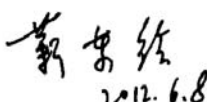
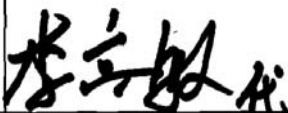
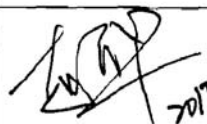


Product Specification

Product Name: VGM256064A4B01

Product Code: M01080

Customer
Approved by Customer
Approved Date:

Designed By	Checked By	Approved By	
		R&D	QA
 2012.6.8		 2012.6.8	 2012.6.11

CONTENT

REVISION RECORD	3
1 OVERVIEW	4
2 FEATURES.....	4
3 MECHANICAL DATA	4
4 MECHANICAL DRAWING	5
5 MODULE INTERFACE.....	6
6 FUNCTION BLOCK DIAGRAM	8
6.1 FUNCTION BLOCK DIAGRAM.....	8
6.2 PANEL LAYOUT DIAGRAM	8
7 ABSOLUTE MAXIMUM RATINGS.....	9
8 ELECTRICAL CHARACTERISTICSB	9
8.1 DC ELECTRICAL CHARACTERISTICSB	9
8.2 ELECTRO-OPTICAL CHARACTERISTICSB	10
8.3 AC ELECTRICAL CHARACTERISTICSB	11
9 FUNCTIONAL SPECIFICATION AND APPLICATION CIRCUIT	18
9.1 RESET TIMING.....	18
9.2 APPLICATION CIRCUIT.....	19
9.3 EXTERNAL DC-DC APPLICATION CIRCUIT	24
9.4 DISPLAY CONTROL INSTRUCTION.....	25
9.5 RECOMMENDED SOFTWARE INITIALIZATION	25
10 PACKAGE SPECIFICATION.....	26
11 RELIABILITY	27
11.1 RELIABILITY TEST	27
11.2 LIFETIME.....	27
11.3 FAILURE CHECK STANDARD	27
12 ILLUSTRATION OF OLED PRODUCT NAME	28
13 OUTGOING QUALITY CONTROL SPECIFICATIONS.....	29
13.1 SAMPLING METHOD	29
13.2 INSPECTION CONDITIONS	29
13.3 QUALITY ASSURANCE ZONES.....	29
13.4 INSPECTION STANDARD.....	30
14 PRECAUTIONS FOR OPERATION AND STORAGE.....	33
14.1 PRECAUTIONS FOR OPERATION	33
14.2 SOLDERING	33
14.3 PRECAUTIONS FOR STORAGE.....	33
14.4 WARRANTY PERIOD	33

1 Overview

VGM256064A4B01 is a monochrome OLED display module with 256×64 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.

