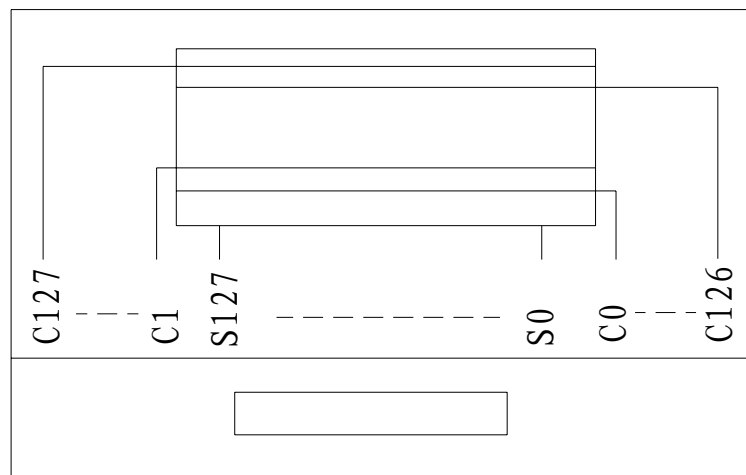
| BS[2:1] | Interface |
|---------|---------------------|
| 00 | 4 line SPI |
| 01 | I ² C |
| 10 | 8-bit 6800 parallel |
| 11 | 8-bit 8080 parallel |

6 Function Block Diagram

6.1 Function Block Diagram



6.2 Panel Layout Diagram



COM&SEG LAYOUT

PRODUCT SPECIFICATION

7 Absolute Maximum Ratings

| ITEM | SYMBOL | MIN | MAX | UNIT | REMARK |
|-----------------|--------|------|------|------|-------------------|
| Supply voltage | VDD | -0.5 | 2.75 | V | IC maximum rating |
| | VCC | -0.5 | 19.0 | V | IC maximum rating |
| | VCI | -0.3 | 4.0 | V | IC maximum rating |
| Operating Temp. | Top | -40 | 70 | °C | - |
| Storage Temp | Tstg | -40 | 85 | °C | - |

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

Note (2): Permanent breakage of module may occur if the module is used beyond the maximum rating. The module can be normal operated under the conditions according to Section 8 “Electrical Characteristics”. Malfunctioning of the module may occur and the reliability of the module may deteriorate if the module is used beyond the conditions.

8 Electrical Characteristics

8.1 DC Electrical Characteristics

| ITEM | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|---|-----------------|-------------------------|---------|-----|---------|------|
| Operating Voltage | VCC | - | 14.5 | 15 | 15.5 | V |
| Logic Supply Voltage | VDD | - | 1.65 | - | 2.6 | V |
| Low voltage power supply, power supply for I/O pins | VCI | - | 1.65 | 3.0 | 3.5 | V |
| High Logic Output Level | V _{OH} | I _{out} =100uA | 0.9×VCI | - | VCI | V |
| Low Logic Output Level | V _{OL} | I _{out} =100uA | 0 | - | 0.1×VCI | V |
| High Logic Input Level | V _{IH} | - | 0.8×VCI | - | VCI | V |
| Low Logic Input Level | V _{IL} | - | 0 | - | 0.2×VCI | V |

PRODUCT SPECIFICATION

8.2 Electro-optical Characteristics

| ITEM | SYMBOL | TEST CONDITION | MIN | TYP | MAX | UNIT |
|-------------------------------|-----------------|--|---------|------|------|-------------------|
| Normal Mode Brightness | L _{br} | All pixels ON(1) | 60 | 80 | - | cd/m ² |
| VDD Sleep mode Current | ISLP_VDD | VCI=2.8V,VCC=OFF VDD(external)=2.5V, Display OFF, No panel attached | - | - | 10 | uA |
| VCI Sleep mode Current | ISLP_VCI | External VDD=2.5V | - | - | 10 | uA |
| | | Enable Internal VDD during Sleep mode | - | 40 | 60 | uA |
| | | Disable Internal VDD during Sleep mode (Deep Sleep mode) | - | - | 10 | uA |
| VCC Sleep mode Current | ISLP_VCC | VCI=2.8V,VCC=8-18V VCC(externa)=2.5V,Display OFF, No panel attached | - | - | 10 | uA |
| Normal Mode Power Consumption | Pt | All pixels ON(1) | - | 555 | 675 | mW |
| C.I.E(White) | (x) | x,y(CIE1931) | 0.26 | 0.30 | 0.34 | - |
| | (y) | | 0.32 | 0.36 | 0.40 | - |
| Dark Room Contrast | CR | - | ≥2000:1 | - | - | - |
| Response Time | - | - | --- | 10 | - | μ s |
| View Angle | - | - | ≥160 | - | - | Degree |

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

- Driving voltage : 15V
- Contrast setting : 0x80
- Frame rate : 100Hz
- Duty setting : 1/128

PRODUCT SPECIFICATION

8.3 AC Electrical Characteristics

(1)8080-series MCU Parallel Interface Timing characteristics

$V_{CI} - V_{SS} = 1.65V$ to $2.1V$ ($T_A = 25^\circ C$)

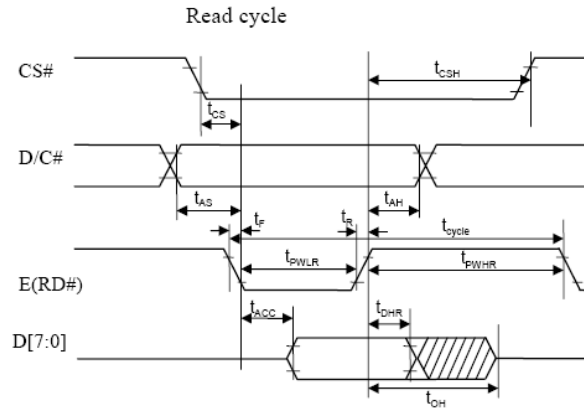
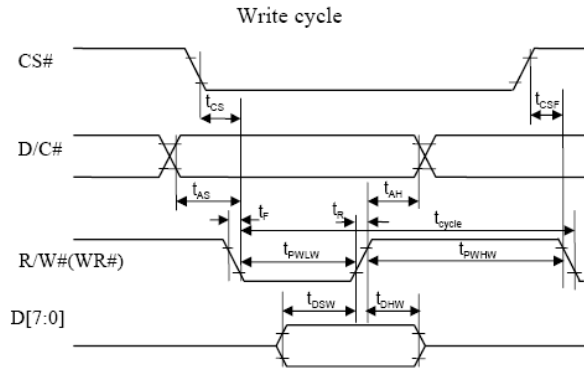
| Symbol | Parameter | Min | Typ | Max | Unit |
|-------------|--------------------------------------|-----|-----|-----|------|
| t_{cycle} | Clock Cycle Time | 300 | - | - | ns |
| t_{AS} | Address Setup Time | 30 | - | - | ns |
| t_{AH} | Address Hold Time | 0 | - | - | ns |
| t_{DSW} | Write Data Setup Time | 20 | - | - | ns |
| t_{DHW} | Write Data Hold Time | 42 | - | - | ns |
| t_{DHR} | Read Data Hold Time | 20 | - | - | ns |
| t_{OH} | Output Disable Time | - | - | 70 | ns |
| t_{ACC} | Access Time | - | - | 140 | ns |
| t_{PWLR} | Read Low Time | 150 | - | - | ns |
| t_{PWLW} | Write Low Time | 60 | - | - | ns |
| t_{PWHR} | Read High Time | 60 | - | - | ns |
| t_{PWHW} | Write High Time | 60 | - | - | ns |
| t_R | Rise Time | - | - | 15 | ns |
| t_F | Fall Time | - | - | 15 | ns |
| t_{CS} | Chip select setup time | 0 | - | - | ns |
| t_{CSH} | Chip select hold time to read signal | 0 | - | - | ns |
| t_{CSF} | Chip select hold time | 20 | - | - | ns |

