

PRODUCT SPECIFICATION

VGA12864N-S001

128 × 64 GRAPHICS

OLED DISPLAY MODULE

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1 Overview

VGA12864N-S001 is an OLED monochrome 128×64 dot matrix display module. 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

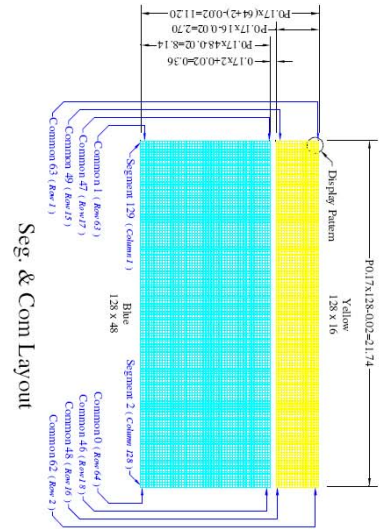
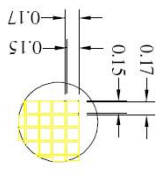
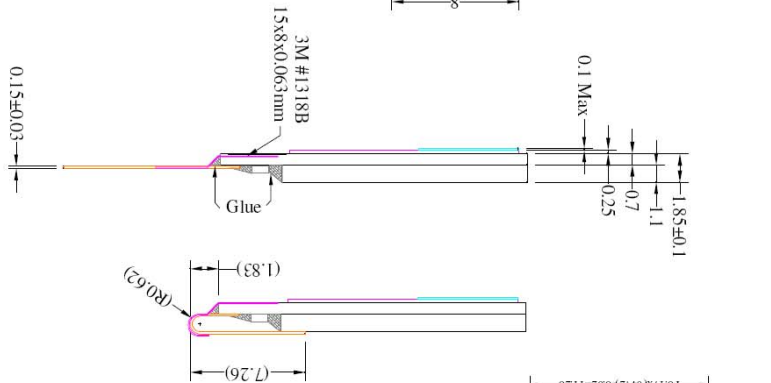
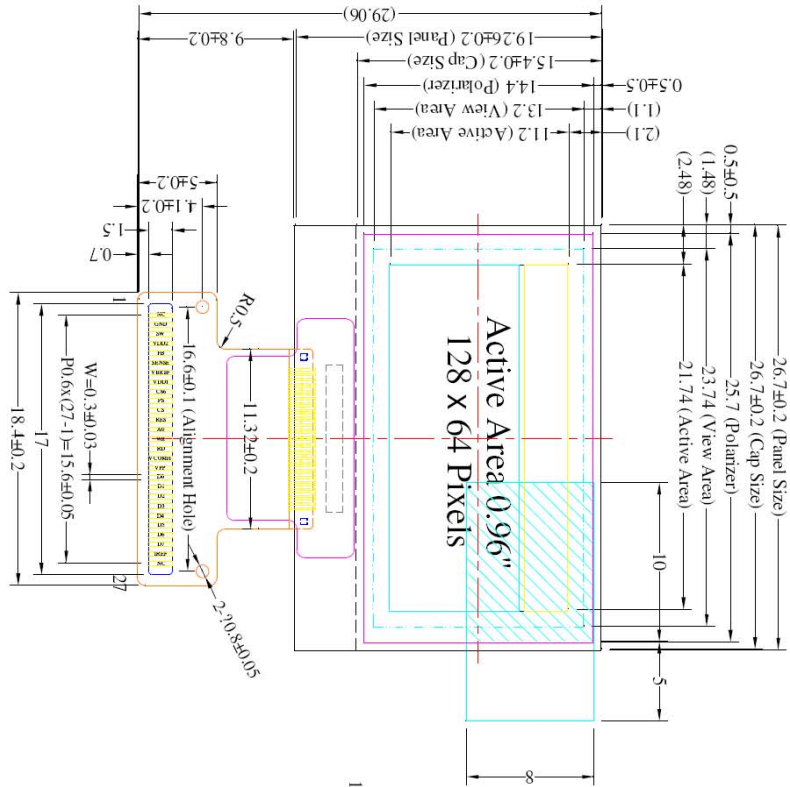
- Color: Area Color(Blue ,Yellow)
- High contrast ratio
- 128×64 pixels
- Wide viewing angle
- Wide range of operating temperature
- 8-bit 8080-Databus or 8-bit 6800-series parallel interface or series peripheral interface.
- Built-in SH1101A standard OLED controller

