



ZHONGJINGYUAN

郑州中景园电子技术有限公司
ZHENG ZHOU ZHONG JING YUAN TECHNOLOGY CO.,LTD
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Product Specification

Part Name: OLED Display Module

Customer Part ID:

Zhong JingYuan ID: ZJY150S0700WG01

Ver: A

Customer:

Approved by

From: Zhong JingYuan technology Co.,Ltd.

Approved by

Notes:

1. Please contact Zhong JingYuan technology Co.,Ltd. before assigning your product based on this module specification
2. The information contained herein is presented merely to indicate the characteristics and performance of our products. No responsibility is assumed by Zhong JingYuan technology Co.,Ltd. for any intellectual property claims or other problems that may result from application based on the module described herein.



ZHENG ZHOU ZHONG JING YUAN TECHNOLOGY CO.,LTD

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Revised History

[illegible]



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1. Basic Specifications

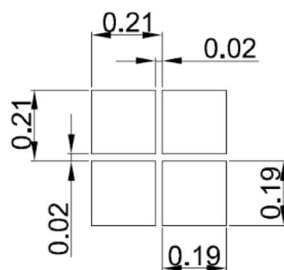
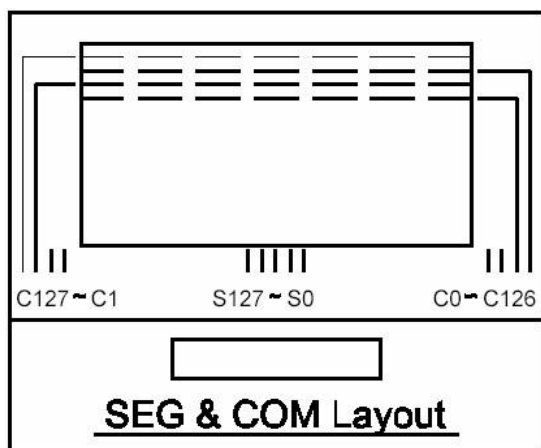
1.1 Display Specifications

- | | |
|-------------------|--------------------|
| 1) Display Mode: | Passive Matrix |
| 2) Display Color: | Monochrome (White) |
| 3) Drive Duty: | 1/128 Duty |