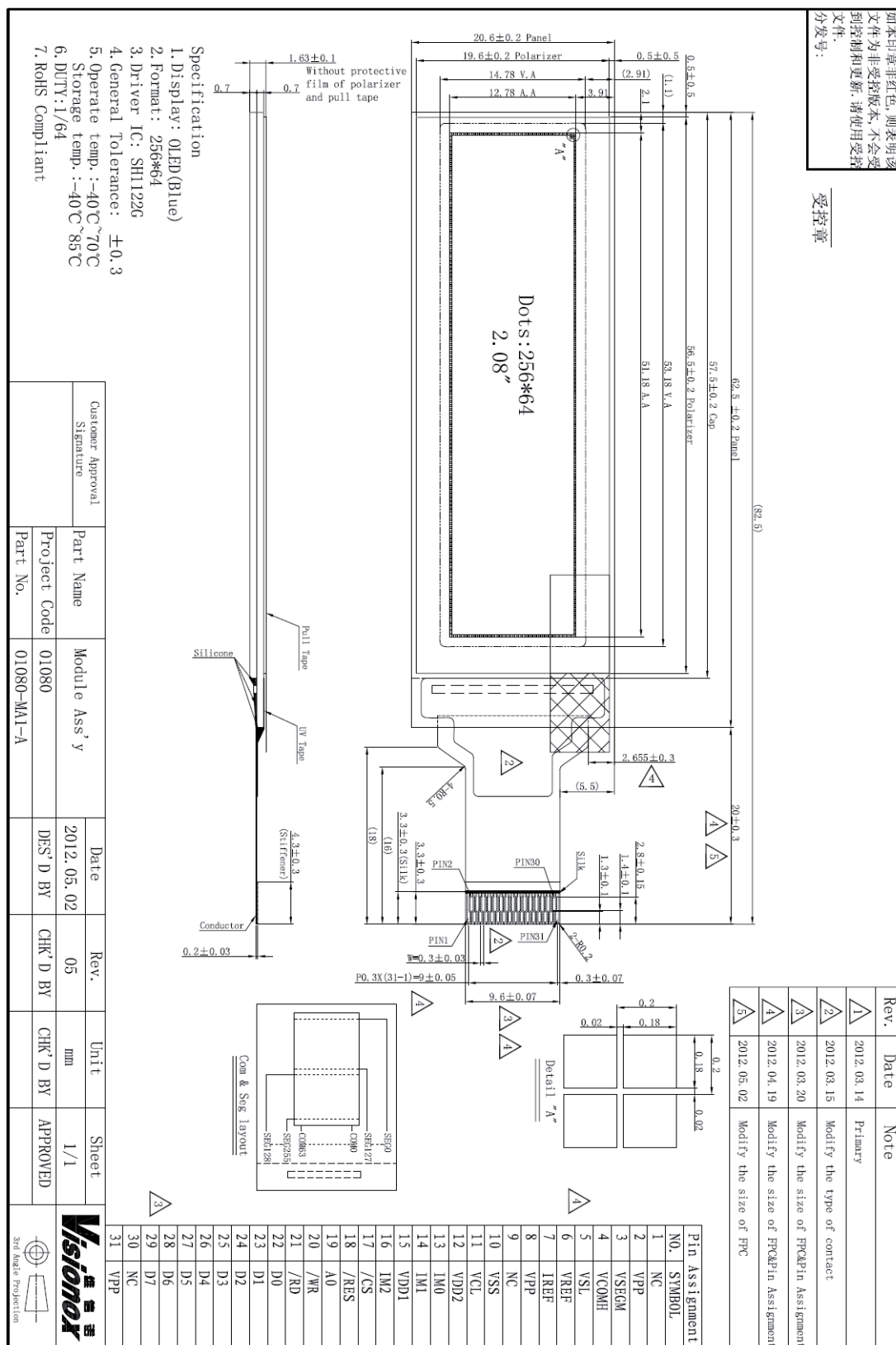
2 Features

- Display Color: Blue
- Dot Matrix: 256×64
- Driver IC: SH1122G
- Interface: 8-bit 8080, 8-bit 6800, 4-wire SPI, 3-wire SPI, I²C
- Wide range of operating temperature: -40°C to 70°C

3 Mechanical Data

NO.	ITEM	SPECIFICATION	UNIT
1	Dot Matrix	256(W)×64(H)	-
2	Dot Size	0.18(W)×0.18 (H)	mm ²
3	Dot Pitch	0.2 (W)×0.2(H)	mm ²
4	Aperture Rate	81	%
5	Active Area	51.18(W)×12.78(H)	mm ²
6	Panel Size	62.5(W)×20.6(H) ×1.4(T)	mm ³
7	Module Size	82.5(W)×20.6(H) ×1.63(T)	mm ³
8	Diagonal A/A Size	2.08	inch
9	Module Weight	4.18±10%	gram