3 Mechanical Data and Part Number

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	128(W) x 64(rows)	-
2	Dot Size	0.15 (W) x 0.15 (H)	mm
3	Dot Pitch	0.17 (W) x 0.17 (H)	mm
4	Aperture Rate	77.9	%
5	Active Area	21.74 (W) x 11.2 (H)	m ²
7	Panel Size	26.7(W) x 19.26(H) x2.3(D)	mm
8	Polarizer	with	
9	Duty	1/64	

4 Mechanical Drawing

- Notes:
 1. OLED Color: (Y/B)
 2. Driver IC: SH1101A
 3. Die Size: 9250um x 1058um
 4. General Tolerance: ±0.30



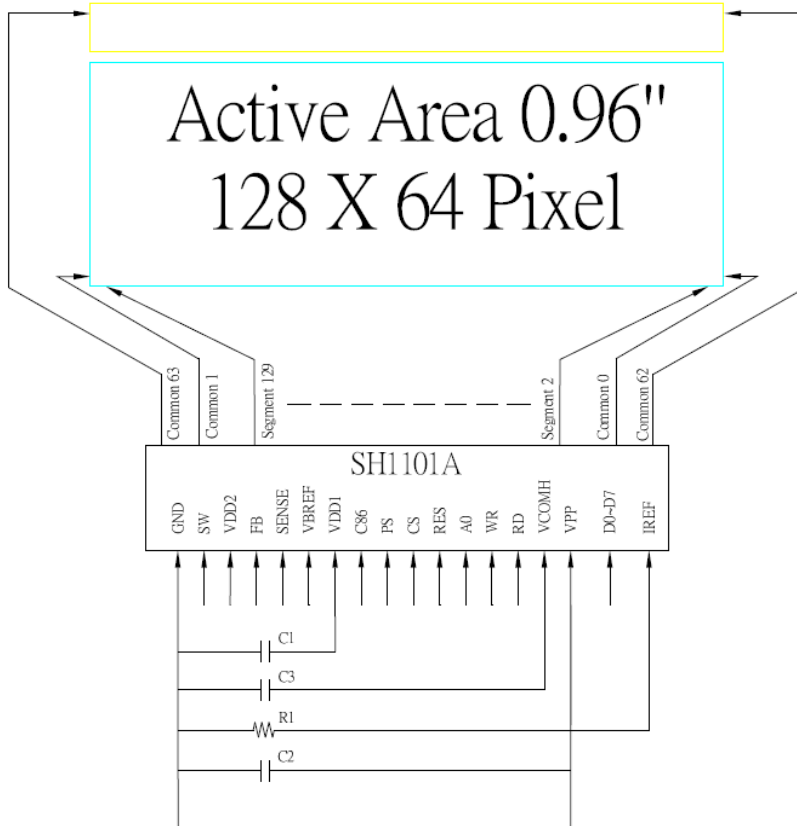
Pin	Symbol
1	NC
2	GND
3	SW
4	VDD2
5	FB
6	SENSE
7	V/REF
8	VDD1
9	C86
10	PS
11	CS
12	RES
13	A0
14	WR
15	RD
16	VCOMH
17	VPP
18	D0
19	D1
20	D2
21	D3
22	D4
23	D5
24	D6
25	D7
26	IREF
27	NC