1.2 Mechanical Specifications

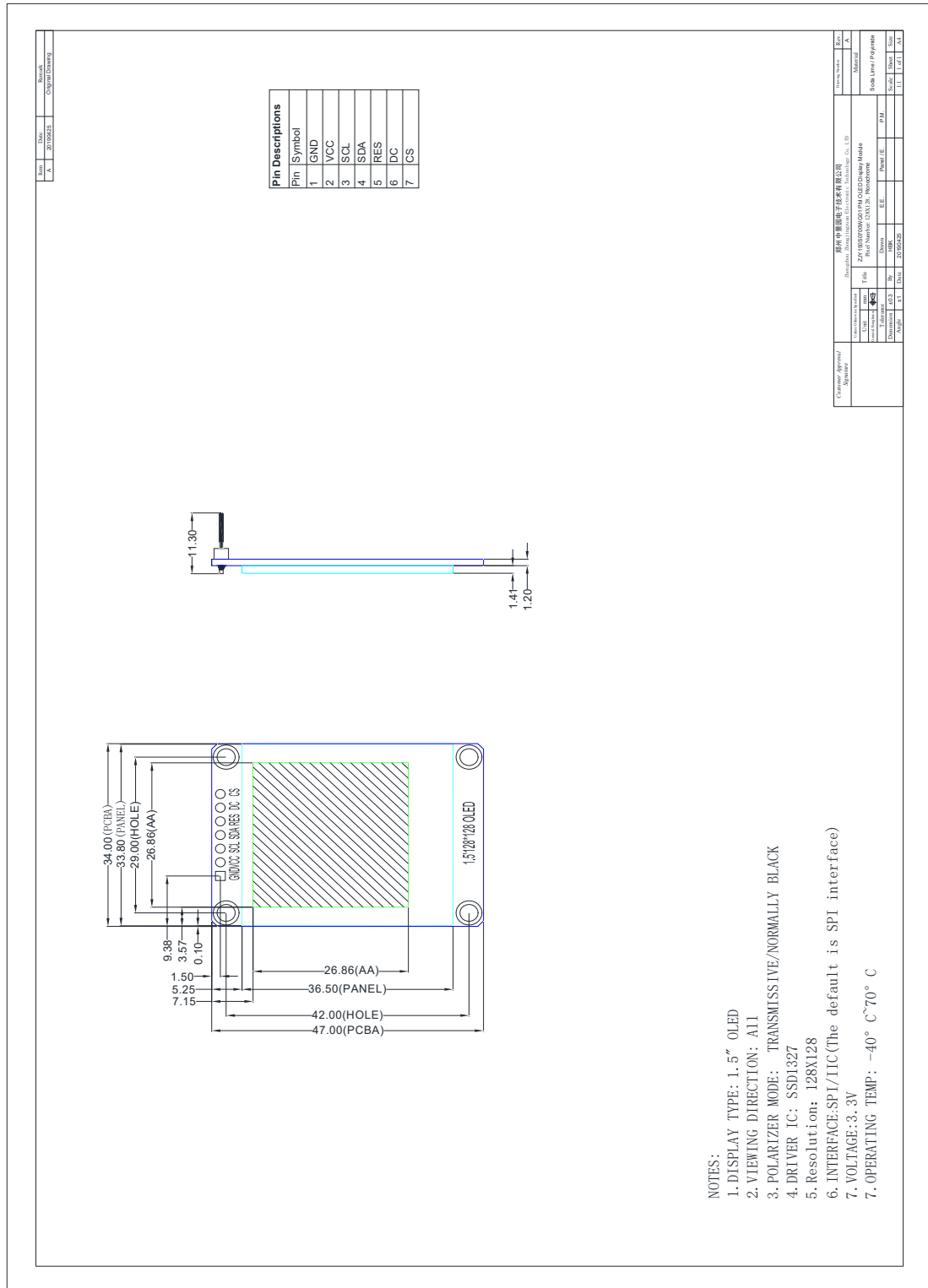
- | | |
|----------------------|--|
| 1) Outline Drawing: | According to the annexed outline drawing |
| 2) Number of Pixels: | 128 × 128 |
| 3) PCB Size: | 34.00×47.00× 2.61 (mm) |
| 4) Active Area: | 26.86 × 26.86 (mm) |
| 5) Pixel Pitch: | 0.21 × 0.21 (mm) |
| 6) Pixel Size: | 0.19 × 0.19 (mm) |