$V_{CI} - V_{SS} = 2.1V$ to $3.5V$ ($T_A = 25^\circ C$)

| Symbol | Parameter | Min | Typ | Max | Unit |
|-------------|--------------------------------------|-----|-----|-----|------|
| t_{cycle} | Clock Cycle Time | 300 | - | - | ns |
| t_{AS} | Address Setup Time | 18 | - | - | ns |
| t_{AH} | Address Hold Time | 0 | - | - | ns |
| t_{DSW} | Write Data Setup Time | 14 | - | - | ns |
| t_{DHW} | Write Data Hold Time | 20 | - | - | ns |
| t_{DHR} | Read Data Hold Time | 20 | - | - | ns |
| t_{OH} | Output Disable Time | - | - | 70 | ns |
| t_{ACC} | Access Time | - | - | 140 | ns |
| t_{PWLR} | Read Low Time | 150 | - | - | ns |
| t_{PWLW} | Write Low Time | 60 | - | - | ns |
| t_{PWHR} | Read High Time | 60 | - | - | ns |
| t_{PWHW} | Write High Time | 60 | - | - | ns |
| t_R | Rise Time | - | - | 15 | ns |
| t_F | Fall Time | - | - | 15 | ns |
| t_{CS} | Chip select setup time | 0 | - | - | ns |
| t_{CSH} | Chip select hold time to read signal | 0 | - | - | ns |
| t_{CSF} | Chip select hold time | 20 | - | - | ns |

PRODUCT SPECIFICATION

8080-series MCU Parallel Interface characteristics



PRODUCT SPECIFICATION

(2)6800-seres MCU parallel interface Timing characteristics

$V_{CI} - V_{SS} = 1.65V$ to $2.1V$ ($T_A = 25^\circ C$)

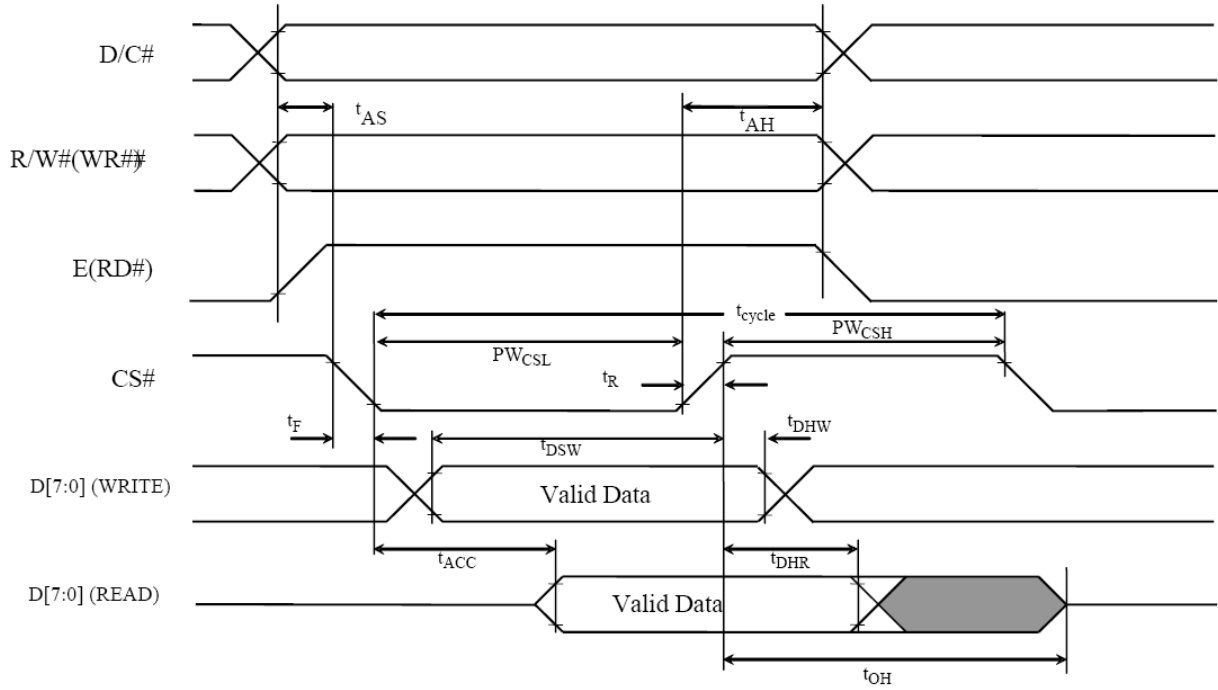
| Symbol | Parameter | Min | Typ | Max | Unit |
|-------------|--------------------------------------|-----|-----|-----|------|
| t_{cycle} | Clock Cycle Time | 300 | - | - | ns |
| t_{AS} | Address Setup Time | 10 | - | - | ns |
| t_{AH} | Address Hold Time | 0 | - | - | ns |
| t_{DSW} | Write Data Setup Time | 40 | - | - | ns |
| t_{DHW} | Write Data Hold Time | 44 | - | - | ns |
| t_{DHR} | Read Data Hold Time | 20 | - | - | ns |
| t_{OH} | Output Disable Time | - | - | 70 | ns |
| t_{ACC} | Access Time | - | - | 250 | ns |
| PW_{CSL} | Chip Select Low Pulse Width (read) | 120 | - | - | ns |
| | Chip Select Low Pulse Width (write) | 60 | - | - | ns |
| PW_{CSH} | Chip Select High Pulse Width (read) | 60 | - | - | ns |
| | Chip Select High Pulse Width (write) | 60 | - | - | ns |
| t_R | Rise Time | - | - | 15 | ns |
| t_F | Fall Time | - | - | 15 | ns |

$V_{CI} - V_{SS} = 2.1V$ to $3.5V$ ($T_A = 25^\circ C$)

| 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 | 20 | - | - | 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) | 120 | - | - | ns |
| | Chip Select Low Pulse Width (write) | 60 | - | - | ns |
| PW_{CSH} | Chip Select High Pulse Width (read) | 60 | - | - | ns |
| | Chip Select High Pulse Width (write) | 60 | - | - | ns |
| t_R | Rise Time | - | - | 15 | ns |
| t_F | Fall Time | - | - | 15 | ns |

PRODUCT SPECIFICATION

6800-Series MCU Parallel Interface Timing Characteristics



PRODUCT SPECIFICATION

(3)Serial Interface Timing Characteristics (4-line SPI)

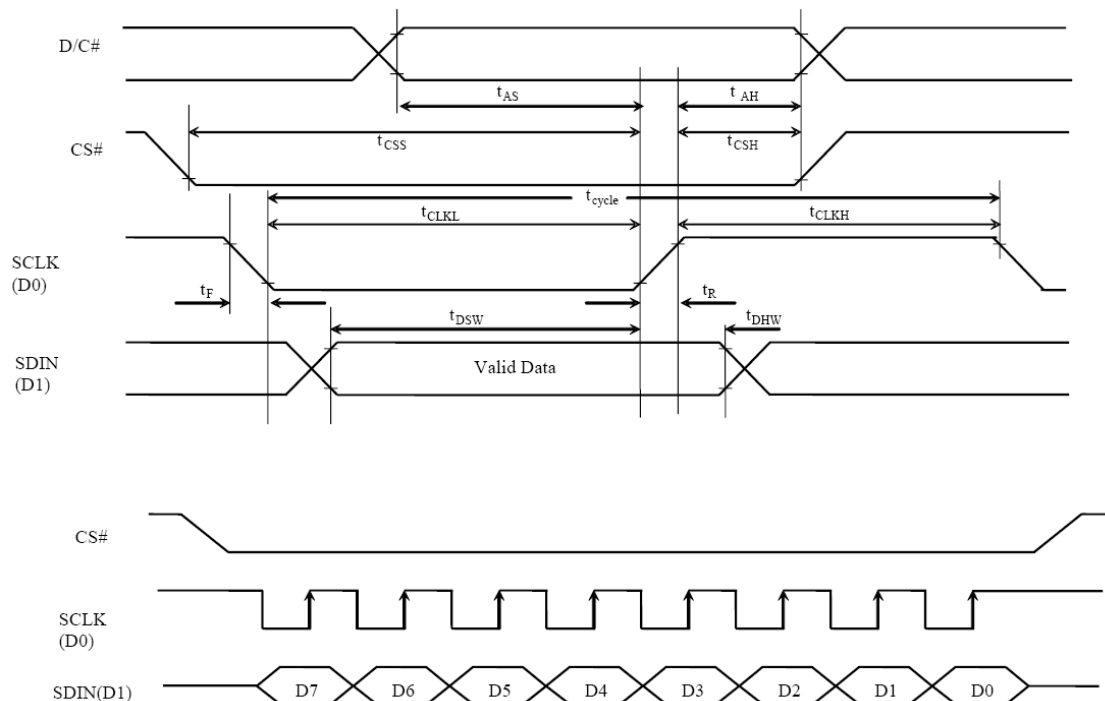
$V_{CI} - V_{SS} = 1.65V$ to $2.1V$ ($T_A = 25^\circ C$)

