

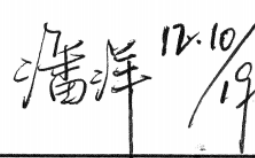
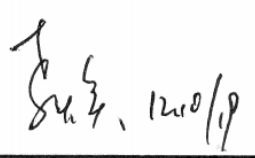
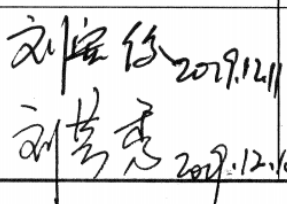
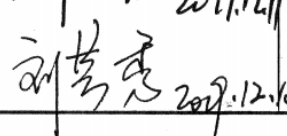
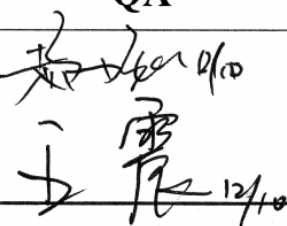
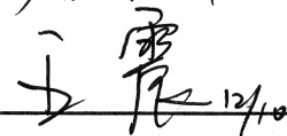
Product Specification

(Common Application)

Product Name: VGM096064A6W01

Product Code: M02830

Customer
Approved by Customer
Approved Date:

Designed By	Checked By	Approved By	
		R&D	QA
 12.10/19	 12.10/19	 2019.12.11  2019.12.10	 12/10  12/10

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1 Application field

Common Application

2 Overview

VGM096064A6W01 is a monochrome OLED display module with 96×64 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.

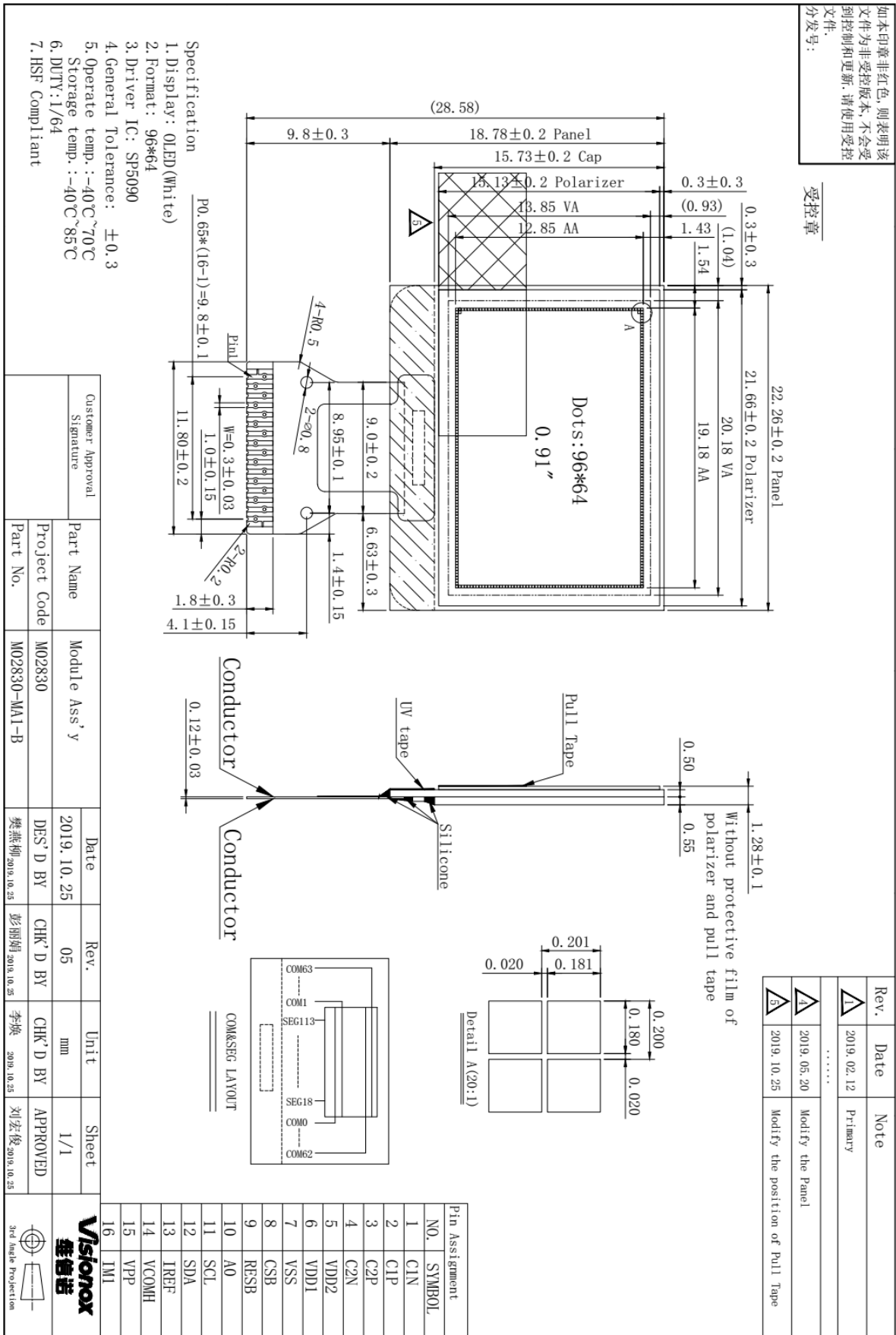
3 Features

- Display Color: White
- Dot Matrix:96×64
- Driver IC: SP5090
- Interface:4 wire SPI,I²C
- Wide range of operating temperature: -40°C to 70°C
- Wide range of Storage temperature: -40°C to 85°C

4 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	96(W)×64(H)	-
2	Dot Size	0.18(W)×0.181(H)	mm ²
3	Dot Pitch	0.2(W)×0.201(H)	mm ²
4	Aperture Rate	81	%
5	Active Area	19.18(W)×12.85(H)	mm ²
6	Panel Size	22.26(W)×18.78(H) ×1.05(T)	mm ³
7	Module Size	22.26(W)×28.58(H) ×1.28(T)	mm ³
8	Diagonal A/A Size	0.91	inch
9	Module Weight	1.03 ± 10%	gram