1.3 Active Area / Memory Mapping & Pixel Construction





1.4 Mechanical Drawing

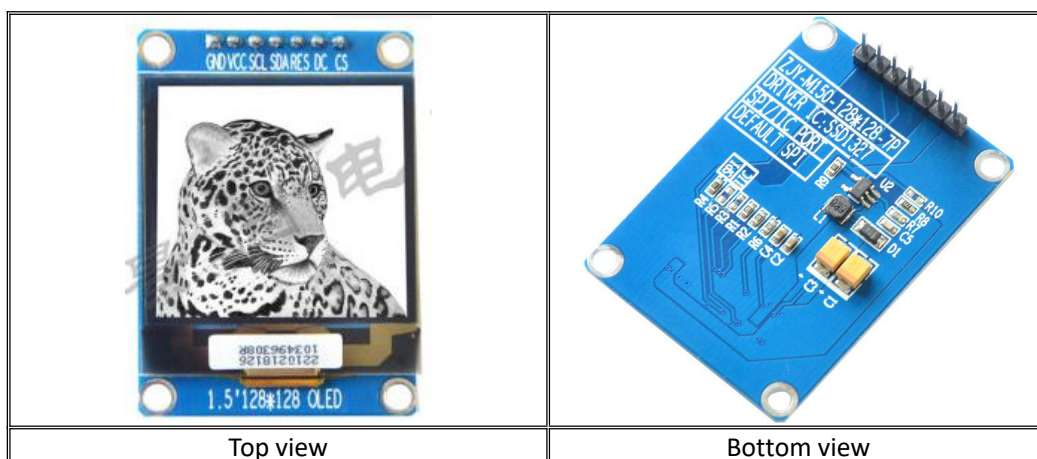




1.5Pin Definition

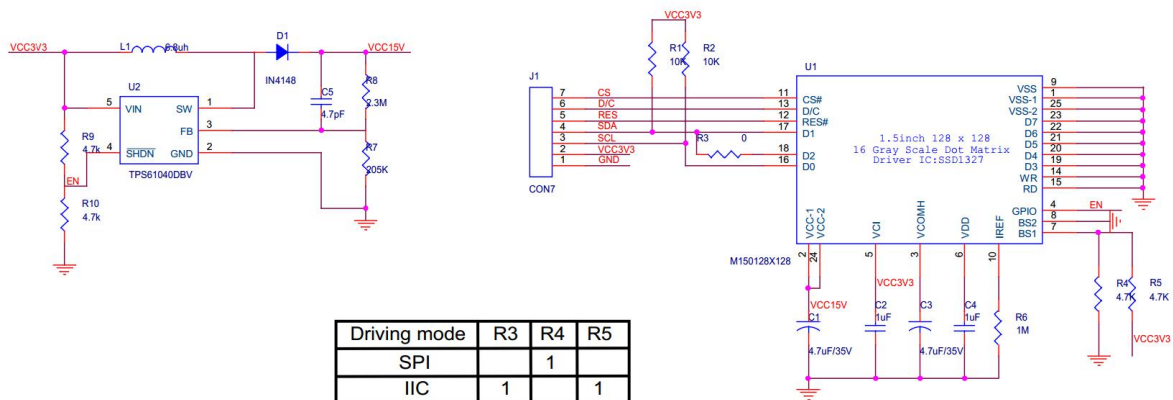
PIN No.	Symbol	Description
1	GND	Ground of Logic Circuit This is a ground pin. It must be connected to ground
2	VCC	Power Supply for OLED This is a voltage supply pin. It must be connected to source
3	SCL	The serial clock input SCL
4	SDA	The serial data input SDA
5	RES	Power Reset for Controller and Driver This pin is reset signal input. When the pin is low, initialization of the chip is executed. Keep this pin pull high during normal operation
6	DC	Data/Command Control This pin is Data/Command control pin. When the pin is pulled high, the input at SDA is treated as display data. When the pin is pulled low, the input at SDA will be transferred to the command register.
7	CS	Chip Select This pin is the chip select pin.Low enable, high disable.

1.6product picture





1.7 Schematic Diagram



SPI Switch to IIC :

1. Change R4 to R5.
2. Ground DC pin and CS pin.
3. Use IIC program.



2. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Notes
Supply Voltage for Display	VCC	3	5	V	
Supply Voltage for Logic	SCL/SDA/RES/DC/CS	1.65	3.3	V	
Operating Temperature	T _{OP}	-40	70	°C	
Storage Temperature	T _{STG}	-40	85	°C	
Life Time(100 cd/m ²)		13,000	-	hour	1(1)
Life Time(80 cd/m ²)		16,000	-	hour	1(2)

Note:

(A)Under Vcc = 15V, Ta = 25°C, 50% RH.

(B)Life time is defined the amount of time when the luminance has decayed to less than 50% of the initial measured luminance.

(1) Setting of 100 cd/m² :

- Contrast setting : 0x5f
- Frame rate : 105Hz
- Duty setting : 1/96

(2) Setting of 80 cd/m² :