| Symbol | Parameter | Min | Typ | Max | Unit |
|-------------|------------------------|-----|-----|-----|------|
| t_{cycle} | Clock Cycle Time | 220 | - | - | 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 | 30 | - | - | ns |
| t_{CLKL} | Clock Low Time | 25 | - | - | ns |
| t_{CLKH} | Clock High Time | 20 | - | - | ns |
| t_R | Rise Time | - | - | 15 | ns |
| t_F | Fall Time | - | - | 15 | ns |

$V_{CI} - V_{SS} = 2.1V$ to $3.5V$ ($T_A = 25^\circ C$)

| Symbol | Parameter | Min | Typ | Max | Unit |
|-------------|------------------------|-----|-----|-----|------|
| t_{cycle} | Clock Cycle Time | 160 | - | - | 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 | - | - | 15 | ns |
| t_F | Fall Time | - | - | 15 | ns |

Serial Interface characteristics (4-line SPI)



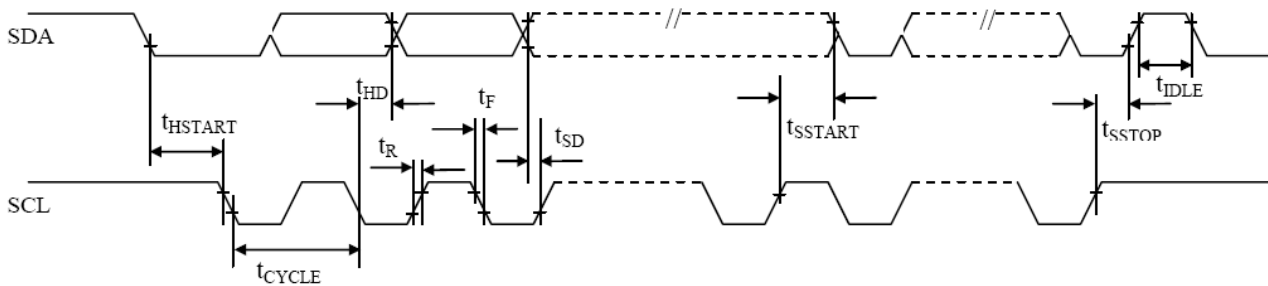
PRODUCT SPECIFICATION

(4) I²C Interface Timing Characteristics

($V_{CI} - V_{SS} = 1.65V$ to $3.5V$, $T_A = 25^\circ C$)

| Symbol | Parameter | Min | Typ | Max | Unit |
|--------------|---|-----|-----|-----|---------|
| t_{cycle} | Clock Cycle Time | 2.5 | - | - | μs |
| t_{HSTART} | Start condition Hold Time | 0.6 | - | - | μs |
| 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 | - | - | μs |
| t_{SSTOP} | Stop condition Setup Time | 0.6 | - | - | μs |
| 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 | - | - | μs |

I²C Interface Timing characteristics

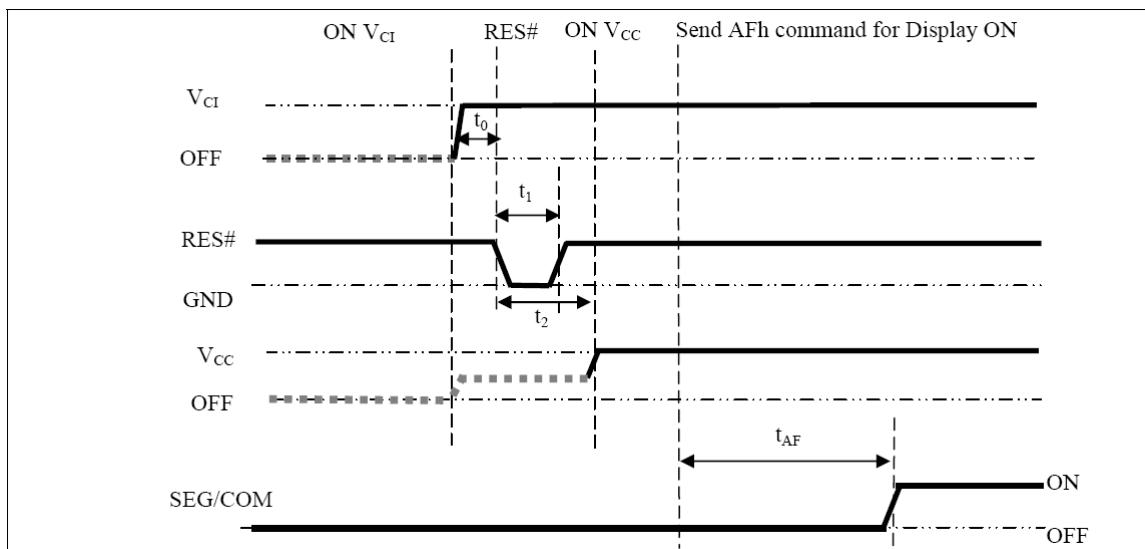


9 Functional Specification and Application Circuit

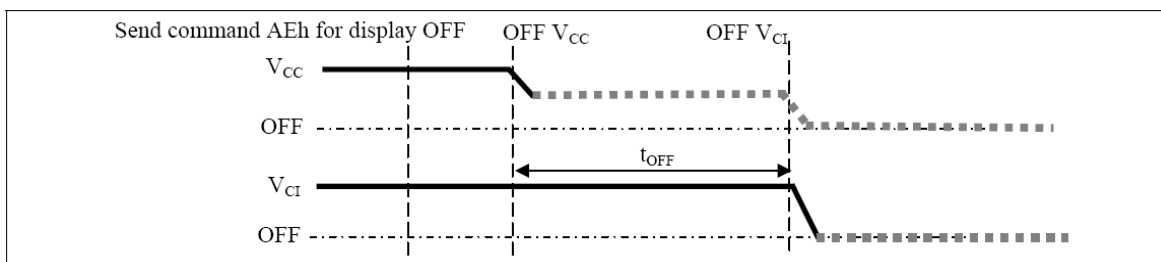
9.1 Power ON and Power OFF Sequence

The following figures illustrate the recommended power ON and power OFF sequence of SSD1327 (assume internal VDD is used)

1. Power ON VCI.
2. After VCI becomes stable, set wait time at least 1ms(t_0) for internal VDD become stable. Then set RES# pin LOW(logic low), for at least 100us(t_1)(4) and then HIGH(logic high).
3. After set RES# pin LOW(logic low), wait for least 100us(t_2). Then Power ON VCC.(1)
4. After VCC become stable, send command AFh for display ON. SEG/COM will be ON after 200ms(t_{AF}).



1. Send command AEh for display OFF.
2. Power OFF VCC.(1),(2),(3)
3. Wait for T_{OFF} . Power OFF VCI (where Minimum $T_{OFF}=0ms$ (5), Typical $t_{OFF}=100ms$)



Note:

- (1) Since an ESD protection circuit is connected between VCI and VCC, VCC becomes lower than VCI whenever VCI is ON and VCC is OFF as shown in the dotted line of VCC in above figures.
- (2) VCC should be kept float (disabled) when it is OFF.
- (3) Power pins(VCI, VCC) can never be pulled to ground under any circumstance.
- (4) The register values are reset after t_1 .
- (5) VCI should not be Power OFF before VCC Power OFF.