4 Mechanical Drawing



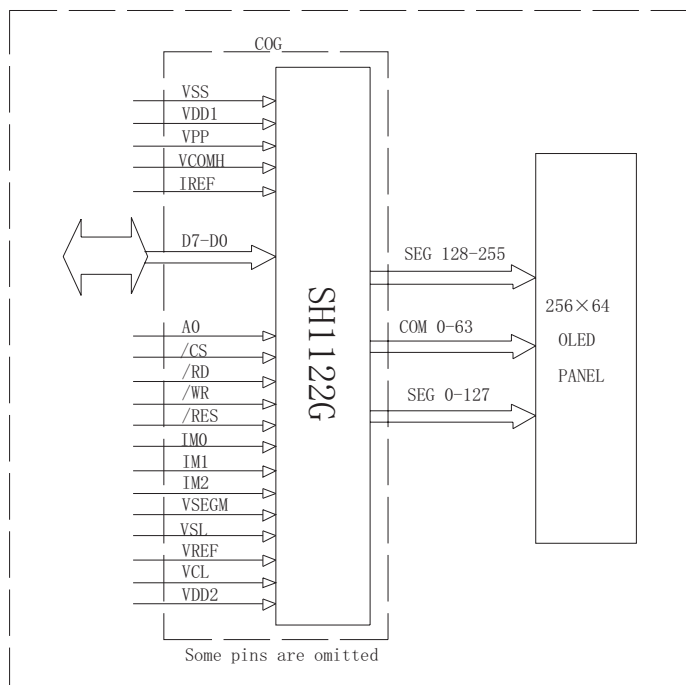
5 Module Interface

PIN NO.	PIN NAME	DESCRIPTION						
1	NC	No Connection.						
2	VPP	This is the most positive voltage supply pad of the chip It should be supplied externally						
3	VSEGM	This is a pad for the voltage output level for segment pre-charge. A capacitor should be connected between this pad and VSS.						
4	VCOMH	This is a pad for the voltage output high level for common signals A capacitor should be connected between this pad and VSS						
5	VSL	This is a segment voltage reference pad A capacitor should be connected between this pad and VSS						
6	VREF	This is a voltage reference pad for pre-charge voltage in driving OLED device. Voltage should be set to match with the OLED driving voltage in current drive phase. It can either be supplied externally or by connecting to VPP.						
7	IREF	This is a segment current reference pad A resistor should be connected between this pad and VSS. Set the current at 15.625 μ A						
8	VPP	This is the most positive voltage supply pad of the chip It should be supplied externally						
9	NC	No Connection.						
10	VSS	Ground for analog, logic&buffer respectively.						
11	VCL	This is a common voltage reference pad This pad should be connected to VSS externally						
12	VDD2	1.65 - 3.5V power supply input pad for logic.VDD2 should be equal to VDD1.						
13	IM0	These are the MPU interface mode select pads.						
14	IM1		8080	I ² C	6800	4-wire SPI	3-wire SPI	
		IM0	0	0	0	0	1	
		IM1	1	1	0	0	0	
16	IM2		IM2	1	0	1	0	0
15	VDD1	1.65 - 3.5Vpower supply input pad						
17	/CS	This pad is the chip select input. When /CS = “L”, then the chip select becomes active, and data/command I/O is enabled.						
18	/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.						
19	A0	This is the Data/Command control pad that 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. In I ² C interface, this pad serves as SA0 to distinguish the different address of OLED driver.						
20	/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 /WR = “H”: Read.When /WR = “L”: Write.						

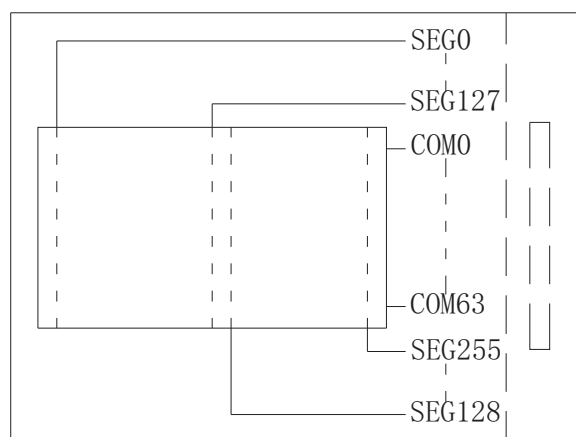
21	/RD	This is a MPU interface input pad. When connected to an 8080 series MPU, it is active LOW. This pad is connected to the /RD signal of the 8080 series MPU, and the SH1122 data bus is in an output status when this signal is “L”. When connected to a 6800 series MPU, this is active HIGH. This is used as an enable clock input of the 6800 series MPU.
22~29	D0~D7	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 I²C interface is selected, then D0 serves as the serial clock input pad (SCL) and D1 serves as the serial data input pad (SDA). 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.
30	NC	No Connection.
31	VPP	This is the most positive voltage supply pad of the chip It should be supplied externally

6 Function Block Diagram

6.1 Function Block Diagram



6.2 Panel Layout Diagram



Com & Seg layout

7 Absolute Maximum Ratings

ITEM	SYMBOL	MIN	MAX	UNIT	REMARK
Logic supply voltage	VDD1	-0.3	3.6	V	IC maximum rating
	VDD2	-0.3	3.6	V	IC maximum rating
OLED Operating voltage	VPP	0	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 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
Power supply of I/O	VDD1	22±3°C, 55±15%R.H	1.65	3.0	3.5	V
Power supply of logic device	VDD2	22±3°C, 55±15%R.H	1.65	3.0	3.5	V
OLED Driver Supply Voltage	VPP	22±3°C, 55±15%R.H	11.5	12	12.5	V
High-level Input Voltage	V _{IH}	-	0.8×VDD1	-	VDD1	V
Low-level Input Voltage	V _{IL}	-	VSS	-	0.2×VDD1	V
High-level Output Voltage	V _{OH}	-	0.8×VDD1	-	VDD1	V
Low-level Output Voltage	V _{OL}	-	VSS	-	0.2×VDD1	V