- Contrast setting : 0x4f
- Frame rate : 105Hz
- Duty setting : 1/96



3. Optics & Electrical Characteristics

3.1 DC Characteristics

SYMBOL	PARAMETERS	TEST CONDITION	MIN	TYP	MAX	UNIT
V_{CC}	Driver power supply (for OLED panel)	-	14.5	15	15.5	V
V_{CI}	Low voltage power supply	-	2.6	-	3.5	V
V_{OH}	High logic output level	$I_{out}=100\text{ }\mu\text{A}$,	$0.9 \cdot V_{CI}$	-	V_{CI}	V
V_{OL}	Low logic output level	$I_{out}=100\text{ }\mu\text{A}$,	0	-	$0.1 \cdot V_{CI}$	V
V_{IH}	High logic input level	$I_{out}=100\text{ }\mu\text{A}$,	$0.8 \cdot V_{CI}$	-	V_{CI}	V
V_{IL}	Low logic input level	$I_{out}=100\text{ }\mu\text{A}$,	0	-	$0.2 \cdot V_{CI}$	V
I_{CC}	V_{CC} Supply Current	$V_{CI} = 3.5\text{V}$, $V_{CC} = 18\text{V}$, Display ON, No panel attached, contrast = FF	External $V_{DD} = 2.5\text{V}$	600	750	μA
			Internal $V_{DD} = 2.5\text{V}$	600	750	
I_{CI}	V_{CI} Supply Current	$V_{CI} = 3.5\text{V}$, $V_{CC} = 18\text{V}$, Display ON, No panel attached, contrast = FF	External $V_{DD} = 2.5\text{V}$	35	50	μA
			Internal $V_{DD} = 2.5\text{V}$	95	120	
I_{SEG}	Segment output current Setting $V_{CC}=18\text{V}$, $I_{REF}=10\text{ }\mu\text{A}$	Contrast=FF	-	300	370	μA
		Contrast=AF	-	206	-	μA
		Contrast=7F	-	150	-	μA
		Contrast=3F	-	75	-	μA
		Contrast=1F	-	37.5	-	μA



3.2 ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	MIN	TYP.	MAX	UNITS	COMMENTS
Normal mode current consumption	-	25.5	27.5	mA	All pixels on
Standby mode current consumption	-	1	2	mA	Standby mode 10% pixels on
Normal mode power consumption	-	382.5	412.5	mW	All pixels on
Standby mode power consumption	-	15	30	mW	Standby mode 10% pixels on
Pixel Luminance	80	100		cd/m ²	Display Average
Standby Luminance		10		cd/m ²	
CIE _x (White)	0.24	0.28	0.32		CIE1931
CIE _y (White)	0.28	0.32	0.36		CIE1931
Dark Room Contrast	2000:1				
Viewing Angle	160			degree	
Response Time		10		μs	

Normal mode condition :

- Driving Voltage : 15V
- Contrast setting : 0x5f
- Frame rate : 105Hz
- Duty setting : 1/96

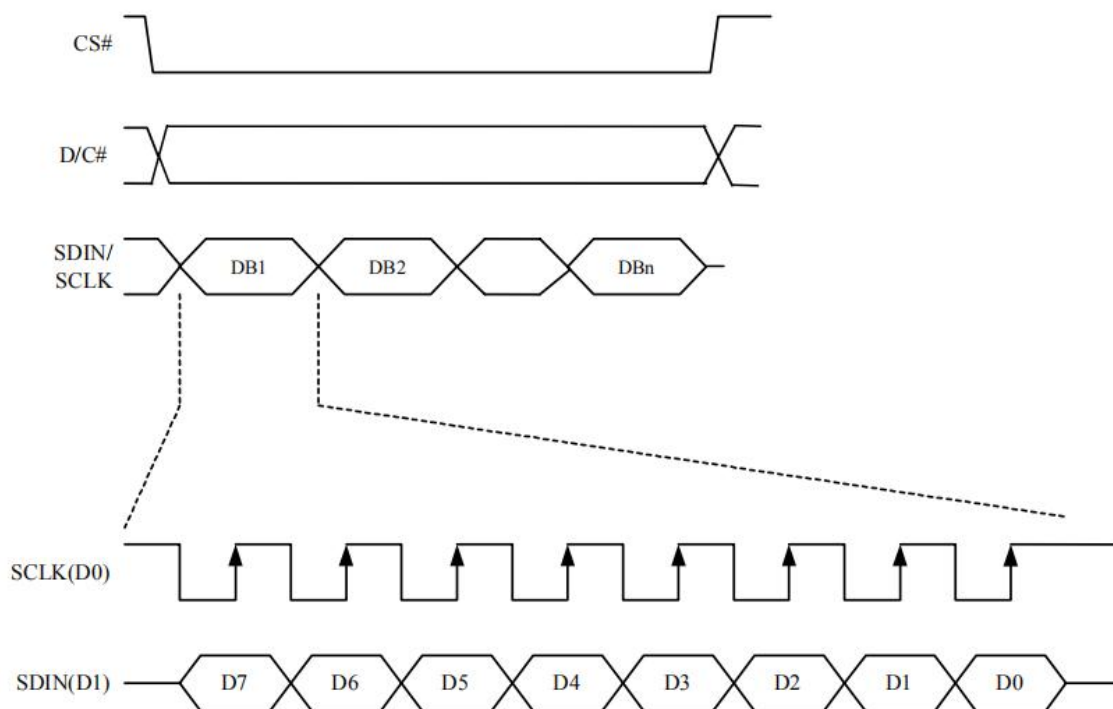
Standby mode condition :