5 Module Interface

PIN NO	PIN NAME	DESCRIPTION												
1	NC	No Connection												
2	GND	Ground												
3	SW	This is an output pad driving the gate of the external NMOS of the booster circuit.												
4	VDD2	2.4 - 3.5V power supply pad for the internal buffer of the DC-DC voltage converter.												
5	FB	This is a feedback resistor input pad for the booster circuit. It is used to adjust the booster output voltage level, V_{PP} .												
6	SENCE	This is a source current pad of the external NMOS of the booster circuit.												
7	VBREF	This is an internal voltage reference pad for booster circuit. A stabilization capacitor, typical 1 μ F, should be connected to GND.												
8	VDD1	2.4 - 3.5V power supply input.												
9	C86	his is the MPU interface switch pad. C86 = "H": 8080 series MPU interface. C86 = "L": 6800 series MPU interface.												
10	PS	<p>This is the parallel data input/serial data input switch pad. P/S = "H": Parallel data input. P/S = "L": Serial data input. When P/S = "L", D2 to D7 are HZ. D2 to D7 may be "H", "L" or Open. RD (E) and WR (R/W) are fixed to either "H" or "L". With serial data input, RAM display data reading is not supported. These are MPU interface input selection pads. See the following table for selecting different interfaces:</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>6800-Parallel Interface</th> <th>8080-Parallel Interface</th> <th>Serial Interface</th> </tr> </thead> <tbody> <tr> <td>C86</td> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>P/S</td> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table>		6800-Parallel Interface	8080-Parallel Interface	Serial Interface	C86	0	1	0	P/S	1	1	0
	6800-Parallel Interface	8080-Parallel Interface	Serial Interface											
C86	0	1	0											
P/S	1	1	0											
11	/CS	This pad is the chip select input. When CS = "L", then the chip select becomes active, and data/command I/O is enabled.												
12	RES	This is a reset signal input pad. When RES is set to "L", the settings are initialized. The reset operation is performed by the RES signal level.												
13	A0	This is the Data/Command control pad which determines whether the data bits are data or a command. A0 = "H": the inputs at D0 to D7 are treated as display data. A0 = "L": the inputs at D0 to D7 are transferred to the command registers.												
14	/WR	This is a MPU interface input pad. When connected to an 8080 MPU, this is active LOW. This pad connects to the 8080 MPU WR signal. The signals on the data bus are latched at the rising edge of the WR signal. When connected to a 6800 Series MPU: This is the read/write control signal input terminal. When R/W = "H": Read. When R/W = "L": Write.												
15	/RD	This is a MPU interface input pad. When connected to an 8080 MPU, this is active LOW. This pad connects to the 8080 MPU WR signal. The signals on the data bus are latched at the rising edge of the WR signal. When connected to a 6800 Series MPU: This is the read/write control signal input terminal. When R/W = "H": Read. When R/W = "L": Write.												
16	VCOMH	This is a pad for the voltage output high level for common signals. A capacitor should be connected between this pad and GND.												
17	VPP	This is the most positive voltage supply pad of the chip. It should be supplied externally.												
18	D0	<p>This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus. When the serial interface is selected, then D0 serves as the serial clock input pad (SCL) and D1 serves as the serial data input pad (SI). At this time, D2 to D7 are set to high impedance. When the chip select is inactive, D0 to D7 are set to high impedance.</p>												
19	D1													
20	D2													
21	D3													
22	D4													
23	D5													
24	D6													
25	D7													
26	IREF	This is a segment current reference pad. A resistor should be connected between this pad and V_{SS} . Set the current at 10 μ A.												
27	NC	No Connection												

6 Function Block Diagram

6.1 Function Block Diagram



MCU Interface Selection: PS and C86

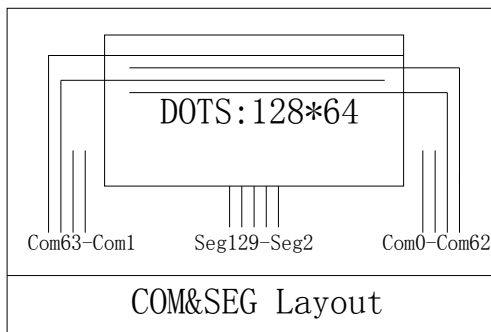
Pins connected to MCU interface: D7~D0, /RD, /WR, A0, RES, and CS

* VBREF, SENSE, FB, VDD2, and SW should be left float when using external DC/DC converter.

C1, C2, C3: 4.7μF

R1: 910kΩ, $R1 = (\text{Voltage at IREF} - \text{GND}) / \text{IREF}$

6.2 PANEL LAYOUT DIAGRAM



7 Absolute Maximum ratings

ITEM	Symbol	MIN	MAX	Unit	Note
Logic supply voltage	V _{DD}	-0.3	+3.5	V	1,2
Diver Supply voltage	V _{PP}	-0.3	+15	V	1,2
Operating Temp.	Top	-20	+70	°C	
Storage Temp	Tstg	-30	+80	°C	

Note 1: All the above voltages are on the basis of “GND = 0V”.

Note 2: When this module is used beyond the above absolute maximum ratings, permanent breakage of the module may occur. Also, for normal operations, it is desirable to use this module under the conditions according to Section 8. “Electrical Characteristics”. If this module is used beyond these conditions, malfunctioning of the module can occur and the reliability of the module may deteriorate.