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

8.2 Electro-optical Characteristics

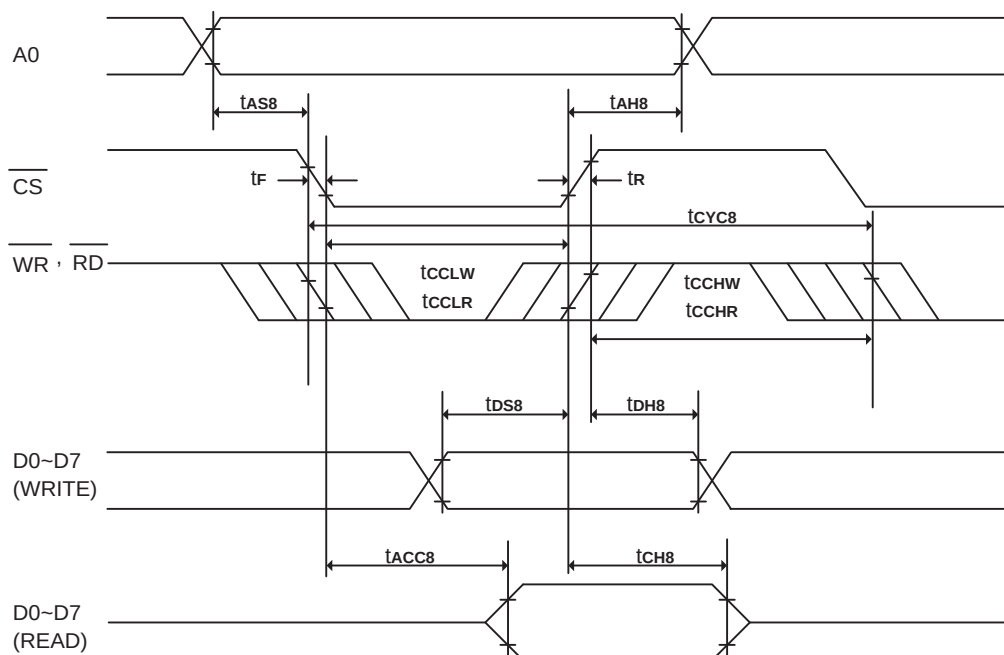
ITEM	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Normal Mode Brightness	L _{br}	All pixels ON(1)	80	100	140	cd/m ²
Sleep mode current Consumption in VDD1 & VDD2	I _{SP}	During sleep, TA = +25℃, VDD1 = 3V, VDD2 = 3V	-	0.01	5	uA
Sleep mode current consumption in VPP		During sleep, TA = +25℃, VPP = 12V	-	0.01	5	uA
Normal Mode Power Consumption	Pt	All pixels ON(1)	-	264	324	mW
C.I.E(Blue)	(x)	x,y(CIE1931)	0.13	0.16	0.19	-
	(y)		0.26	0.30	0.34	-
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 : 12V
- Contrast setting : 0x26
- Frame rate : 125Hz
- Duty setting : 1/64