- Driving Voltage : 15V
- Contrast setting : 0x0a
- Frame rate : 105Hz
- Duty setting : 1/96



3.3 AC Characteristics

3.3.1 SPI Interface Timing Characteristics:





4. The appendix

```
void OLED_Init(void)
{
    //OLED 复位
    OLED_RES_Clr();//RES 置 0
    delay_ms(200);//延时 200ms
    OLED_RES_Set();//RES 置 1

    //OLED 初始化
    OLED_WR_Byte(0xAE,OLED_CMD); /*display off*/

    OLED_WR_Byte(0x04,OLED_CMD); /*set lower column address*/
    OLED_WR_Byte(0x10,OLED_CMD); /*set higher column address*/

    OLED_WR_Byte(0x40,OLED_CMD); /* set display start line */

    OLED_WR_Byte(0x81,OLED_CMD); /* set contrast control */
    OLED_WR_Byte(0x80,OLED_CMD);

    OLED_WR_Byte(0xa1,OLED_CMD); /* set segment remap */

    OLED_WR_Byte(0xa6,OLED_CMD); /* set normal display */

    OLED_WR_Byte(0xa8,OLED_CMD); /* set multiplex ratio */
    OLED_WR_Byte(0x1f,OLED_CMD); /* 1/32 */

    OLED_WR_Byte(0xc8,OLED_CMD); /* set com scan direction */

    OLED_WR_Byte(0xd3,OLED_CMD); /* set display offset */
    OLED_WR_Byte(0x00,OLED_CMD);

    OLED_WR_Byte(0xd5,OLED_CMD); /* set display clock divide/oscillator frequency */
    OLED_WR_Byte(0xf0,OLED_CMD);

    OLED_WR_Byte(0xD8,OLED_CMD); /*set area color mode off */
    OLED_WR_Byte(0x05,OLED_CMD);
    OLED_WR_Byte(0xD9,OLED_CMD); /* Set Pre-Charge Period */
    OLED_WR_Byte(0xC2,OLED_CMD);
    OLED_WR_Byte(0xda,OLED_CMD); /* set com pin configuartion */
```



```
OLED_WR_Byte(0x12,OLED_CMD);

OLED_WR_Byte(0xdb,OLED_CMD); /* set Vcomh */
OLED_WR_Byte(0x08,OLED_CMD);

OLED_Clear();
OLED_WR_Byte(0xAF,OLED_CMD); /*display ON*/
}
```

```
#define OLED_CMD  0  //write command
#define OLED_DATA 1  //write data
```

```
void OLED_WR_Byte(u8 dat,u8 cmd)
```

```
{
    u8 i;
    if(cmd)
        OLED_DC_Set();
    else
        OLED_DC_Clr();
    OLED_CS_Clr();
    for(i=0;i<8;i++)
    {
        OLED_SCL_Clr();
        if(dat&0x80)
            OLED_SDA_Set();
        else
            OLED_SDA_Clr();
        OLED_SCL_Set();
        dat<<=1;
    }
    OLED_CS_Set();
    OLED_DC_Set();
}
```



5. Reliability

5.1 Contents of Reliability Tests

Item	Conditions	Criteria
High Temperature Operation	70°C, 240 hrs	The operational functions work.
Low Temperature Operation	-40°C, 240 hrs	
High Temperature Storage	85°C, 240 hrs	
Low Temperature Storage	-40°C, 240 hrs	
High Temperature/Humidity Operation	60°C, 90% RH, 120 hrs	
Thermal Shock	-40°C ⇔ 85°C, 24 cycles 60 mins dwell	

- * The samples used for the above tests do not include polarizer.
- * No moisture condensation is observed during tests.

5.2 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 23±5°C; 55±15% RH.



6. Outgoing Quality Control Specifications

6.1 Environment Required

Customer's test & measurement are required to be conducted under the following conditions:

Temperature:	$23 \pm 5^{\circ}\text{C}$
Humidity:	$55 \pm 15\% \text{ RH}$
Fluorescent Lamp:	30W
Distance between the Panel & Lamp:	$\geq 50\text{cm}$
Distance between the Panel & Eyes of the Inspector:	$\geq 30\text{cm}$
Finger glove (or finger cover) must be worn by the inspector.	
Inspection table or jig must be anti-electrostatic.	