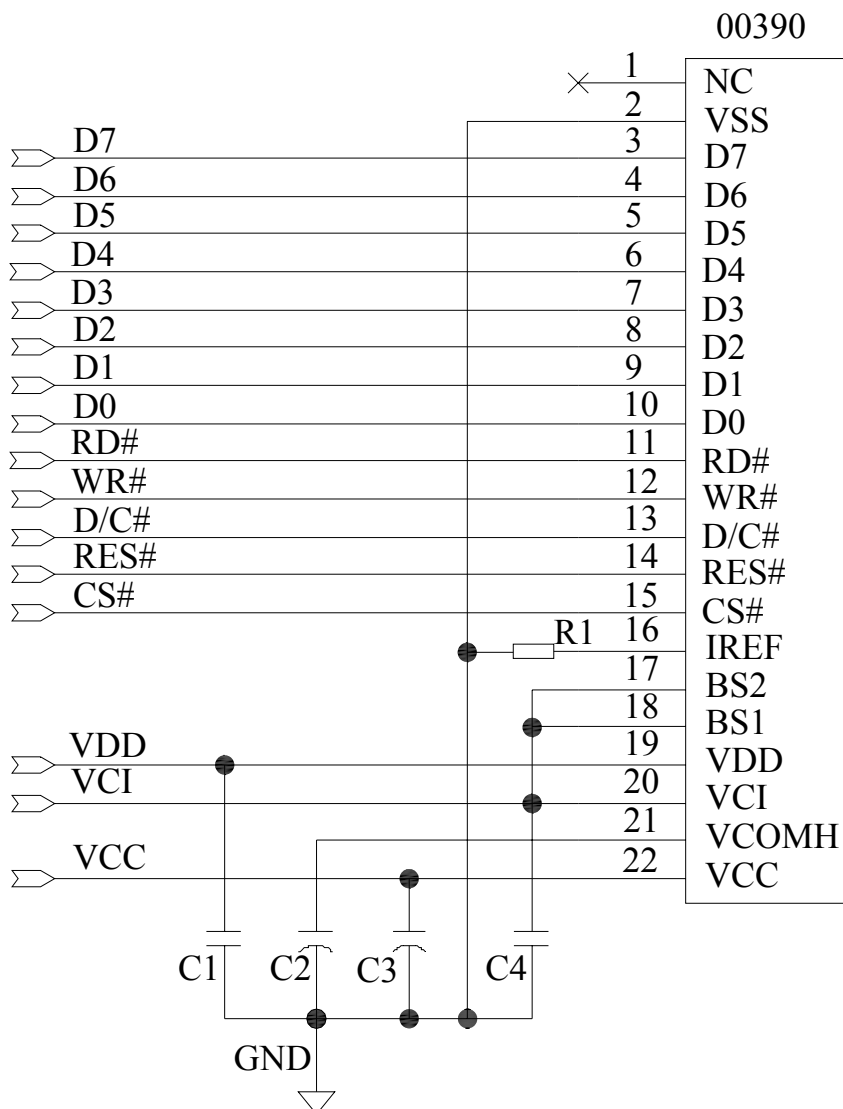
9.2 Application Circuit

The double byte command for 0xAB is used to enable or disable the VDD regulator.

No matter VDD is supplied by external source or internal regulated ; VCI must always be set equivalent to or higher than VDD.

(A) .VDD can be supplied externally (with the range of 1.65V to 2.6V, VCI must always be set equivalent to or higher than VDD.) when A[0] is set to 0b.

(1).The configuration for 8-bit 8080-parallel interface mode, external VCC is shown in the following diagram:



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

Recommended components

C1,C4: 0.1uF-0603-X7R±10%.ROHS

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

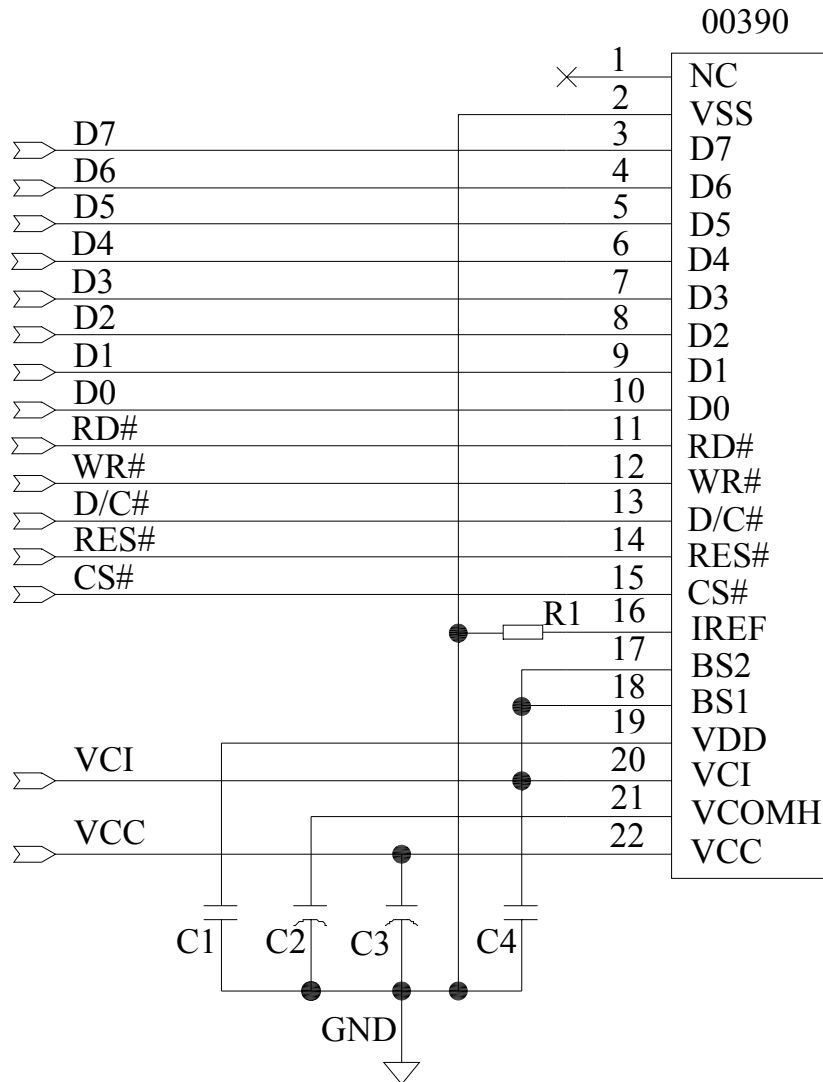
R1: 0603 1/10W +/-5% 1.2Mohm.ROHS

PRODUCT SPECIFICATION

(B) .VDD can be supplied regulated internally from VCI when A[0] is set to 1b.

(VCI must be > 2.6V)

(1).The configuration for 8-bit 8080-parallel interface mode, external VCC is shown in the following diagram:



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

Recommended components

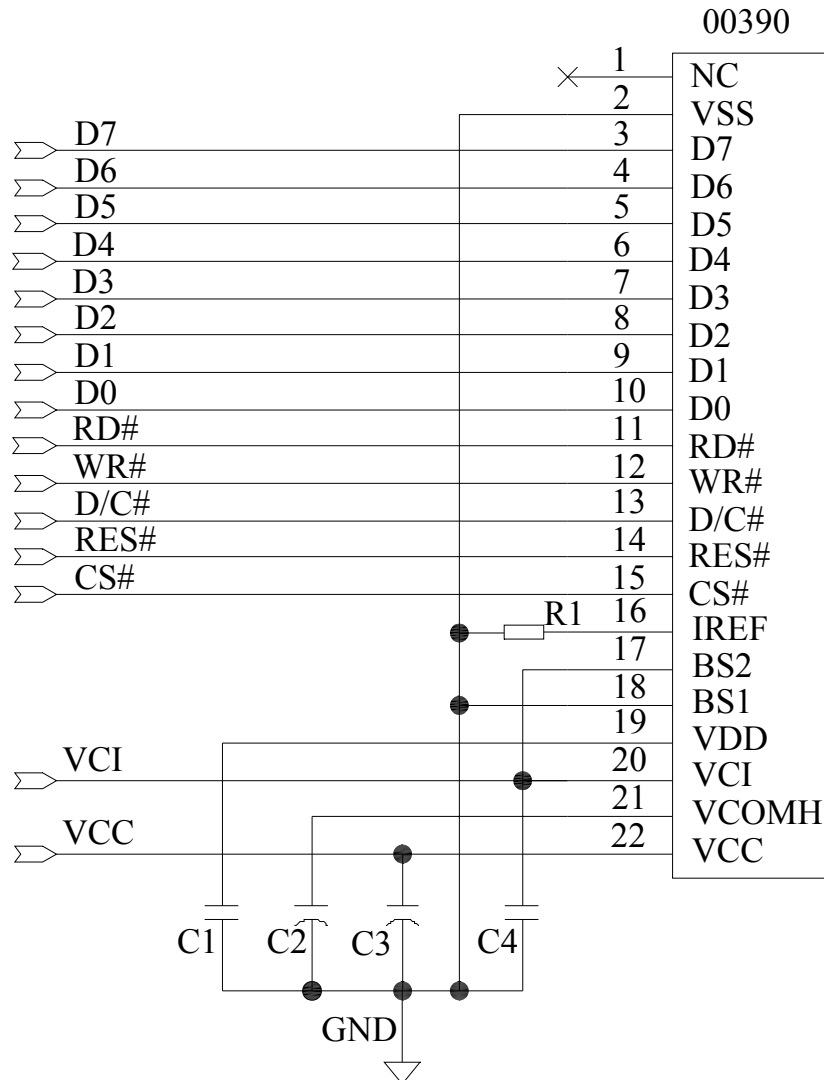
C1,C4: 0.1uF-0603-X7R±10%.ROHS

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

R1: 0603 1/10W +/-5% 1.2Mohm.ROHS

PRODUCT SPECIFICATION

(2).The configuration for 8-bit 6800-parallel interface mode, external VCC is shown in the following diagram:



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

Recommended components

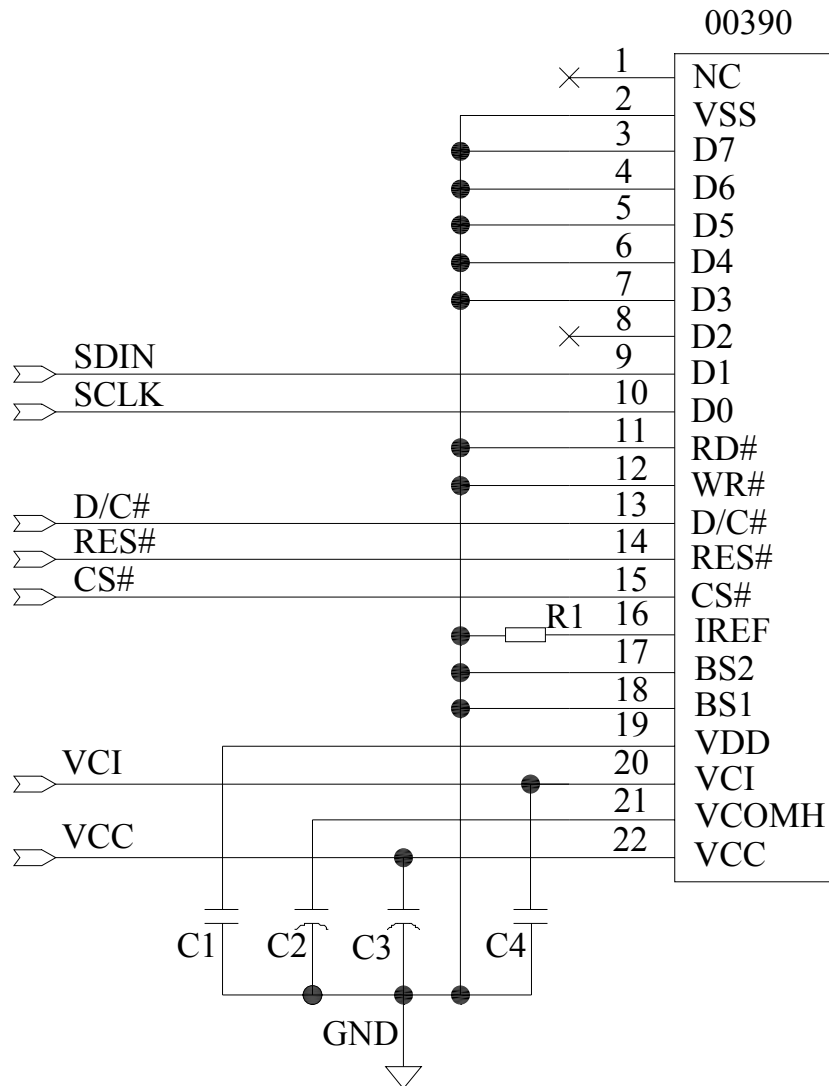
C1,C4: 0.1uF-0603-X7R±10%.ROHS

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

R1: 0603 1/10W +/-5% 1.2Mohm.ROHS

PRODUCT SPECIFICATION

(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

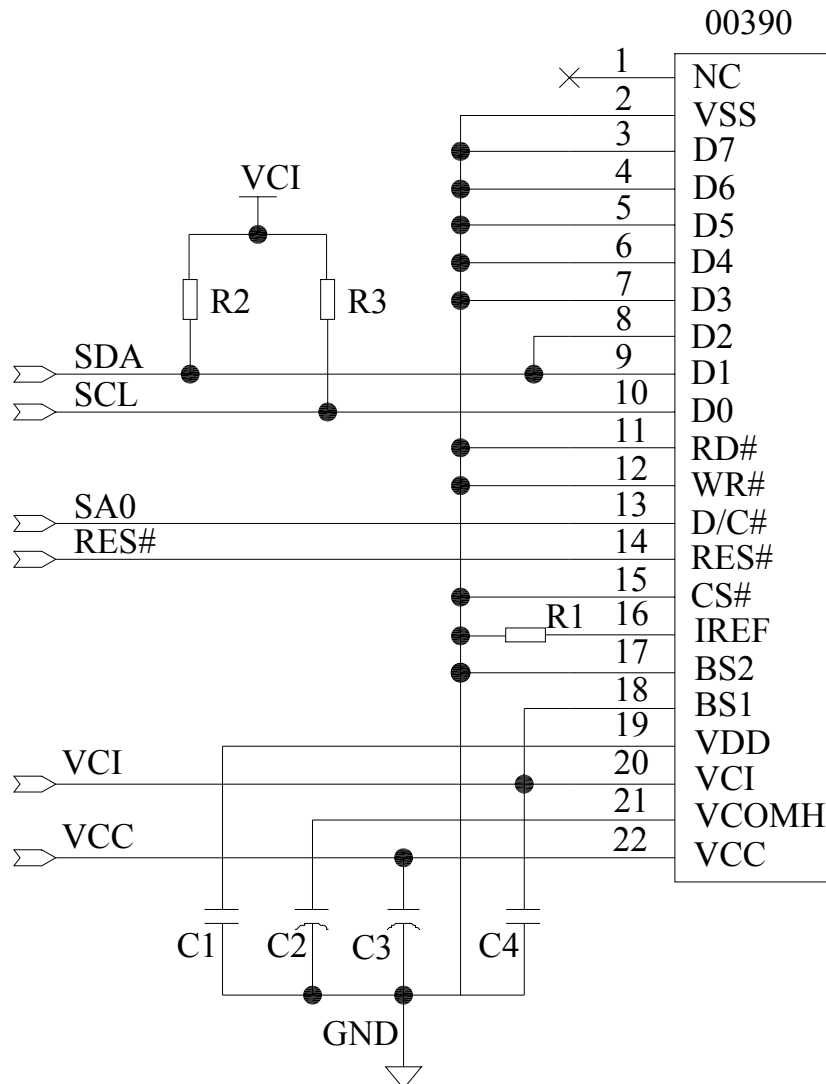
C1,C4: 0.1uF-0603-X7R±10%.ROHS

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

R1: 0603 1/10W +/-5% 1.2Mohm.ROHS

PRODUCT SPECIFICATION

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



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

Recommended components

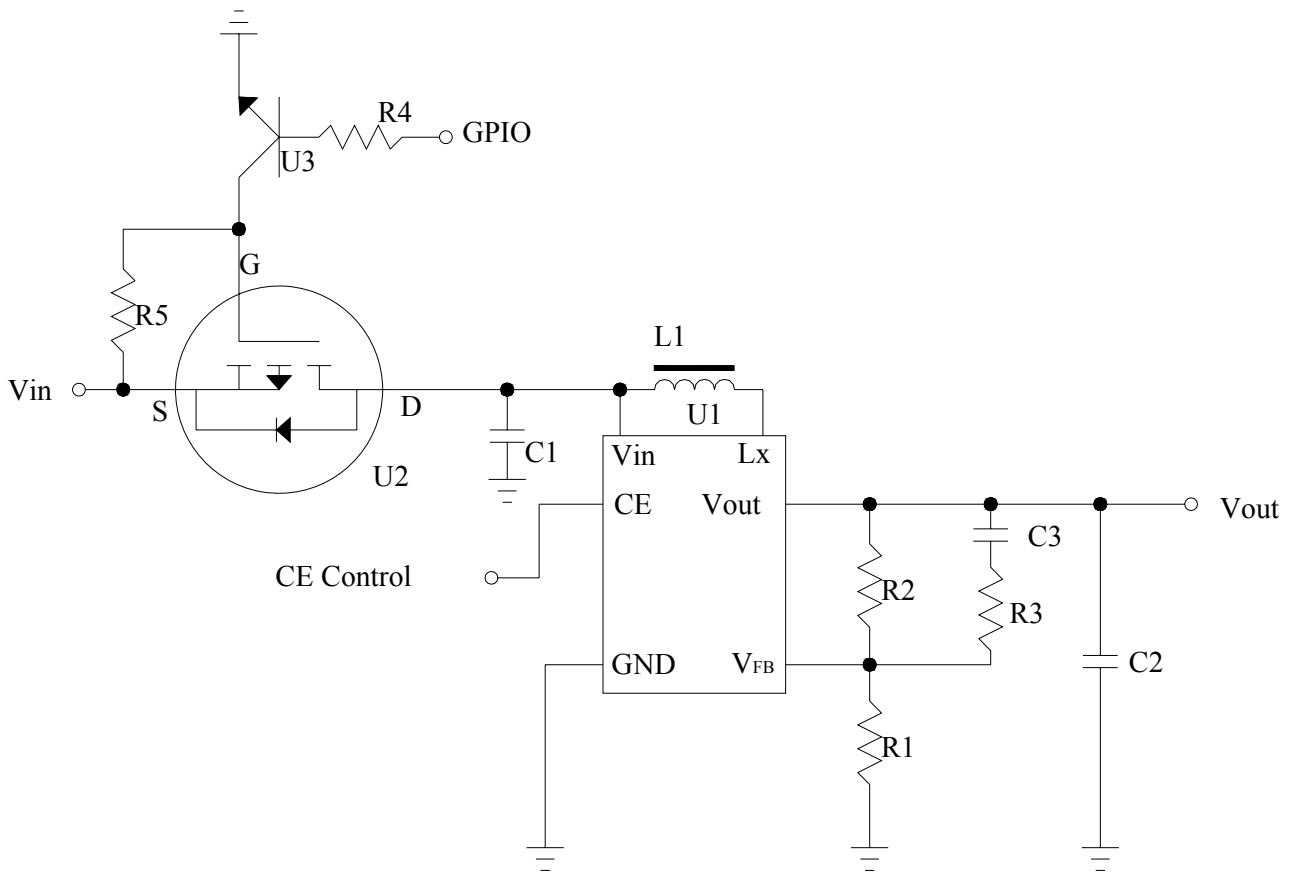
C1,C4: 0.1uF-0603-X7R±10%.ROHS

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

R1: 0603 1/10W +/-5% 1.2Mohm.ROHS

R2,R3: 0603 1/10W +/-5% 10Kohm.ROHS

9.3 External DC-DC application circuit



Recommend component

- The C1 : 1 uF-0603-X7R±10%.ROHS
- The C2 : 1 uF-0603-X7R±10%.ROHS
- The C3 : 220pF-0603-X7R±10%.ROHS
- The R1 : 0603 1/10W +/-5% 10Kohm.ROHS
- The R2 : 0603 1/10W +/-5% 140Kohm.ROHS
- The R3 : 0603 1/10W +/-5% 2Kohm.ROHS
- The R4 : 0603 1/10W +/-5% 1Kohm.ROHS
- The R5 : 0603 1/10W +/-5% 10Kohm.ROHS
- The L1 : 22uH
- The U1 : R1200
- The U2 : FDN338P
- The U3 : 8050

9.4 Display Control Instruction

Refer to SSD1327Z IC Specification.

9.5 Recommended Software Initialization

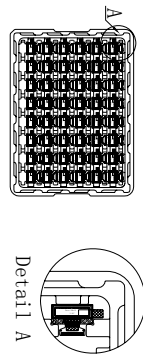
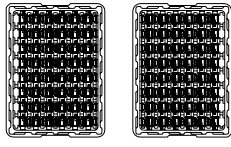
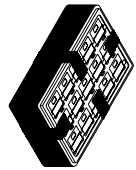
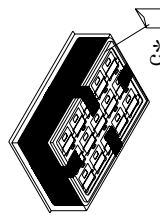
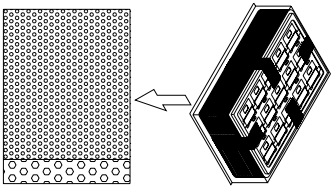
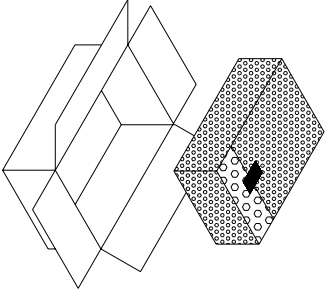
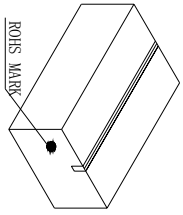
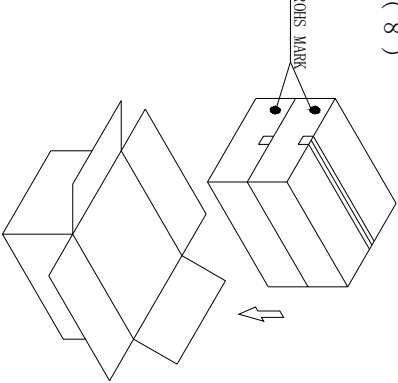
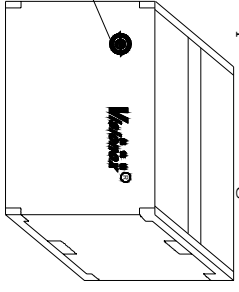

```
void init_program()
{
    write_c(0xae);
    write_c(0x15);    // set column address
    write_c(0x00);    // start column    0
    write_c(0x3f);    // end column    127
    write_c(0x75);    // set row address
    write_c(0x00);    // start row    0
    write_c(0x7f);    // end row    127
    write_c(0x81);    // set contrast control
    write_c(0x80);
    write_c(0xa0);    //segment remap
    write_c(0x51);    //
    write_c(0xa1);    // start line
    write_c(0x00);
    write_c(0xa2);    // display offset
    write_c(0x00);
    write_c(0xa4);    //normal display
    write_c(0xa8);    // set multiplex ratio
    write_c(0x7f);
    write_c(0xb1);    // set phase leghth
    write_c(0xf1);
    write_c(0xb3);    // set dclk
    write_c(0x00);    //80Hz:0xc1  90Hz:0xe1  100Hz:0x00  110Hz:0x30
                        //120Hz:0x50  130Hz:0x70

    write_c(0xab);
    write_c(0x01);
    write_c(0xb6);    // set phase leghth
    write_c(0x0f);
    write_c(0xbe);
    write_c(0x0f);
    write_c(0xbc);
    write_c(0x08);
    write_c(0xd5);
    write_c(0x62);
```