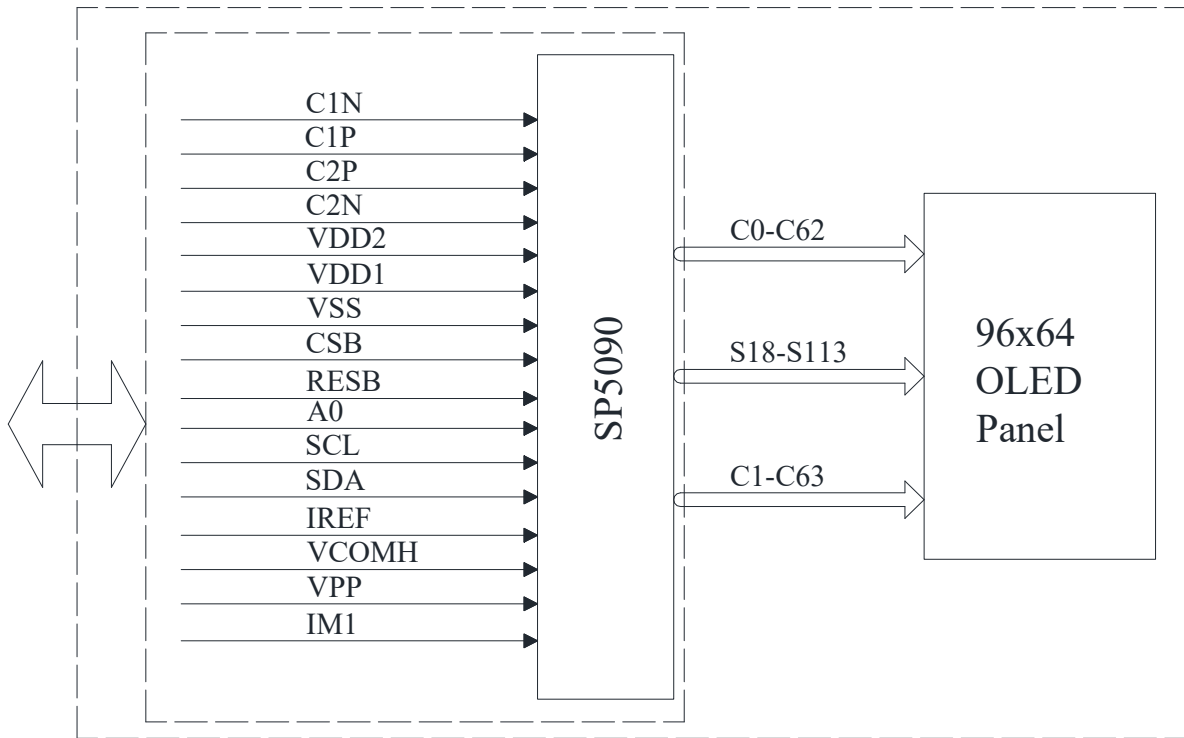
5 Mechanical Drawing



6 Module Interface

PIN NO.	PIN NAME	DESCRIPTION				
1	C1N	Connect to charge pump capacitor.				
2	C1P	These pins are not used and should be disconnected when Vpp is supplied externally.				
3	C2P					
4	C2N	These pins are not used and should be disconnected when Vpp is supplied externally.				
5	VDD2	2.2 – 4.7V power supply pad for Power supply for charge pump circuit. This pin should be disconnected when VPP is supplied externally.				
6	VDD1	Power supply input: 1.65 - 3.5V.				
7	VSS	Ground.				
8	CSB	This pad is the chip select input. When CS = “L”, then the chip select becomes active, and data/command I/O is enabled.				
9	RESB	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.				
10	A0	This is the Data/Command control pad that determines whether the data bits are data or a command. A0 = “H” : the inputs at SDA are treated as display data. A0 = “L” : the inputs at SDA are transferred to the command registers. In I ² C interface, this pad serves as SA0 to distinguish the different address of OLED driver.				
11	SCL	Serial clock input pad.				
12	SDA	Serial data input pad.				
13	IREF	This is a segment current reference pad. A resistor should be connected between this pad and VSS.				
14	VCOMH	This is a pad for the voltage output high level for common signals. A capacitor should be connected between this pad and VSS.				
15	VPP	OLED panel power supply. Generated by internal charge pump. Connect to capacitor. It could be supplied externally.				
16	IM1	These are the MPU interface mode select pads.				
		<table border="1"> <thead> <tr> <th></th> <th>4-wire SPI</th> <th>I²C</th> </tr> </thead> <tbody> <tr> <td>IM1</td> <td>0</td> <td>1</td> </tr> </tbody> </table>		4-wire SPI	I ² C	IM1
	4-wire SPI	I ² C				
IM1	0	1				

7 Function Block Diagram



8 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
Logic supply voltage	VDD1	-0.3	3.6	V	IC maximum rating
Charge Pump Regulator Supply Voltage	VDD2	-0.3	4.8	V	IC maximum rating
OLED Operating voltage	VPP	-0.3	14.5	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 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	VDD1	22±3°C, 55±15%R.H	1.65	-	3.5	V
OLED Driver Supply Voltage (VPP Generated by internal DC-DC)	VPP	22±3°C, 55±15%R.H	-	9	-	V
Charge Pump Regulator Supply Voltage	VDD2	22±3°C, 55±15%R.H	3.7	3.9	4.2	V
High-level Input Voltage	V _{IHC}	A0, SCL,SDA, CS ,IM1 and RES .	0.8× VDD1	-	VDD1	V
Low-level Input Voltage	V _{ILC}		VSS	-	0.2× VDD1	V
High-level Output Voltage	V _{OHC}	I _{OH} = -0.5mA (SCL,SDA).	0.8× VDD1	-	VDD1	V
Low-level Output Voltage	V _{OLC}	I _{OL} = 0.5mA (SCL,SDA)	VSS	-	0.1× VDD1	V

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

9.2 Electro-optical Characteristics

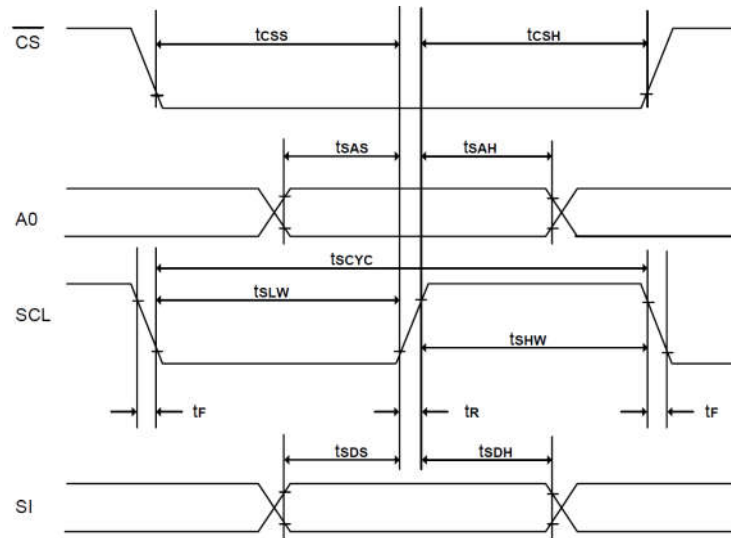
ITEM	SYMBOL	TEST CONDITION	MIN	TYPE	MAX	UNIT
Normal Mode Brightness (With Polarizer)	L _{br}	All pixels ON (1)	100	130	-	cd/m ²
Normal Mode Power Consumption	P _t	All pixels ON(1) (VPP generated by internal DC/DC)	-	159.6	214.5	mW
Sleep mode current consumption in VDD1 & VDD2	I _{SP}	During sleep, TA = +25°C, VDD1 = 3V, VDD2 = 3.0V.	-	-	10	uA
Sleep mode current consumption in VPP		During sleep, TA = +25°C, VPP = 9V (external)	-	-	10	uA
C.I.E(White)	(X)	x,y(CIE1931)	0.26	0.30	0.34	-
	(Y)		0.29	0.33	0.37	-
Dark Room Contrast	CR	-	≥2000:1	-	-	-
Response Time	-	-	-	10	-	μs
View Angle	-	-	≥160	-	-	Degree