6.2 Sampling Plan

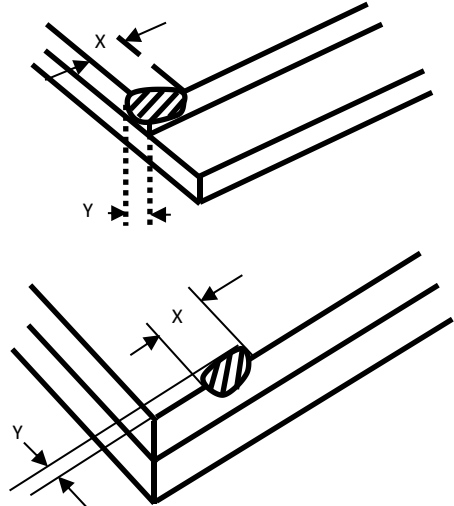
Level II, Normal Inspection, Single Sampling, MIL-STD-105E

6.3 Criteria & Acceptable Quality Level

Partition	AQL	Definition
Major	0.65	Defects in Pattern Check (Display On)
Minor	1.0	Defects in Cosmetic Check (Display Off)

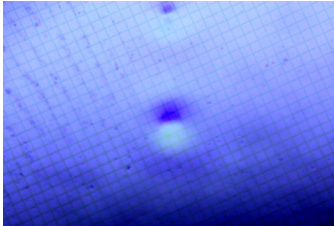


6.3.1 Cosmetic Check (Display Off) in Non-Active Area

Check Item	Classification	Criteria
Panel General Chipping	Minor	$X > 6 \text{ mm}$ (Along with Edge) $Y > 1 \text{ mm}$ (Perpendicular to edge) 

6.3.2 Cosmetic Check (Display Off) in Active Area

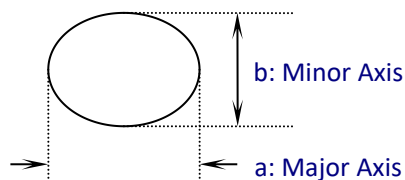
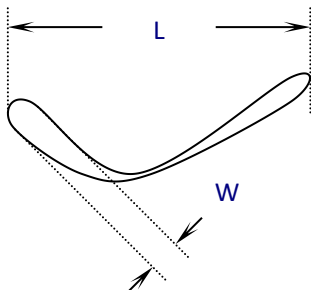
It is recommended to execute in clear room environment (class 10k) if actual in necessary.

Check Item	Classification	Criteria
Any Dirt & Scratch on Polarizer's Protective Film	Acceptable	Ignore for not Affect the Polarizer
Scratches, Fiber, Line-Shape Defect (On Polarizer)	Minor	$W \leq 0.1$ Ignore $W > 0.1$ $L \leq 2$ $n \leq 1$ $L > 2$ $n = 0$
Dirt, Black Spot, Foreign Material, (On Polarizer)	Minor	$\Phi \leq 0.1$ Ignore $0.1 < \Phi \leq 0.25$ $n \leq 1$ $0.25 < \Phi$ $n = 0$
Dent, Bubbles, White spot (Any Transparent Spot on Polarizer)	Minor	$\Phi \leq 0.5$ → Ignore if no Influence on Display $0.5 < \Phi$ $n = 0$ 
Fingerprint, Flow Mark (On Polarizer)	Minor	Not Allowable




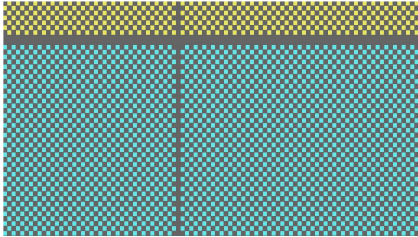
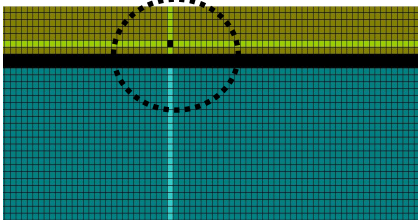
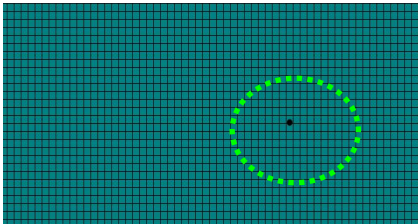
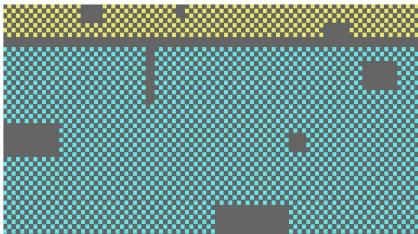
* Protective film should not be tear off when cosmetic check.