PRODUCT SPECIFICATION

```
write_c(0xfd);  
write_c(0x12);  
write_c(0xae);  
}
```


10 Package Specification

| Controlled Seal | | Packing Process (1)~(9) | | |
|---|--|--|--|--|
| <p>(1) Tray Type:00390-MT6-A</p>  | <p>(2)</p>  <p>TRAY</p> | <p>(3) order ①、② ①、② fix trays with tape 500 pcs of 1 small carton 1 tray contain 30 pcs 17 contained trays, 1 empty tray quantity distribution:16*30+1*20</p>  | <p>(4) Use vacuum bag to package the tray and add 5 bags of desiccant into the vacuum bag *5</p>  | |
| <p>(5) After tray be packaged, wrap the package in a bubble bag and seal with scoth tape.</p>  | <p>(6)</p>  | <p>(7)</p> <p>small carton package L390*W290*L120 mm</p>  | <p>(8)</p> <p>2 small cartons in 1 big carton</p>  | |
| <p>(9) 34 contained trays, 2 empty trays, Package quantity products: 1000 pcs of 1 big carton</p>  <p>Package finished L410*W310*L272 mm</p> | <p>NOTE:1、 The inner carton and master carton must be sealed with adhesive tape. 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  .</p> | | | |

PRODUCT SPECIFICATION

11 Reliability

11.1 Reliability Test

| NO. | ITEM | CONDITION | QUANTITY |
|-----|--|---|----------|
| 1 | High Temperature (Non-operation) | 85°C,240hrs | 4 |
| 2 | Low Temperature (Non-operation) | -40°C,240hrs | 4 |
| 3 | High Temperature (Operation) | 70°C,240hrs | 4 |
| 4 | Low Temperature (Operation) | -40°C,240hrs | 4 |
| 5 | High Temperature / High Humidity (Operation) | 60°C,90%RH,240hrs | 4 |
| 6 | Thermal shock (Non-operation) | -40°C~85°C(-40°C/30min;transit/3min;85°C/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 $\pm 3^{\circ}\text{C}$, and the tolerance of relative humidity is $\pm 5\%$.

Evaluation criteria

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

11.2 Lifetime

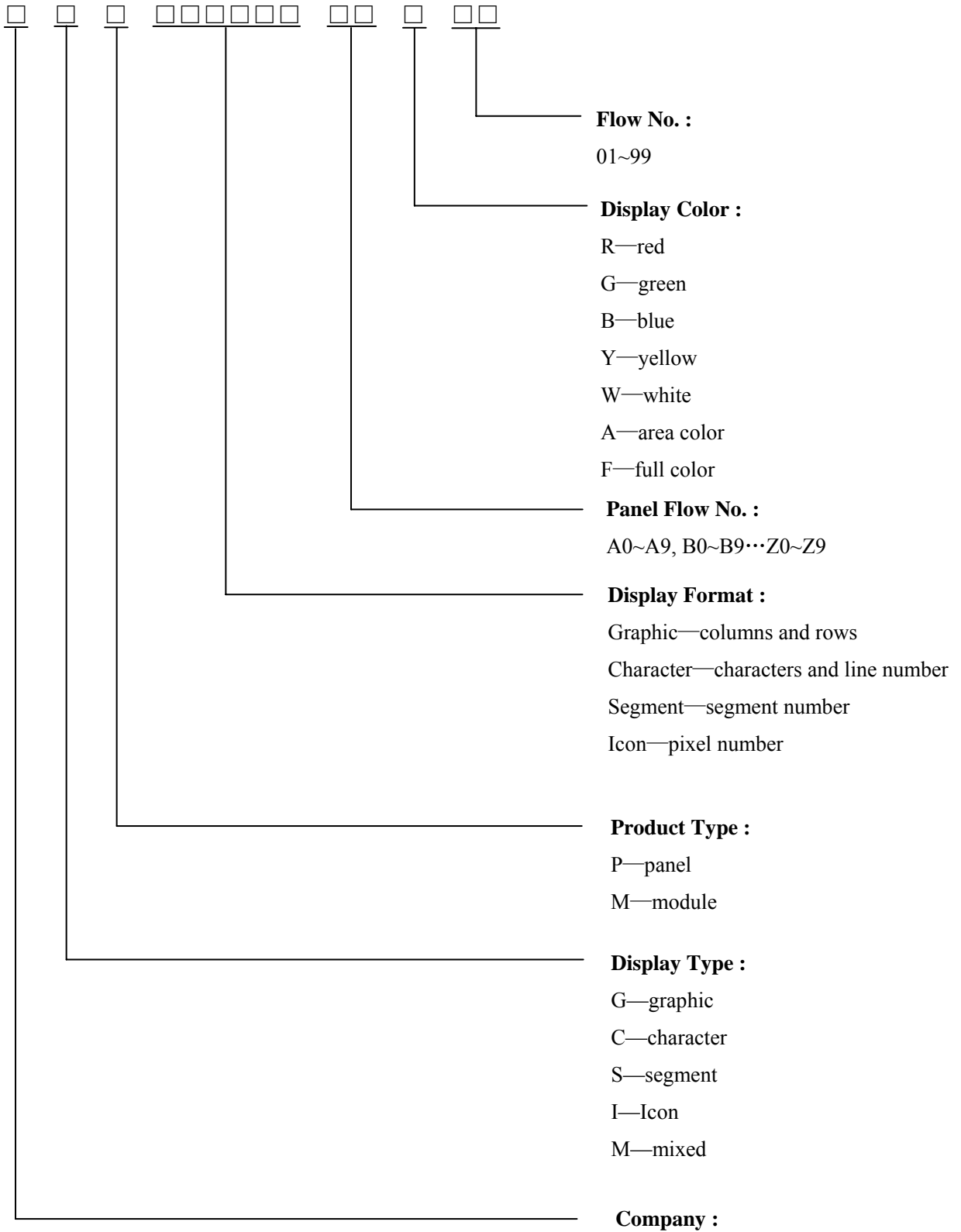
End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

| ITEM | MIN | MAX | UNIT | CONDITION |
|---------------------|--------|-----|------|---|
| Operation Life Time | 16,000 | - | hrs | 80 d/m ² , 50% alternating checkerboard, 22 \pm 3°C, 55 \pm 15% RH |

11.3 Failure Check Standard

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

12 Illustration of OLED Product Name



13 Outgoing Quality Control Specifications

13.1 Sampling Method

- (1) GB/T 2828.1-2003/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: $22\pm 3^{\circ}\text{C}$

Humidity: $55\pm 15\%\text{R.H}$

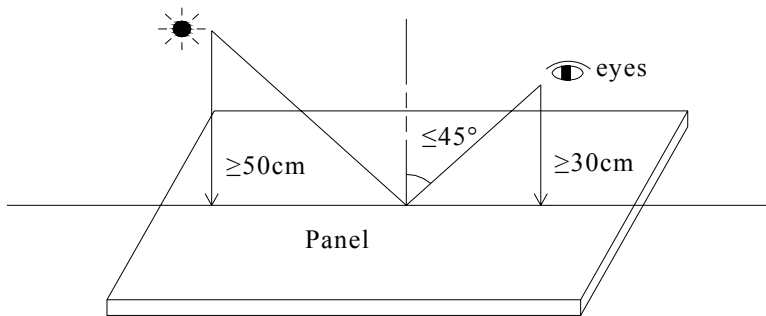
Fluorescent Lamp: 30W

Distance between the Panel & Lamp: $\geq 50\text{cm}$

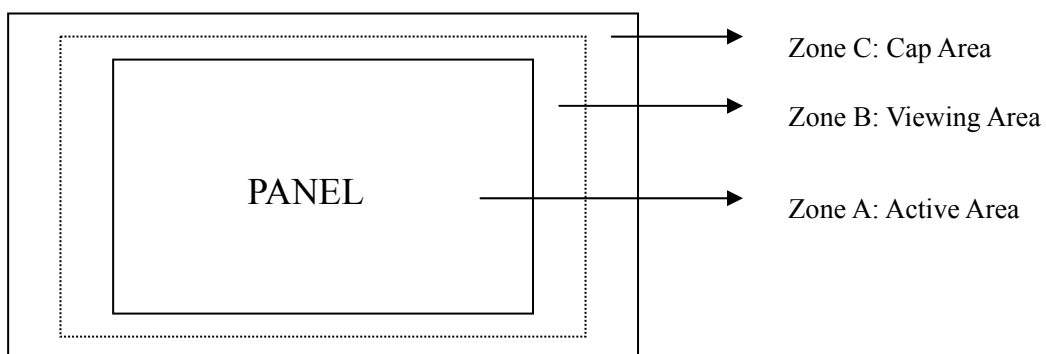
Distance between the Panel & Eyes: $\geq 30\text{cm}$