8.3 AC Electrical Characteristics

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



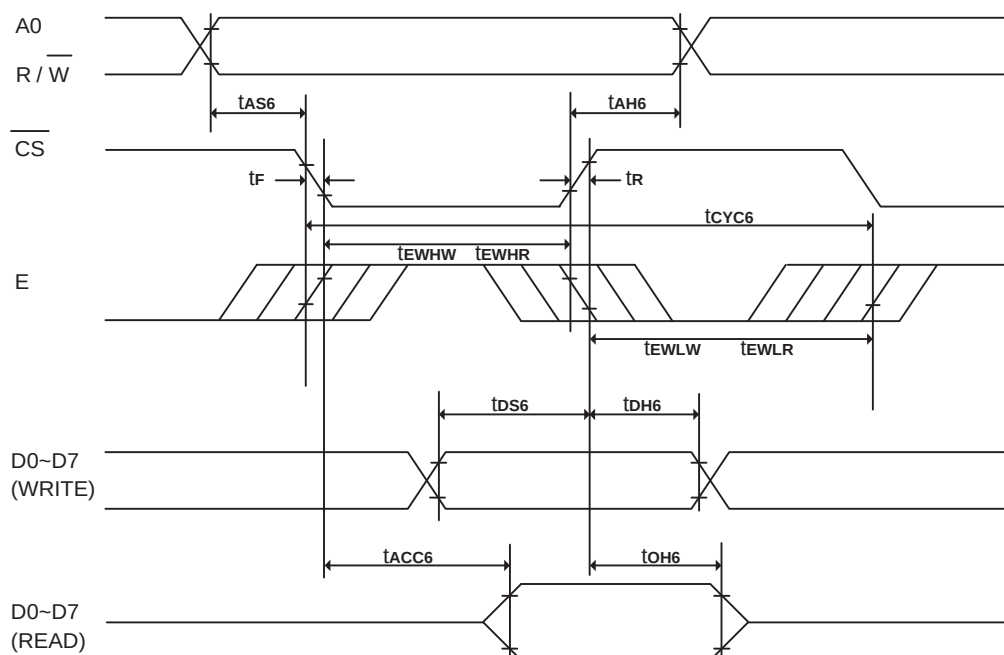
(VDD1 = VDD2 = 1.65 - 3.5V, TA = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
tCYC8	System cycle time	600	-	-	ns	
tAS8	Address setup time	0	-	-	ns	
tAH8	Address hold time	0	-	-	ns	
tDS8	Data setup time	80	-	-	ns	
tDH8	Data hold time	30	-	-	ns	
tCH8	Output disable time	20	-	140	ns	CL = 100pF
tACC8	$\overline{RD}$ access time	-	-	280	ns	CL = 100pF
tCCLW	Control L pulse width (WR)	200	-	-	ns	
tCCLR	Control L pulse width (RD)	240	-	-	ns	
tCCHW	Control H pulse width (WR)	200	-	-	ns	
tCCHR	Control H pulse width (RD)	200	-	-	ns	
tR	Rise time	-	-	30	ns	
tF	Fall time	-	-	30	ns	

(VDD1 = VDD2 = 2.4 - 3.5V, T_A = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
t _{CYC8}	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	C _L = 100pF
t _{ACC8}	$\overline{\text{RD}}$ access time	-	-	140	ns	C _L = 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	

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



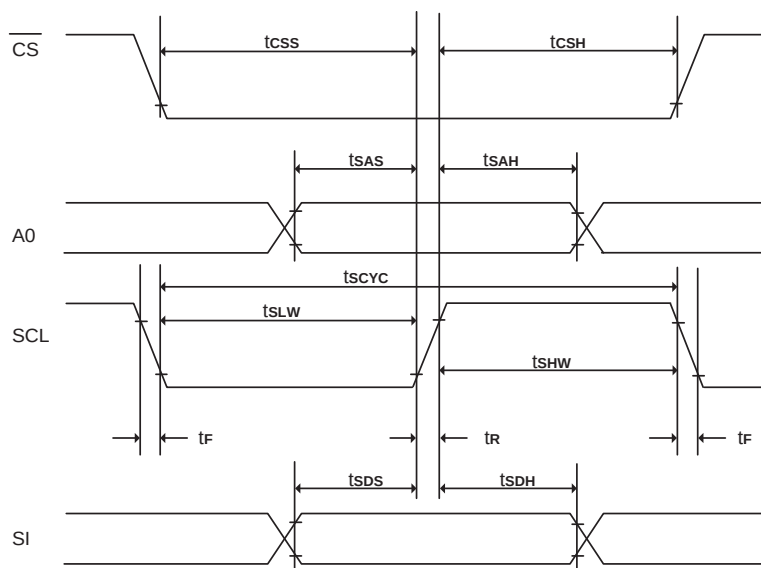
(VDD1 = VDD2 = 1.65 - 3.5V, TA = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
tCYC6	System cycle time	600	-	-	ns	
tAS6	Address setup time	0	-	-	ns	
tAH6	Address hold time	0	-	-	ns	
tDS6	Data setup time	80	-	-	ns	
tDH6	Data hold time	30	-	-	ns	
tOH6	Output disable time	20	-	140	ns	CL = 100pF
tACC6	Access time	-	-	280	ns	CL = 100pF
tEWHW	Enable H pulse width (Write)	200	-	-	ns	
tEWHR	Enable H pulse width (Read)	240	-	-	ns	
tEWLW	Enable L pulse width (Write)	200	-	-	ns	
tEWLR	Enable L pulse width (Read)	200	-	-	ns	
tR	Rise time	-	-	30	ns	
tF	Fall time	-	-	30	ns	

(VDD1 = VDD2 = 2.4 - 3.5V, T_A = +25°C)