8 Electrical Characteristics

8.1 DC Electrical Characteristics

ITEM	Symbol	Test condition	MIN	TYPE	MAX	Unit
Logic Supply Voltage	V _{DD1}		2.6	2.8	3.5	V
DC/DC Supply Voltage	V _{DD2}		2.6	-	3.5	V
OLED Driver Supply Voltage	V _{PP}		8	9	10	V
High-level Input Voltage	V _{IHC}	I _{out} =0.5mA,3.3MHz	0.8*V _{DD1}	-	V _{DD1}	V
Low-level input Voltage	V _{ILC}	I _{out} =0.5mA,3.3MHz	0	-	0.2*V _{DD1}	V
High-level Output Voltage	V _{OHC}	I _{out} =0.5mA,3.3MHz	0.8*V _{DD1}	-	V _{DD1}	V
High-level Output Voltage	V _{OLC}	I _{out} =0.5mA,3.3MHz	0	-	0.2*V _{DD1}	V

Note : The V_{PP} input must keep in a stable value; ripple and noise are not allowed.

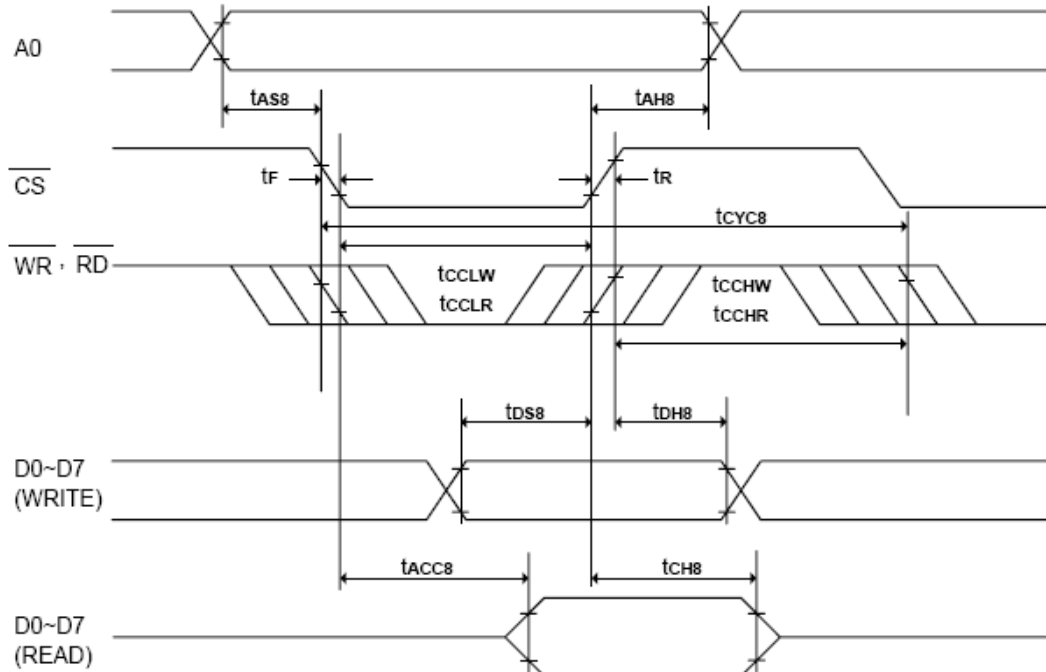
8.2 Electro-optical Characteristics

Item	Symbol	Test condition	MIN	TYPE	MAX	Unit
Normal mode Power consumption		All pixels on(1)	-	70.2	87.3	mW
Brightness	L _{br}	With polarizer	35	60	-	cd/m ²
C.I.E(Blue)	(x)	x, y	0.12	0.16	0.20	
	(y)		0.22	0.26	0.30	
C.I.E(Yellow)	(x)	x, y	0.43	0.47	0.51	
	(y)		0.4	0.50	0.54	
Dark room contrast	CR		-	>100:1	-	
View angle			>160			degree

Note 1: V_{DD1} = 2.8V, V_{PP} = 9V, Frame Rate = 100Hz, Contrast Setting = 0x64, 100% Display Area Turn on.