Viewing angle from the vertical in each direction: $\leq 45^{\circ}$

(See the sketch below)



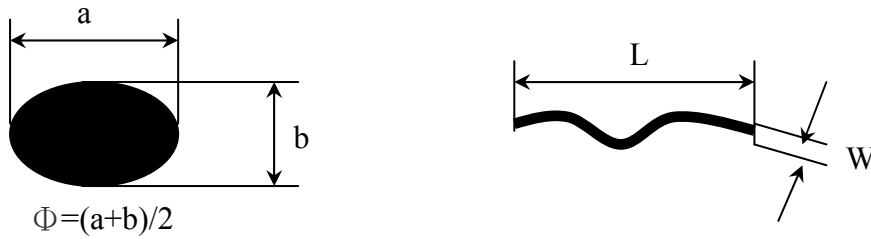
13.3 Quality Assurance Zones



PRODUCT SPECIFICATION

13.4 Inspection Standard

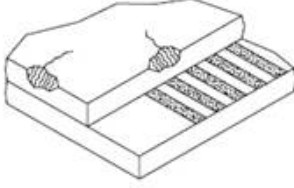
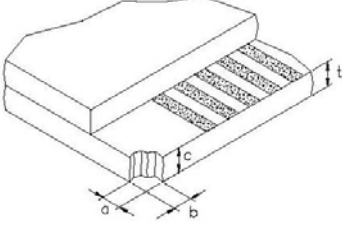
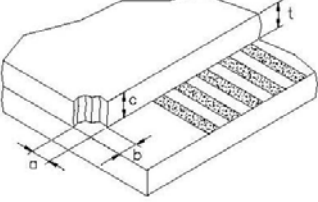
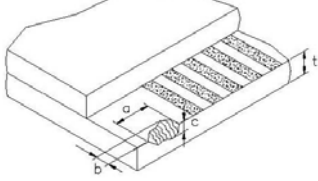
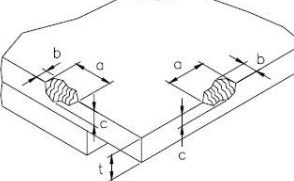
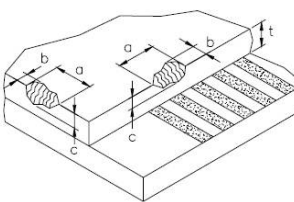
Definition of Φ &L&W (Unit: mm)



I . Appearance Defects

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

PRODUCT SPECIFICATION

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

PRODUCT SPECIFICATION

II . Displaying Defects

| NO. | ITEM | CRITERIA | CLASSIFICATION | | | | | | | | | | | | | | | |
|-------------------------|--|---|-----------------------|------------------|--|------------------|----------|--------|-------------------------|--------|--|---------------|---|--------|---------------|---|--|-------|
| 1 | Black/White spot Dirty spot Foreign matter | <table border="1"> <thead> <tr> <th data-bbox="517 367 794 434">Average Diameter (mm)</th> <th colspan="2" data-bbox="794 367 1155 405">Pieces Permitted</th> </tr> <tr> <td data-bbox="517 434 794 465">$\Phi \leq 0.10$</td> <td data-bbox="794 405 979 434">Zone A,B</td> <td data-bbox="979 405 1155 434">Zone C</td> </tr> <tr> <td data-bbox="517 465 794 497">$0.10 < \Phi \leq 0.20$</td> <td colspan="2" data-bbox="794 434 1155 465">Ignore</td> </tr> <tr> <td data-bbox="517 497 794 528">$\Phi > 0.20$</td> <td data-bbox="794 465 979 497">3</td> <td data-bbox="979 465 1155 497">Ignore</td> </tr> <tr> <td data-bbox="517 528 794 537">$\Phi > 0.20$</td> <td colspan="2" data-bbox="794 497 1155 528">0</td> </tr> </thead> </table> | Average Diameter (mm) | Pieces Permitted | | $\Phi \leq 0.10$ | Zone A,B | Zone C | $0.10 < \Phi \leq 0.20$ | Ignore | | $\Phi > 0.20$ | 3 | Ignore | $\Phi > 0.20$ | 0 | | Minor |
| Average Diameter (mm) | Pieces Permitted | | | | | | | | | | | | | | | | | |
| $\Phi \leq 0.10$ | Zone A,B | Zone C | | | | | | | | | | | | | | | | |
| $0.10 < \Phi \leq 0.20$ | Ignore | | | | | | | | | | | | | | | | | |
| $\Phi > 0.20$ | 3 | Ignore | | | | | | | | | | | | | | | | |
| $\Phi > 0.20$ | 0 | | | | | | | | | | | | | | | | | |
| 2 | No Display | Not allowable. | Major | | | | | | | | | | | | | | | |
| 3 | Irregular Display | Not allowable. | Major | | | | | | | | | | | | | | | |
| 4 | Missing Line (row or column) | Not allowable. | Major | | | | | | | | | | | | | | | |
| 5 | Short | Not allowable. | Major | | | | | | | | | | | | | | | |
| 6 | Flicker | Not allowable. | Major | | | | | | | | | | | | | | | |
| 7 | Abnormal Color | Refer to the SPEC. | Major | | | | | | | | | | | | | | | |
| 8 | Luminance NG | Refer to the SPEC. | Major | | | | | | | | | | | | | | | |
| 9 | Over Current | Refer to the SPEC. | Major | | | | | | | | | | | | | | | |

14 Precautions for operation and Storage

14.1 Precautions for Operation

- (1) Since OLED panel is made of glass, do not apply any mechanical shock or impact or excessive force to it when installing the OLED module. Any strong mechanical impact due to falling dropping etc. may cause damage (breakage or cracking).
- (2) The polarizer on the OLED surface is made of soft material and is easily scratched. Please take most care when handing. When the surface of the polarizer of OLED Module is contaminated, please wipe it off gently by using moisten soft cloth with isopropyl alcohol, do not use water, ketone or aromatics. If there is saliva or water on the OLED surface, please wipe it off immediately.
- (3) When handling OLED module, please be sure that the body and the tools are properly grounded. And do not touch I/O pins with bare hands or contaminate I/O pins, it will cause disconnection or defective insulation of terminals.
- (4) Do not attempt to disassemble or process the OLED module.
- (5) OLED module should be used under recommended operating conditions shown in the specification. Since the higher voltage leads to the shorter lifetime, be sure to use the specified operating voltage.
- (6) Foggy dew, moisture condensation or water droplets deposited on surface and contact terminals will cause polarizer stain or damage, the deteriorated display quality and electrochemical reaction then leads to shorter life time and permanent damage to the module probably. Please pay attention to the environmental temperature and humidity.
- (7) An afterimage is created by the difference in brightness between unused dot and the fixed dot, according to the decrease of brightness of the emitting time. Therefore, to avoid having an afterimage, the full set should be thoroughly used instead of using a fixed dot. When the fixed dot emits, an afterimage can be created.
- (8) Flicker could be come out at full on display. And it disappears when frame frequency increase, but brightness decreases too.

14.2 Soldering

- (1) Soldering should be performed only on the I/O terminals.
- (2) Use soldering irons with proper grounding and no leakage.
- (3) Iron: no higher than 300°C 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°C and 35°C 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

Leehon warrants for a period of 12 months from the shipping date when stored or used under normal conditions