Symbol	Parameter	Min	Typ	Max	Unit	Condition
t _{CYC6}	System cycle time	300	-	-	ns	
t _{AS6}	Address setup time	0	-	-	ns	
t _{AH6}	Address hold time	0	-	-	ns	
t _{DS6}	Data setup time	40	-	-	ns	
t _{DH6}	Data hold time	15	-	-	ns	
t _{OH6}	Output disable time	10	-	70	ns	C _L = 100pF
t _{ACC6}	Access time	-	-	140	ns	C _L = 100pF
t _{EWHW}	Enable H pulse width (Write)	100	-	-	ns	
t _{EWHR}	Enable H pulse width (Read)	120	-	-	ns	
t _{EWLW}	Enable L pulse width (Write)	100	-	-	ns	
t _{EWLR}	Enable L pulse width (Read)	100	-	-	ns	
t _R	Rise time	-	-	15	ns	
t _F	Fall time	-	-	15	ns	

(3) System buses Write characteristics 3(For 4 wire SPI)



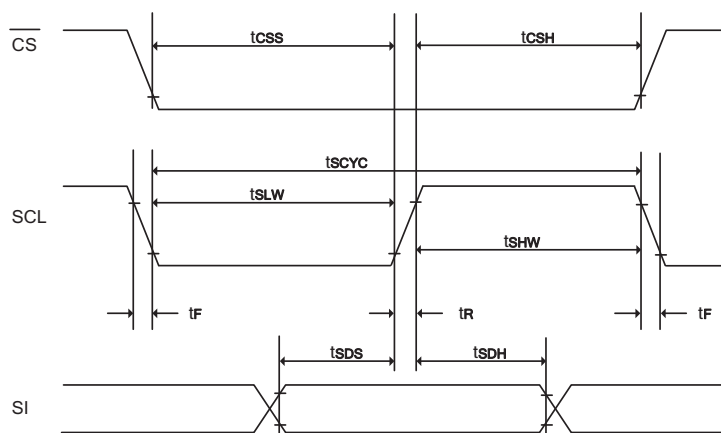
(VDD1 = VDD2 = 1.65 - 3.5V, TA = +25°C)

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 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 = VDD2 = 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	100	-	-	ns	
tSLW	Serial clock L pulse	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

(4) System buses Write characteristics 4(For 3 wire SPI)



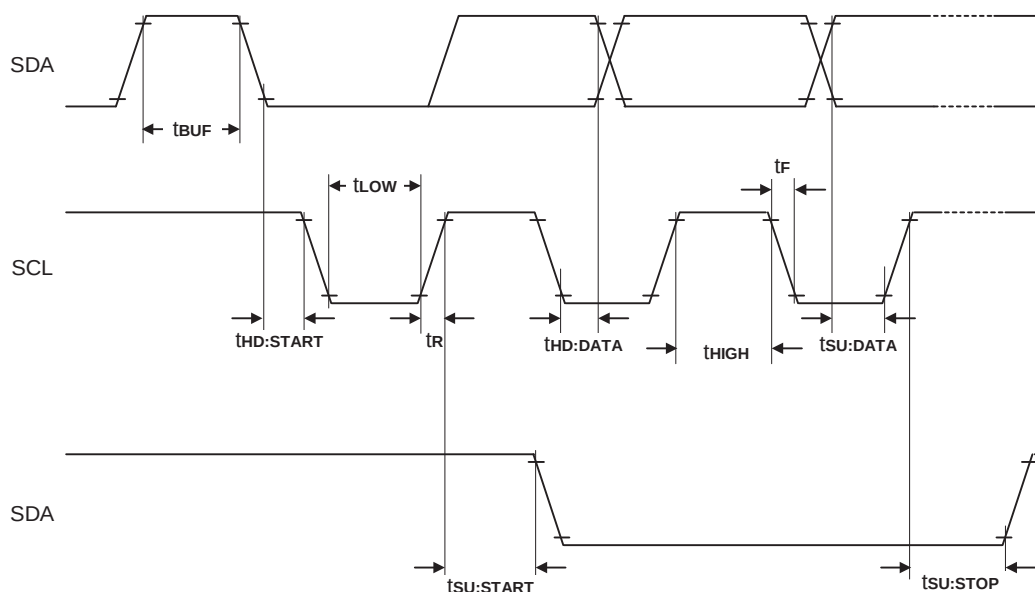
(VDD1 = VDD2 = 1.65 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tSCYC	Serial clock cycle	500	-	-	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 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 = VDD2 = 2.4 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tSCYC	Serial clock cycle	250	-	-	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	100	-	-	ns	
tSLW	Serial clock L pulse	100	-	-	ns	
tR	Rise time	-	-	15	ns	
tF	Fall time	-	-	15	ns	