8.3 AC Electrical Characteristics

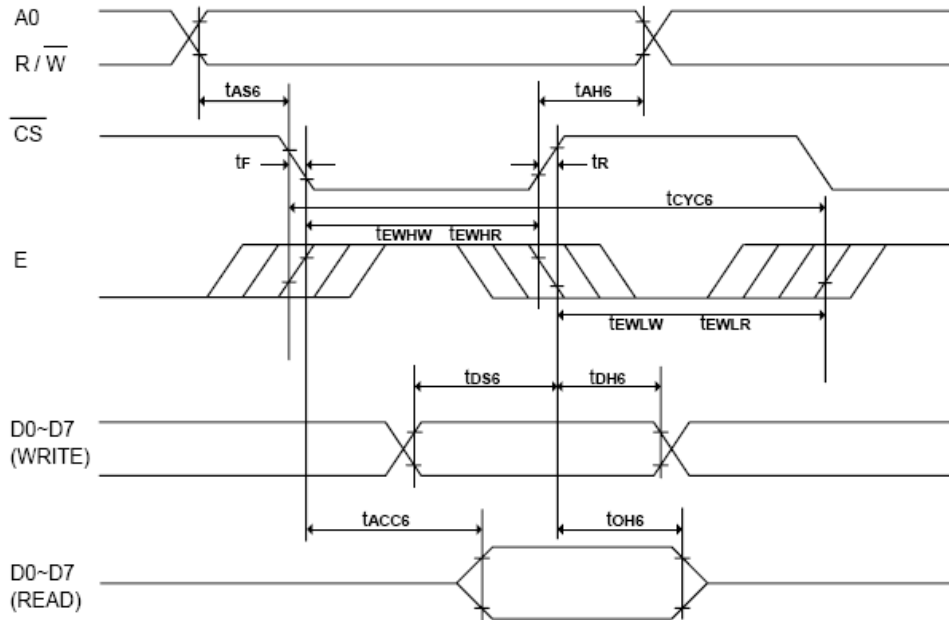
System buses Read/Write characteristics 1 (For the 8080 Series Interface MPU)



(VDD1 = 2.4 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t _{cy8}	System cycle time	300	-	-	ns	
t _{as8}	Address setup time	0	-	-	ns	
t _{ah8}	Address hold time	0	-	-	ns	
t _{ds8}	Data setup time	40	-	-	ns	
t _{dh8}	Data hold time	15	-	-	ns	
t _{ch8}	Output disable time	10	-	70	ns	CL = 100pF
t _{acc8}	\overline{RD} access time	-	-	140	ns	CL = 100pF
t _{cclw}	Control L pulse width (WR)	100	-	-	ns	
t _{cclr}	Control L pulse width (RD)	120	-	-	ns	
t _{cchw}	Control H pulse width (WR)	100	-	-	ns	
t _{cchr}	Control H pulse width (RD)	100	-	-	ns	
t _r	Rise time	-	-	15	ns	
t _f	Fall time	-	-	15	ns	

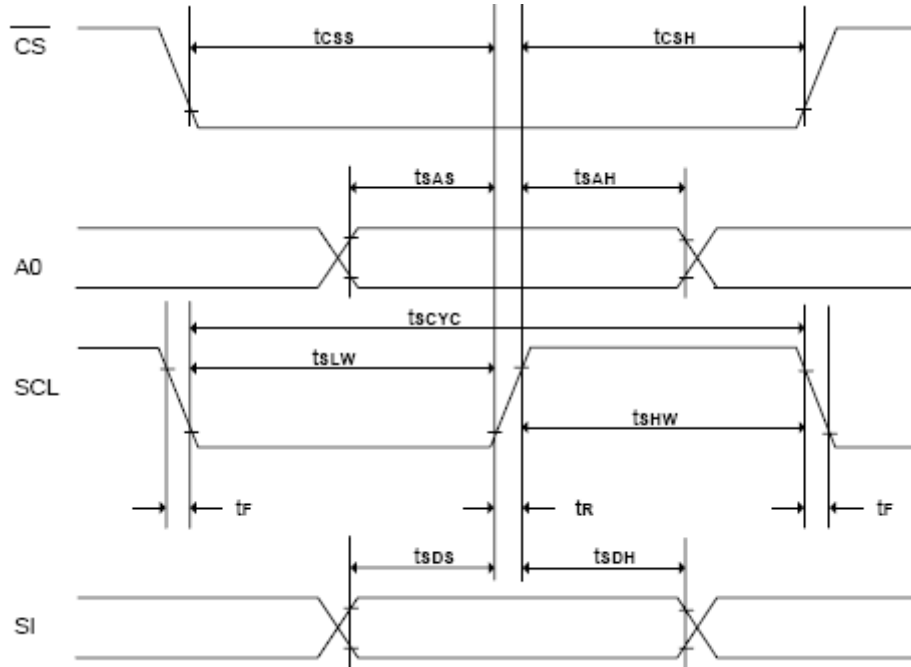
System buses Read/Write Characteristics 2(For the 6800 Series Interface MPU)