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

- Driving voltage : 3.9V(VPP Generated By Internal DC/DC)
- Contrast setting : 0xA0
- Frame rate : 105Hz
- Duty setting : 1/64

9.3 AC Electrical Characteristics

(1) 4-wire SPI Interface Timing Characteristics



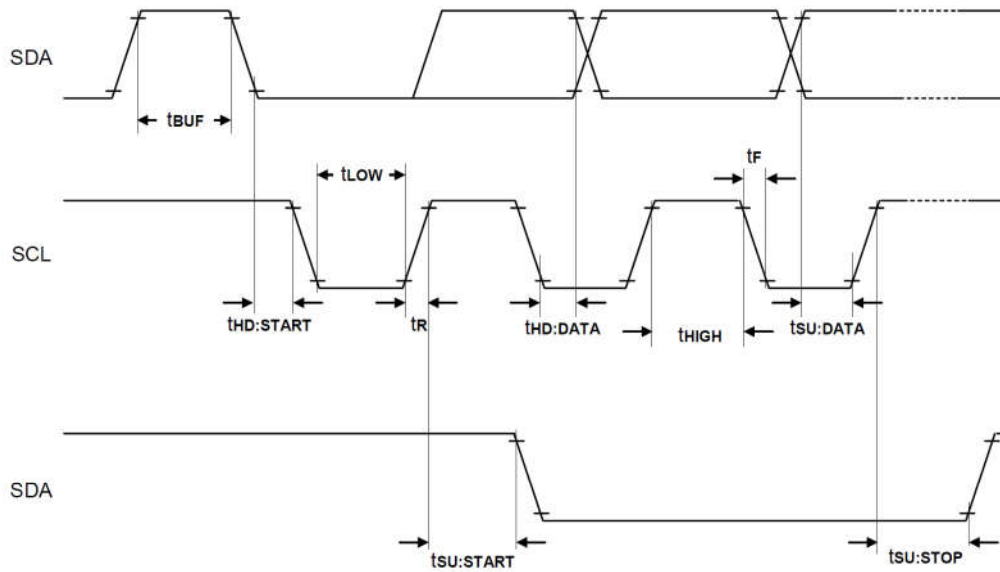
(VDD1 = 1.65 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tscyc	Serial clock cycle	500	-	-	ns	
tsAS	Address setup time	300	-	-	ns	
tsAH	Address hold time	300	-	-	ns	
tsDS	Data setup time	200	-	-	ns	
tsDH	Data hold time	200	-	-	ns	
tcSS	\overline{CS} setup time	240	-	-	ns	
tcSH	\overline{CS} hold time	120	-	-	ns	
tSHW	Serial clock H pulse width	200	-	-	ns	
tSLW	Serial clock L pulse width	200	-	-	ns	
tr	Rise time	-	-	30	ns	
tf	Fall time	-	-	30	ns	

(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	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	

(2) I²C Interface Timing Characteristics



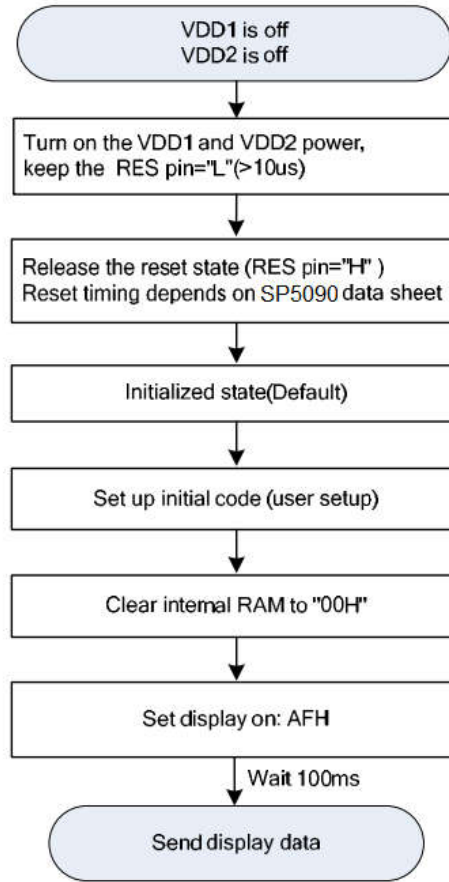
(V_{DD1} = 1.65 - 3.5V, T_A = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
f _{SCL}	SCL clock frequency	DC	-	400	kHz	
T _{LOW}	SCL clock Low pulse width	1.3	-	-	uS	
T _{HIGH}	SCL clock H pulse width	0.6	-	-	uS	
T _{SU:DATA}	data setup time	100	-	-	nS	
T _{HD:DATA}	data hold time	0	-	0.9	uS	
T _R	SCL · SDA rise time	20+0.1Cb	-	300	nS	
T _F	SCL · SDA fall time	20+0.1Cb	-	300	nS	
C _b	Capacity load on each bus line	-	-	400	pF	
T _{SU:START}	Setup time for re-START	0.6	-	-	uS	
T _{HD:START}	START Hold time	0.6	-	-	uS	
T _{SU:STOP}	Setup time for STOP	0.6	-	-	uS	
T _{BUF}	Bus free times between STOP and START condition	1.3	-	-	uS	

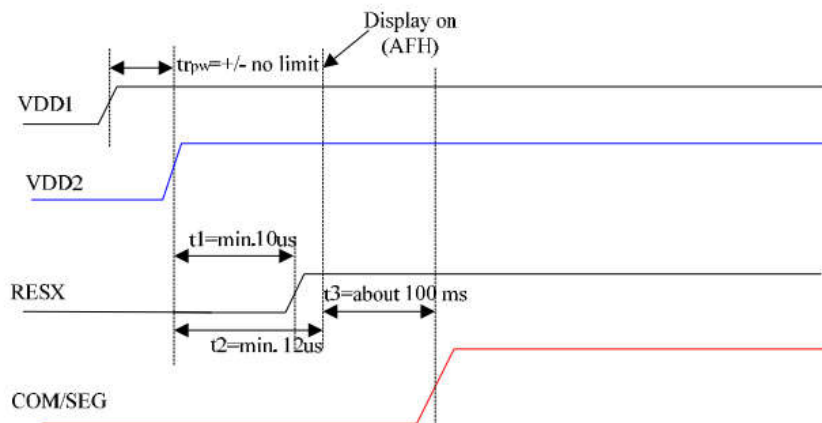
10 Functional Specification and Application Circuit