** Definition of W & L & Φ (Unit: mm): $\Phi = (a + b) / 2$

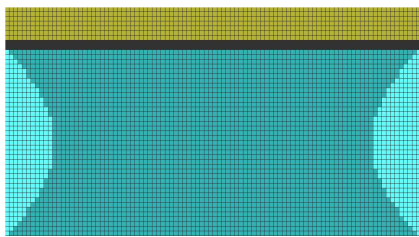




6.3.3 Pattern Check (Display On) in Active Area

Check Item	Classification	Criteria
No Display	Major	
Missing Line	Major	
Pixel Short	Major	
Darker Pixel	Major	
Wrong Display	Major	



Un-uniform	Major	
------------	-------	---

7. Precautions When Using These OEL Display Modules

7.1 Handling Precautions

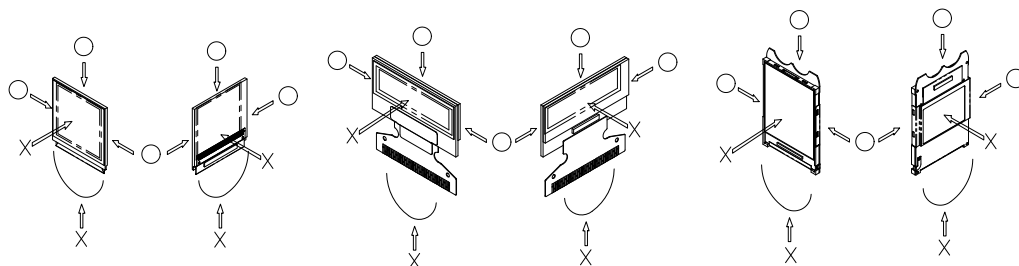
- 1) Since the display panel is being made of glass, do not apply mechanical impacts such as dropping from a high position.
- 2) If the display panel is broken by some accident and the internal organic substance leaks out, be careful not to inhale nor lick the organic substance.
- 3) If pressure is applied to the display surface or its neighborhood of the OEL display module, the cell structure may be damaged and be careful not to apply pressure to these sections.
- 4) The polarizer covering the surface of the OEL display module is soft and easily scratched. Please be careful when handling the OEL display module.
- 5) When the surface of the polarizer of the OEL display module has soil, clean the surface. It takes advantage of by using following adhesion tape.

* Scotch Mending Tape No. 810 or an equivalent

Never try to breathe upon the soiled surface nor wipe the surface using cloth containing solvent such as ethyl alcohol, since the surface of the polarizer will become cloudy.

Also, pay attention that the following liquid and solvent may spoil the polarizer:

- * Water
 - * Ketone
 - * Aromatic Solvents
- 6) Hold OEL display module very carefully when placing OEL display module into the system housing. Do not apply excessive stress or pressure to OEL display module. And, do not over bend the film with electrode pattern layouts. These stresses will influence the display performance. Also, secure sufficient rigidity for the outer cases.



- 7) Do not apply stress to the driver IC and the surrounding molded sections.
- 8) Do not disassemble nor modify the OEL display module.



-
- 9) Do not apply input signals while the logic power is off.
 - 10) Pay sufficient attention to the working environments when handing OEL display modules to prevent occurrence of element breakage accidents by static electricity.
 - * Be sure to make human body grounding when handling OEL display modules.
 - * Be sure to ground tools to use or assembly such as soldering irons.
 - * To suppress generation of static electricity, avoid carrying out assembly work under dry environments.
 - * Protective film is being applied to the surface of the display panel of the OEL display module. Be careful since static electricity may be generated when exfoliating the protective film.
 - 11) Protection film is being applied to the surface of the display panel and removes the protection film before assembling it. At this time, if the OEL display module has been stored for a long period of time, residue adhesive material of the protection film may remain on the surface of the display panel after removed of the film. In such case, remove the residue material by the method introduced in the above Section 5).
 - 12) If electric current is applied when the OEL display module is being dewed or when it is placed under high humidity environments, the electrodes may be corroded and be careful to avoid the above.