(VDD1 = 2.4 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tCYC6	System cycle time	300	-	-	ns	
tAs6	Address setup time	0	-	-	ns	
tAH6	Address hold time	0	-	-	ns	
tDS6	Data setup time	40	-	-	ns	
tDH6	Data hold time	15	-	-	ns	
tOH6	Output disable time	10	-	70	ns	CL = 100pF
tACC6	Access time	-	-	140	ns	CL = 100pF
tEWHW	Enable H pulse width (Write)	100	-	-	ns	
tEWHR	Enable H pulse width (Read)	120	-	-	ns	
tEWLW	Enable L pulse width (Write)	100	-	-	ns	
tEWLR	Enable L pulse width (Read)	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

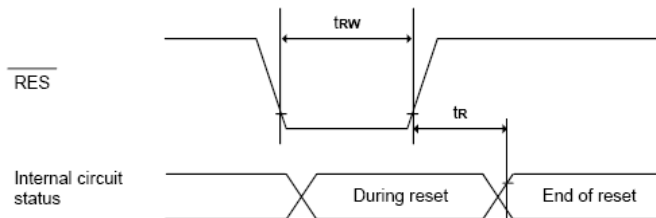
System buses Write characteristics 3(For the Serial Interface MPU)



(VDD1 = 2.4 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tscyc	Serial clock cycle	250	-	-	ns	
tsAS	Address setup time	150	-	-	ns	
tsAH	Address hold time	150	-	-	ns	
tsDS	Data setup time	100	-	-	ns	
tsDH	Data hold time	100	-	-	ns	
tcSS	\overline{CS} setup time	120	-	-	ns	
tcSH	\overline{CS} hold time time	60	-	-	ns	
tsHW	Serial clock H pulse width	100	-	-	ns	
tsLW	Serial clock L pulse width	100	-	-	ns	
tr	Rise time	-	-	15	ns	
tf	Fall time	-	-	15	ns	

Reset Timing



(VDD1 = 2.4 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tr	Reset time	-	-	1.0	μs	
trw	Reset low pulse width	5.0	-	-	μs	

9 Precautions for operation and Storage

9.1 Precautions for Operation

- (1) Since OLED panel is made of glass, in order to prevent from glass broken, please 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.
- (3) If OLED surface is contaminated, please wipe it off gently by using moisten soft cloth with normal ethanol, do not use acetone, ketone, isopropyl alcohol or water. If there is saliva or water on the OLED surface, please wipe it off immediately.
- (4) When handling OLED module, please be sure that the body and the tools are properly rounded. And do not touch I/O pins with bare hands or contaminate I/O pins, it will cause disconnection or defective insulation of terminals.
- (5) Do not attempt to disassemble or process the OLED module.
- (6) 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.
- (7) 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 the shorter life time and permanent damage to the module probably. Please pay attention to the environmental temperature and humidity.

9.2 Soldering

- (8) Use the high quality solder. (60-63% tin mixed with lead)
- (9) Iron: no higher than 260°C and less than 3~4 sec during soldering.
- (10) Soldering: only to the I/O terminals.
- (11) Rewiring: no more than 3 times.

9.3 Precautions for Storage

- (12) Please store OLED module in a dark place, avoid exposure to sunlight, the light of fluorescent lamp or any ultraviolet ray.
- (13) Keep the environment temperature at between 10°C and 35°C and the relative humidity less than 60%. Avoid high temperature, high humidity.
- (14) That keeps the OLED modules stored in the container shipped from supplier before using them is recommended.
- (15) Do not leave any article on the OLED module surface for an extended period of time.

9.4 Warranty period

Visionox Technology Co. Ltd. warrants for a period of 12 months from the shipping date when stored or used under normal condition

10 Test Status

10.1 Content of Reliability Tests

TEST ITEM	TEST CONDITION	Criteria
High temperature storage	80°C, 120 hours	The brightness should be greater than 50% of the initial brightness. The operational functions work
Low temperature storage	-30°C, 120 hours	
Humidity (storage)	60°C, 90%RH, 120hours	
High temperature (operating)	70°C, 120hours	
Low temperature (operating)	-20°C, 120 hours	

* The samples used for the above tests do not include polarizer.

* No moisture condensation is observed during tests.

* All operation tests are conducted in all display on pattern.

10.2 Lifetime

End of lifetime is specified as 50% of initial brightness.

The average operating lifetime at room temperature is estimated by the accelerated operation at high temperature conditions.

11 Contact us

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