10.1 Power ON and Power OFF Sequence

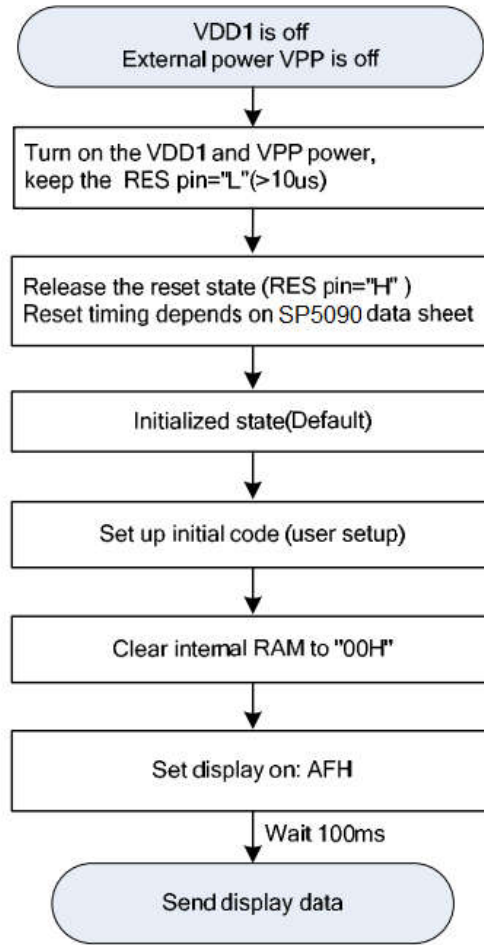
10.1.1 Built-in DC-DC pump power is being used immediately after turning on the power:



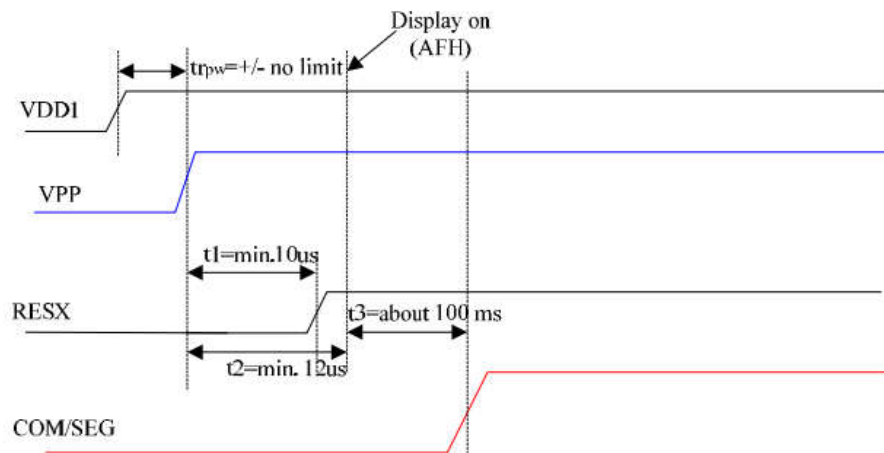
Power on sequence:



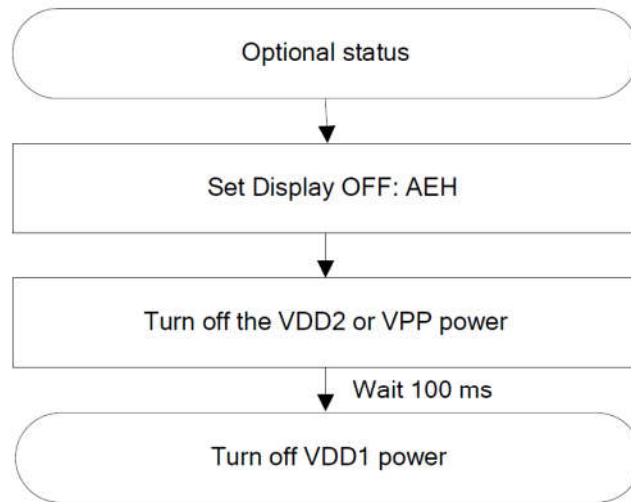
10.1.2 External power is being used immediately after turning on the power:



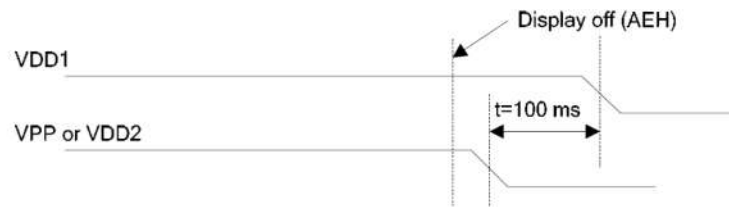
Power on sequence:



10.1.3 Power OFF



Power off sequence:



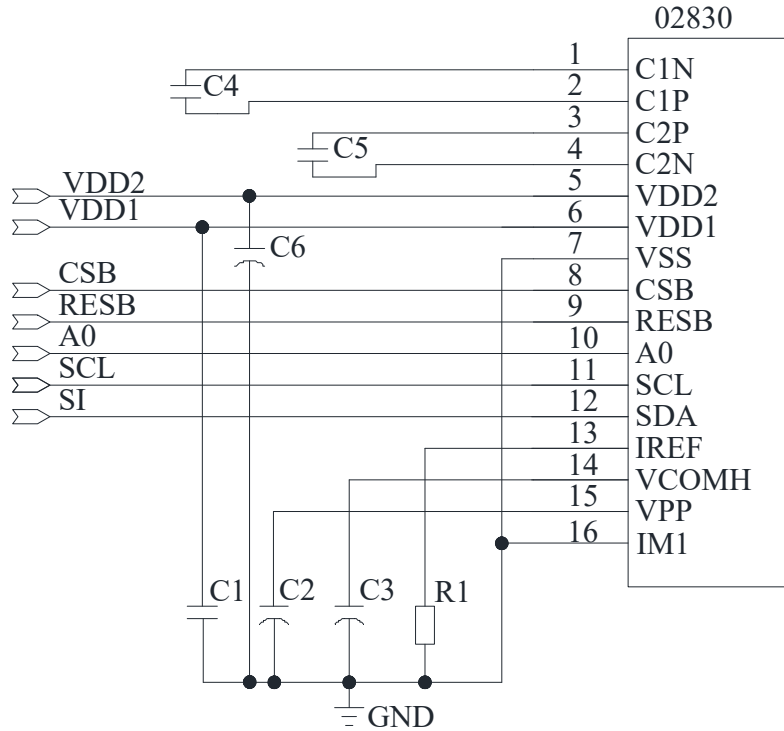
Note: There will be no damages to the display module if the power sequences are not met.