7.2 Storage Precautions

- 1) When storing OEL display modules, put them in static electricity preventive bags avoiding exposure to direct sun light nor to lights of fluorescent lamps. and, also, avoiding high temperature and high humidity environment or low temperature (less than 0 ° C) environments. (We recommend you to store these modules in the packaged state when they were shipped from ZhongJingYuan technology Co.,Ltd.)

At that time, be careful not to let water drops adhere to the packages or bags nor let dewing occur with them.

- 2) If electric current is applied when water drops are adhering to the surface of the OEL display module, when the OEL display module is being dewed or when it is placed under high humidity environments, the electrodes may be corroded and be careful about the above.

7.3 Designing Precautions

- 1) The absolute maximum ratings are the ratings which cannot be exceeded for OEL display module, and if these values are exceeded, panel damage may be happen.
- 2) To prevent occurrence of malfunctioning by noise, pay attention to satisfy the V_{IL} and V_{IH} specifications and, at the same time, to make the signal line cable as short as possible.
- 3) We recommend you to install excess current preventive unit (fuses, etc.) to the power circuit (V_{DD}). (Recommend value: 0.5A)
- 4) Pay sufficient attention to avoid occurrence of mutual noise interference with the neighboring devices.
- 5) As for EMI, take necessary measures on the equipment side basically.
- 6) When fastening the OEL display module, fasten the external plastic housing section.



-
- 7) If power supply to the OEL display module is forcibly shut down by such errors as taking out the main battery while the OEL display panel is in operation, we cannot guarantee the quality of this OEL display module.
 - 8) The electric potential to be connected to the rear face of the IC chip should be as follows: SSD1306
- * Connection (contact) to any other potential than the above may lead to rupture of the IC.

7.4 Precautions when disposing of the OEL display modules

- 1) Request the qualified companies to handle industrial wastes when disposing of the OEL display modules. Or, when burning them, be sure to observe the environmental and hygienic laws and regulations.

7.5 Other Precautions

- 1) When an OEL display module is operated for a long of time with fixed pattern may remain as an after image or slight contrast deviation may occur.
Nonetheless, if the operation is interrupted and left unused for a while, normal state can be restored. Also, there will be no problem in the reliability of the module.
 - 2) To protect OEL display modules from performance drops by static electricity rapture, etc., do not touch the following sections whenever possible while handling the OEL display modules.
 - * Pins and electrodes
 - * Pattern layouts such as the FPC
 - 3) With this OEL display module, the OEL driver is being exposed. Generally speaking, semiconductor elements change their characteristics when light is radiated according to the principle of the solar battery. Consequently, if this OEL driver is exposed to light, malfunctioning may occur.
- * Design the product and installation method so that the OEL driver may be shielded from light in actual usage.
- * Design the product and installation method so that the OEL driver may be shielded from light during the inspection processes.
- 4) Although this OEL display module stores the operation state data by the commands and the indication data, when excessive external noise, etc. enters into the module, the internal status may be changed. It therefore is necessary to take appropriate measures to suppress noise generation or to protect from influences of noise on the system design.
 - 5) We recommend you to construct its software to make periodical refreshment of the operation statuses (re-setting of the commands and re-transference of the display data) to cope with catastrophic noise.



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ZHENG ZHOU ZHONG JING YUAN TECHNOLOGY CO.,LTD

TEL: 18601955397

ZHONGJINGYUAN

Warranty:

The warranty period shall last twelve (12) months from the date of delivery. Buyer shall be completed to assemble all the processes within the effective twelve (12) months. ZhongJingYuan technology Co.,Ltd. shall be liable for replacing any products which contain defective material or process which do not conform to the product specification, applicable drawings and specifications during the warranty period. All products must be preserved, handled and appearance to permit efficient handling during warranty period. The warranty coverage would be exclusive while the returned goods are out of the terms above.

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