(5) I²C interface characteristics

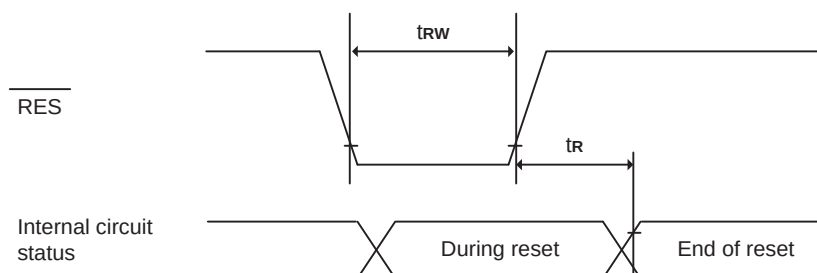


(VDD1 = VDD2 = 1.65 - 3.5V, TA = +25°C)

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	
Cb	Capacity load on each bus line	-	-	400	pF	
T _{SU:START}	Setup timefor 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	

9 Functional Specification and Application Circuit

9.1 Reset Timing



(VDD1 = VDD2 = 1.65 - 3.5V, TA = +25°C)

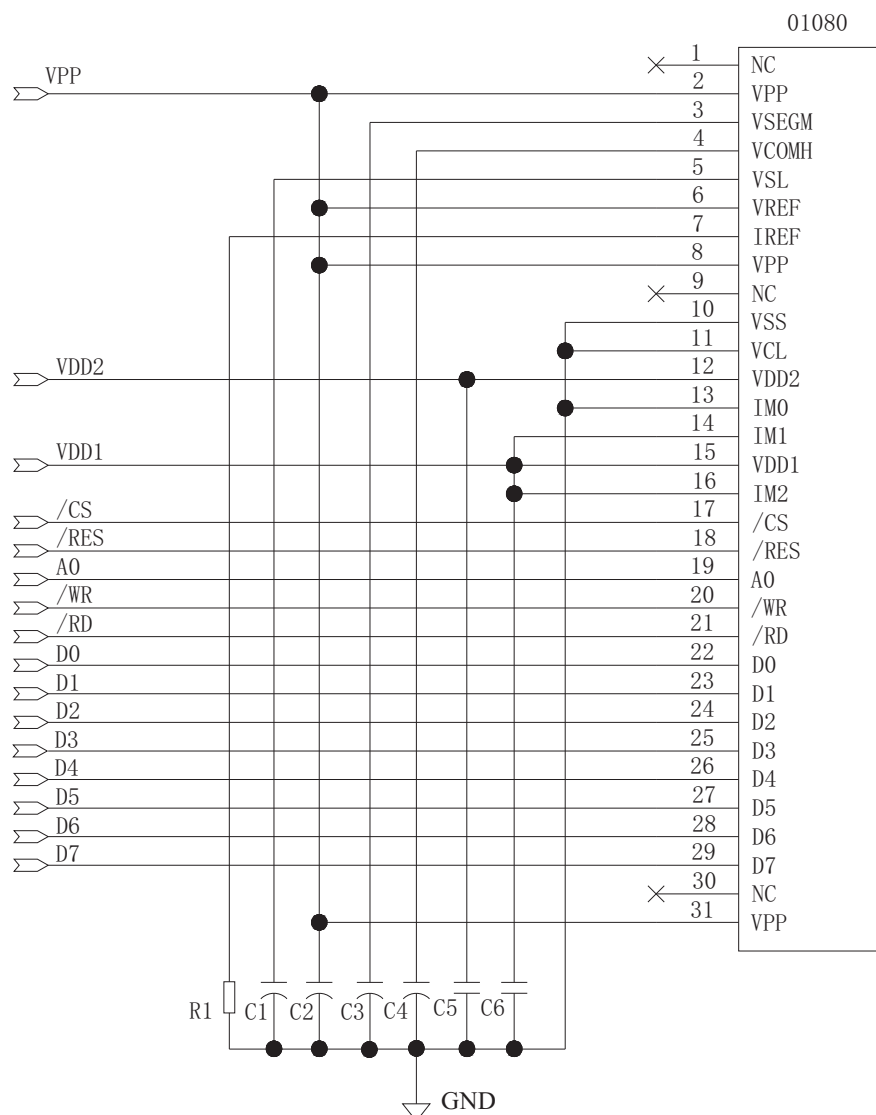
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t_R	Reset time	-	-	2.0	μs	
t_{RW}	Reset low pulse width	10.0	-	-	μs	