10.2 Application Circuit

10.2.1 Under internal VPP Mode, the charge Pump Setting (ADh) must be set as follow:

ADh:DC-DC Control Mode Set 8Bh:DC-DC is enable

(1) The configuration for 4-Wire SPI mode, VPP Generated by Internal DC/DC Circuit is shown in the following diagram



Pin connected to MCU interface: CSB,RESB,A0,SCL,SI.

Recommended components

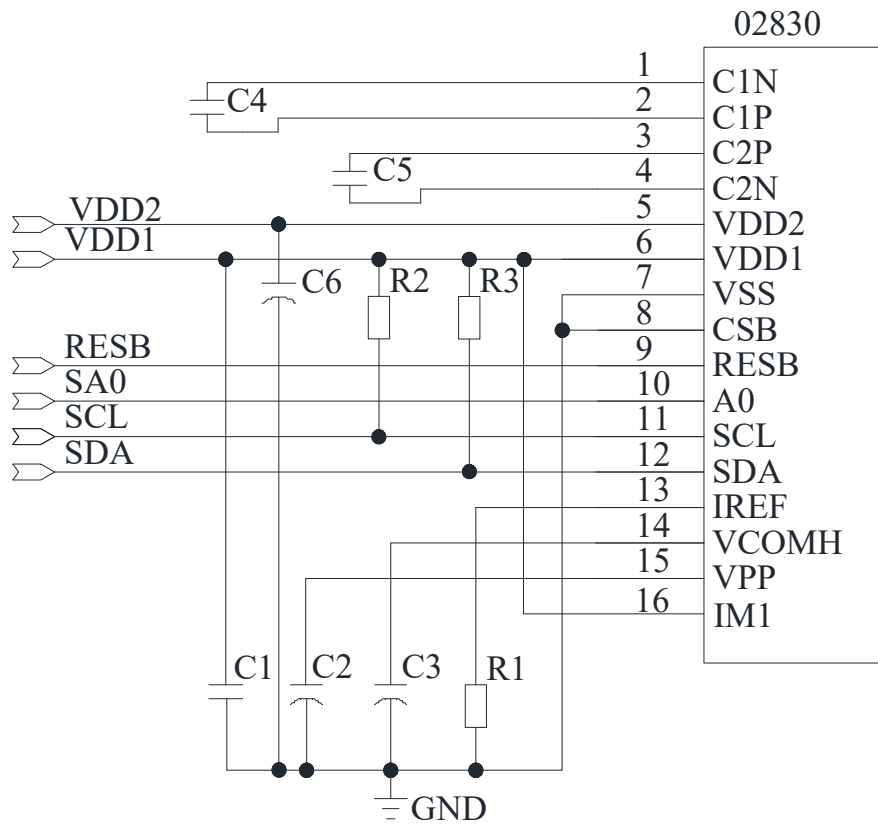
C1: 0.1uF-0603-X7R±10%.RoHS

C4,C5: 1uF-0603-X7R±10%.RoHS

C2,C3,C6 : 4.7µF/16V.RoHS (Tantalum Capacitors)

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

(2) The configuration for I²C mode, VPP Generated by Internal DC/DC Circuit is shown in the following diagram



Pin connected to MCU interface: SA0, RESB, SCL, SDA.

SA0	Slave address
0	0x78
1	0x7a

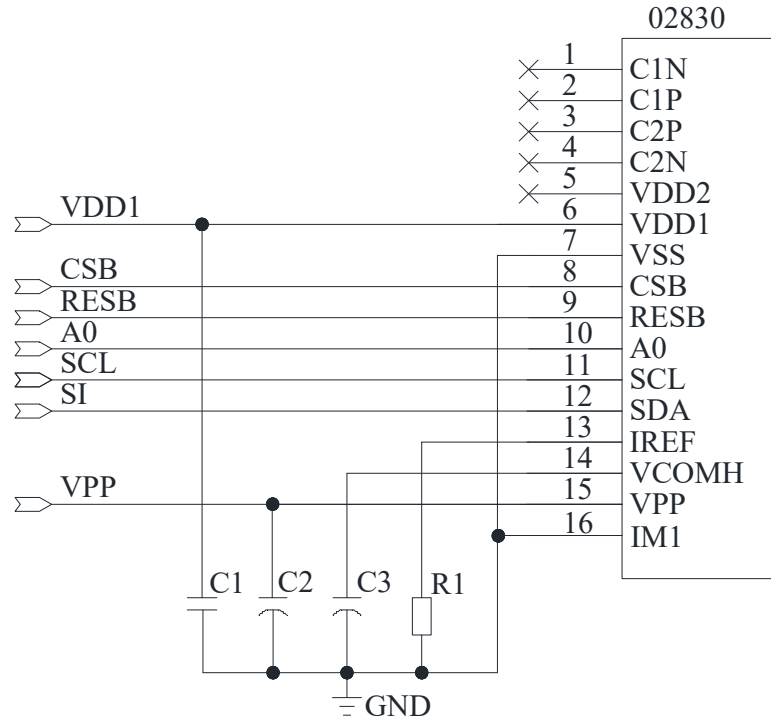
Recommended components

- C1: 0.1uF-0603-X7R±10%.RoHS
- C4, C5: 1uF-0603-X7R±10%.RoHS
- C2, C3,C6 : 4.7μF/16V.RoHS (Tantalum Capacitors)
- R1: 0603 1/10W +/-5% 390Kohm.RoHS
- R2, R3: 0603 1/10W +/-5% 10Kohm.RoHS

10.2.2 Under external VPP Mode, the charge Pump Setting (ADh) must be set as follow:

ADh:DC-DC Control Mode Set 8Ah:DC-DC is disable

(1) The configuration for 4-Wire SPI mode, VPP supply by external is shown in the following diagram:



Pin connected to MCU interface: SCL, SI, A0, RESB, CSB.

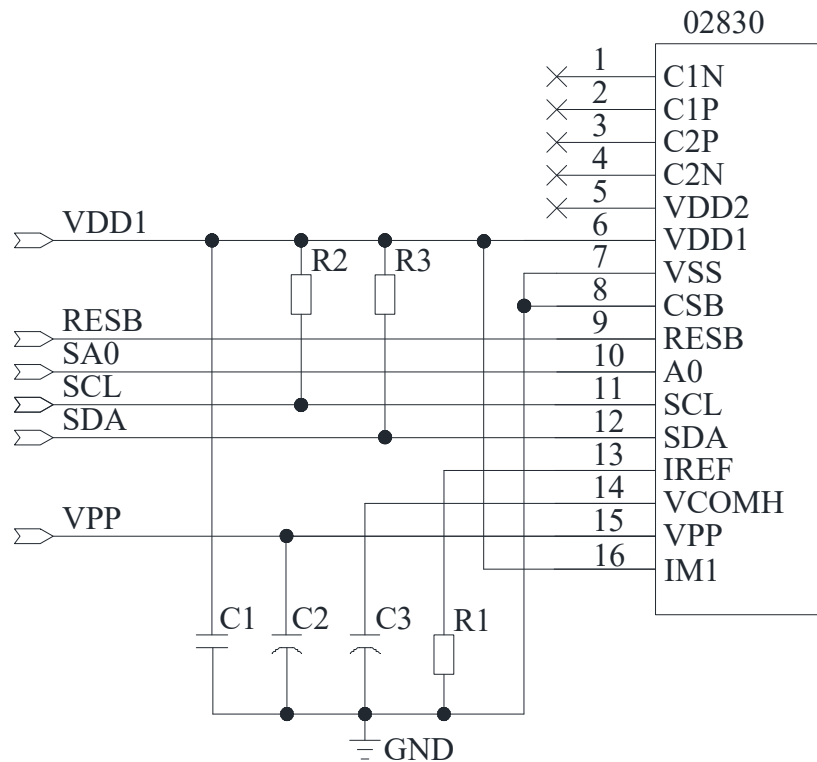
Recommended components

C1: 0.1uF-0603-X7R±10%.RoHS

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

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

(2) The configuration for I²C mode, VPP supply by external is shown in the following diagram:



Pin connected to MCU interface: SA0, RESB, SCL, SDA.

SA0	Slave address
0	0x78
1	0x7a

Recommended components

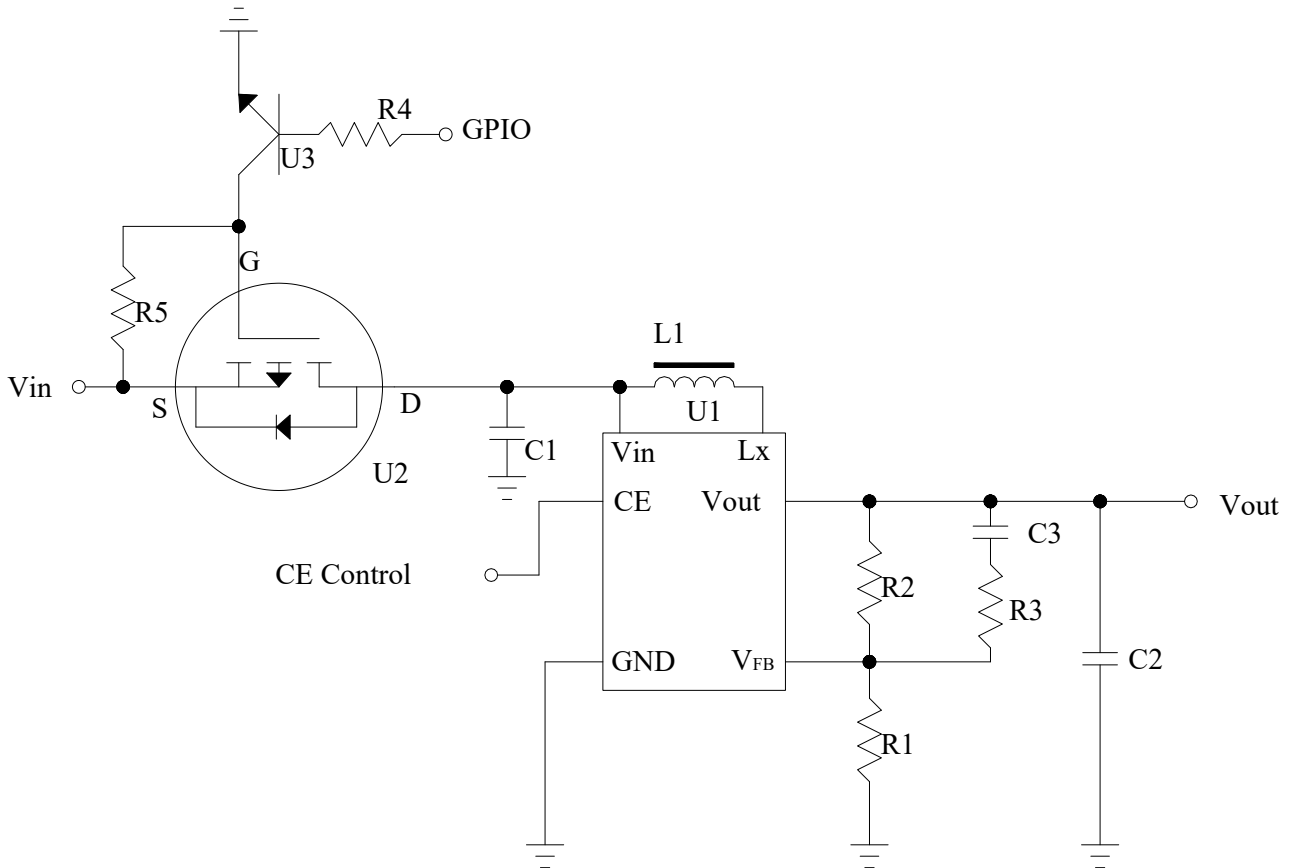
C1: 0.1uF-0603-X7R±10%.RoHS

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

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

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

10.3 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% 80Kohm.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

10.4 Display Control Instruction

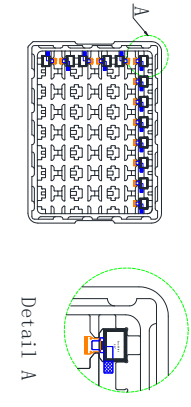
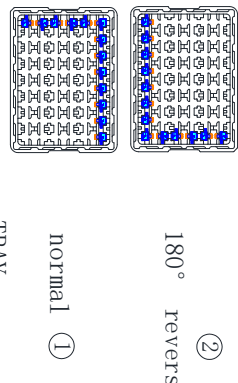

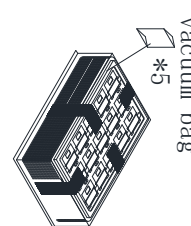
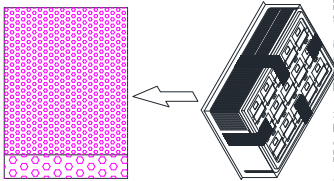
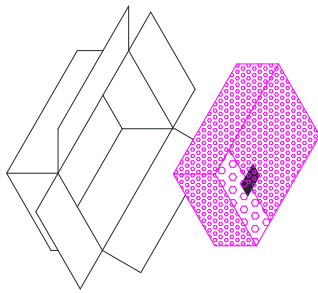
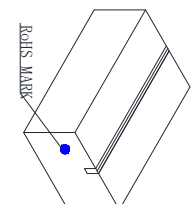
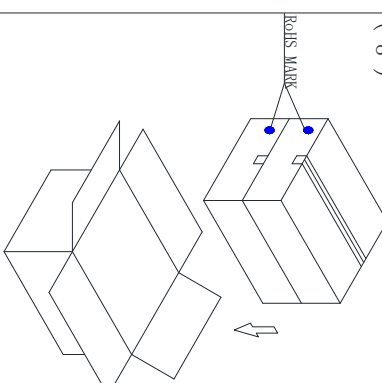
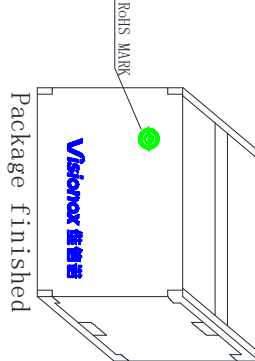

Refer to SP5090 IC Specification.

10.5 Recommended Software Initialization

In order to ensure the reliability and stability of the module, the module must initialize use the following code, Malfunctioning of the module may occur and the reliability of the module may deteriorate if the module is used beyond the initialize code.

```
void Init_IC()
{
    write_c(0xAE);    //Set Display Off
    write_c(0xD5);    //Display divide ratio/osc. freq. mode
    write_c(0x80);
    write_c(0xA8);    //Multiplex ration mode:63
    write_c(0x3F);
    write_c(0xD3);    //Set Display Offset
    write_c(0x00);
    write_c(0x40);    //Set Display Start Line
    write_c(0xAD);    //DC-DC Control Mode Set
    write_c(0x8B);    //DC-DC ON/OFF Mode Set
    write_c(0x33);    //Set Pump voltage value
    write_c(0xA0);    //Segment Remap
    write_c(0xC0);    //Set COM Output Scan Direction
    write_c(0xDA);    //Common pads hardware: alternative
    write_c(0x12);
    write_c(0x81);    //Contrast control
    write_c(0xA0);
    write_c(0xD9);    //Set pre-charge period
    write_c(0x22);
    write_c(0xDB);    //VCOM deselect level mode
    write_c(0x2B);
    write_c(0xA4);    //Set Entire Display On/Off
    write_c(0xA6);    //Set Normal Display
    clear_screen();
    write_c(0xAF);    // Set Display ON
}
```

11 Package Specification

Packing Process (1)~(9)			
<p>(1) Tray Type:02830-MT5-A</p> 	<p>(2)</p>  <p>normal ① 180° revers ②</p> <p>TRAY</p>	<p>(3) order ①、②、①、② Fix trays with tape 1056 pcs of 1 small carton 1 tray contain 48 pcs 22 contained trays, 1 empty tray</p>  <p>small carton package</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 scotch tape</p> 	<p>(6)</p> 	<p>(7)</p>  <p>small carton package</p>	<p>(8)</p>  <p>2 small cartons in 1 big carton</p>
<p>(9) 44 contained trays, 2 empty trays, Package quantity products: 2112 pcs of 1 big carton</p>  <p>Package finished</p>	<p>NOTE:1、The inner carton and master carton must be sealed with adhesive tape.</p> <p>2、Fill up the gap with tray.</p> <p>3、If the customer has special needs with the RoHS making, the inner carton and master carton need adhesive new RoHS marking at .</p> <p>4、Packaging materials are not recommended for recycling.</p>		

12 Reliability

12.1 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	ESD Air discharge (Non-operation)	± 8kV, Test 9 point; Each point discharge 10 times. Time interval is less than 1 second.	4

Test and measurement conditions

- All measurements shall not be started until the specimens attain to temperature stability, the stable time is at least 15 minutes.
- The degradation of polarizer is ignored for item 5.
- The tolerance of temperature is $\pm 3^{\circ}\text{C}$, and the tolerance of relative humidity is $\pm 5\%$.

Evaluation criteria

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

12.2 Lifetime

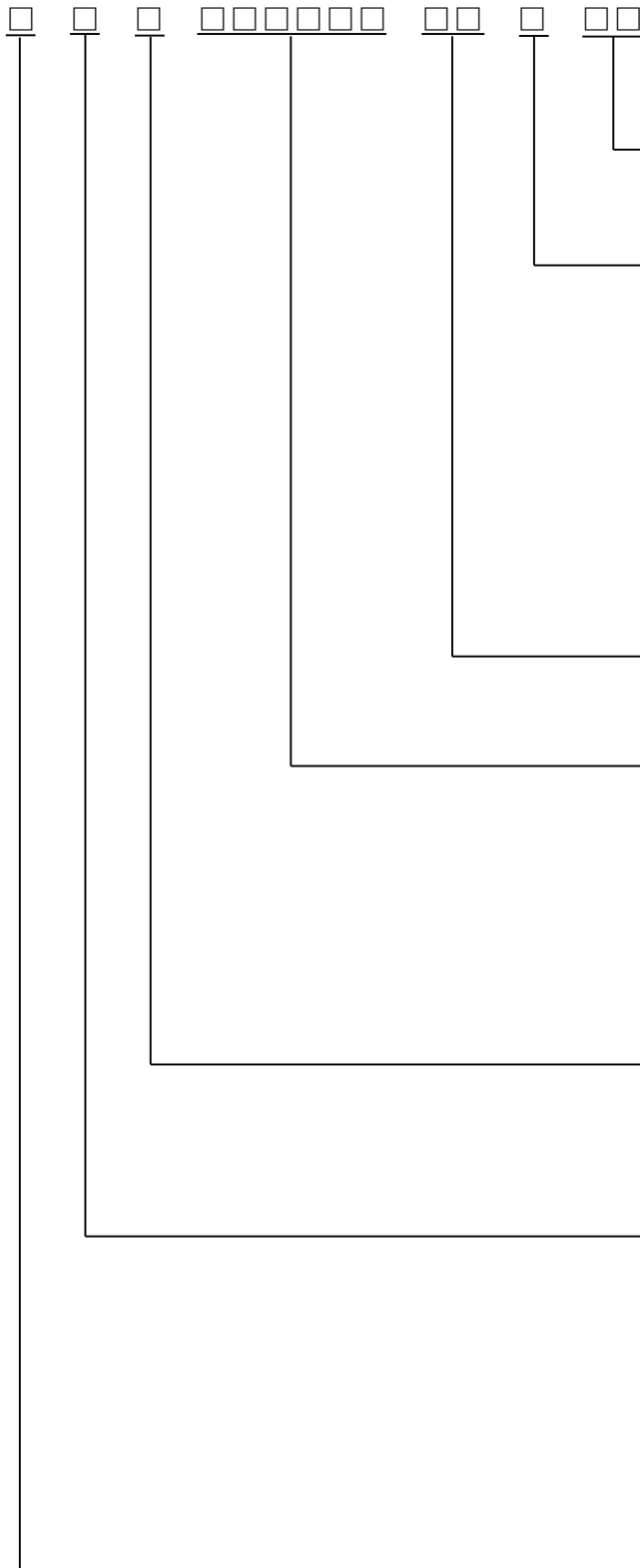
End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	10,000	-	hrs	130cd/m ² , 50% alternating checkerboard, 22±3°C, 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°C; 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

Mixed—pixel number

Product Type :

P—panel

M—module

Display Type :

G—graphic

C—character

S—segment

I—Icon

M—mixed

Company :

V—Visionox

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: $22\pm 3^{\circ}\text{C}$

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

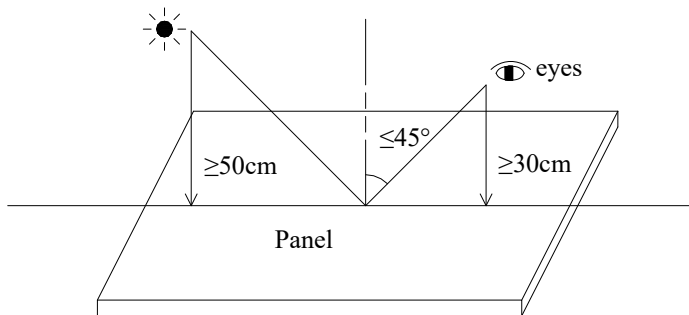
Fluorescent Lamp: 30W

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

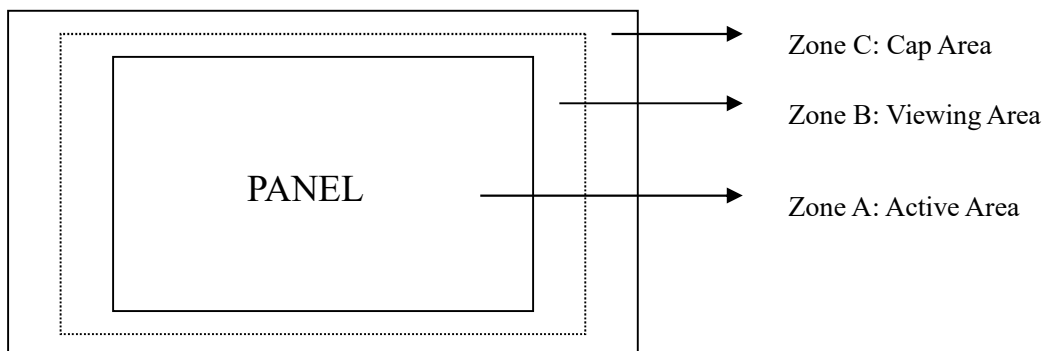
Distance between the Panel & Eyes: $\geq 30\text{cm}$

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

(See the sketch below)

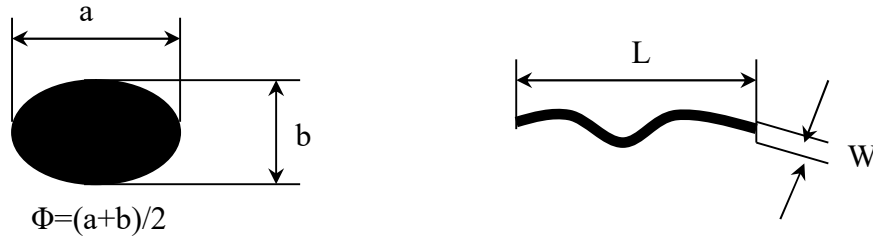


14.3 Quality Assurance Zones



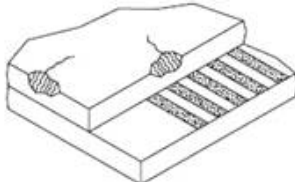
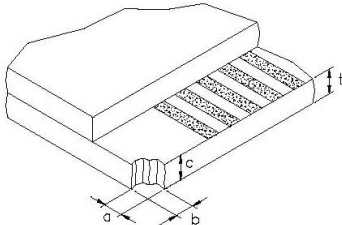
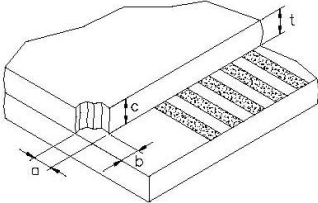
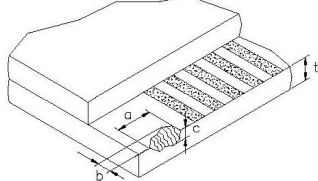
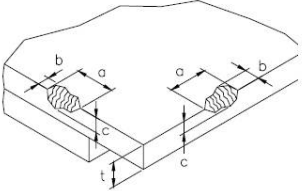
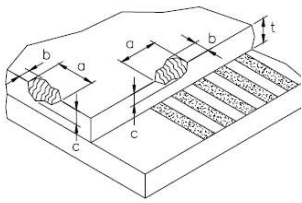
14.4 Inspection Standard

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>$W \leq 0.05$</td> <td>---</td> <td>Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.05 < W \leq 0.1$</td> <td>$L \leq 5.0$</td> <td>3</td> </tr> <tr> <td>$W > 0.1$</td> <td>---</td> <td>0</td> </tr> </tbody> </table>	Width (mm)	Length (mm)	Acceptable Number		Zone A,B	Zone C	$W \leq 0.05$	---	Ignore	Ignore	$0.05 < W \leq 0.1$	$L \leq 5.0$	3	$W > 0.1$	---	0	Minor
Width (mm)	Length (mm)	Acceptable Number																	
		Zone A,B	Zone C																
$W \leq 0.05$	---	Ignore	Ignore																
$0.05 < W \leq 0.1$	$L \leq 5.0$	3																	
$W > 0.1$	---	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>$\Phi \leq 0.2$</td> <td>Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$0.2 < \Phi \leq 0.5$</td> <td>3</td> </tr> <tr> <td>$\Phi > 0.5$</td> <td>0</td> </tr> </tbody> </table>	Average Diameter (mm)	Acceptable Number		Zone A,B	Zone C	$\Phi \leq 0.2$	Ignore	Ignore	$0.2 < \Phi \leq 0.5$	3	$\Phi > 0.5$	0	Minor				
Average Diameter (mm)	Acceptable Number																		
	Zone A,B	Zone C																	
$\Phi \leq 0.2$	Ignore	Ignore																	
$0.2 < \Phi \leq 0.5$	3																		
$\Phi > 0.5$	0																		
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	 <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 $b \leq 2.0\text{mm}$, $c \leq t$ (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. (2) Terminal lead twisted or broken is not allowable. (3) Copper exposed is not allowed by naked eye inspection.</p>	Minor
14	Dimension Unconformity	Checking by mechanical drawing.	Major

II. Displaying Defects

NO.	Items	Criteria		Classification
1	Black/White spot Dirty spot Foreign matter	Average Diameter (mm)	Pieces Permitted	Minor
		$\Phi \leq 0.10$	Zone A,B Zone C	
		$0.10 < \Phi \leq 0.20$	Ignore	
		$\Phi > 0.20$	3 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

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°C, but we suggest that during soldering, the temperature of iron tip should be no higher than 330°C 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°C and 35°C 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

Visionox 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.