(VDD1 = VDD2 = 2.4 - 3.5V, TA = +25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
t_R	Reset time	-	-	1.0	μs	
t_{RW}	Reset low pulse width	5.0	-	-	μs	

9.2 Application Circuit

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



Pin connected to MCU interface: D[7:0], /RD, /WR, A0, /RES, /CS

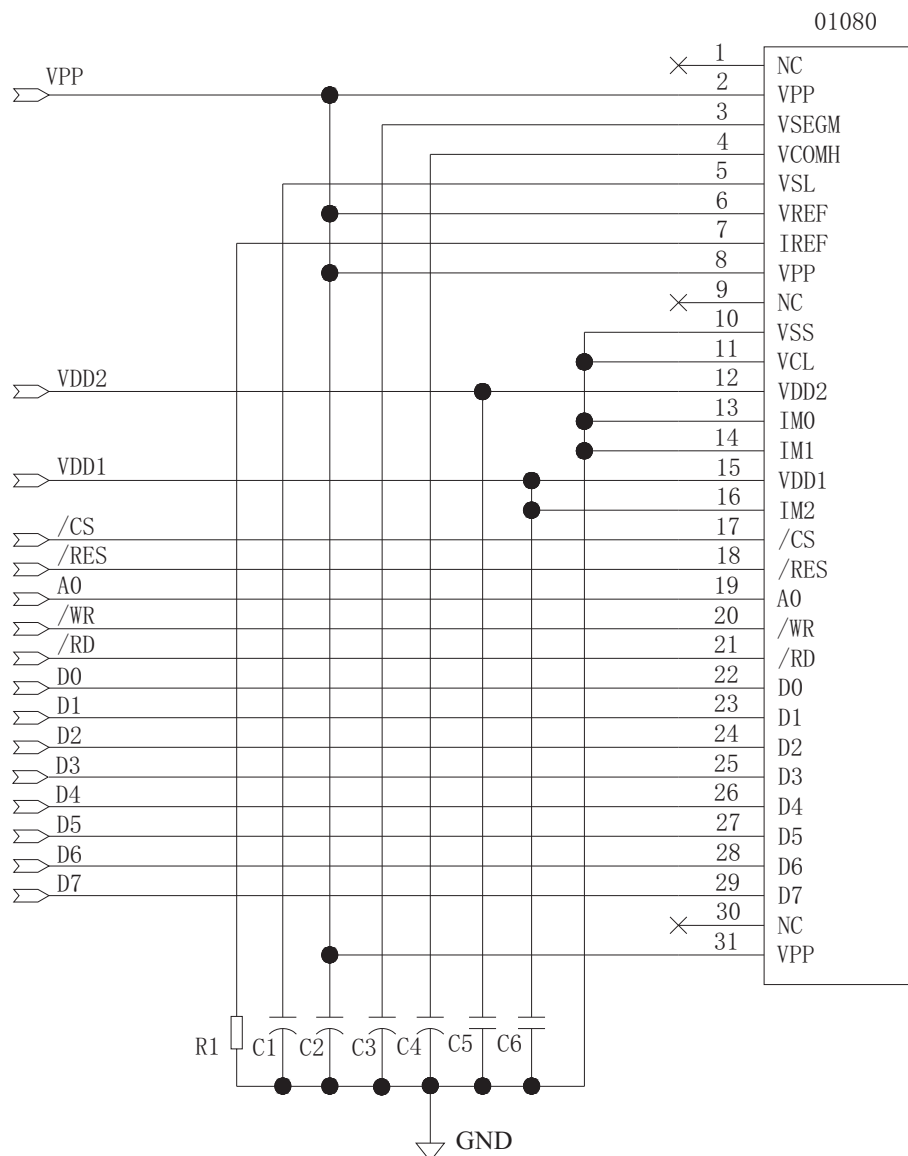
Recommended components

C1, C2, C3, C4: 4.7μF/25V.ROHS (Tantalum Capacitors)

C5, C6: 0.1μF-0603-X7R±10%.ROHS

R1: 0603 1/10W +/-5% 620Kohm.ROHS

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



Pin connected to MCU interface: D[7:0], /RD, /WR, A0, /RES, /CS

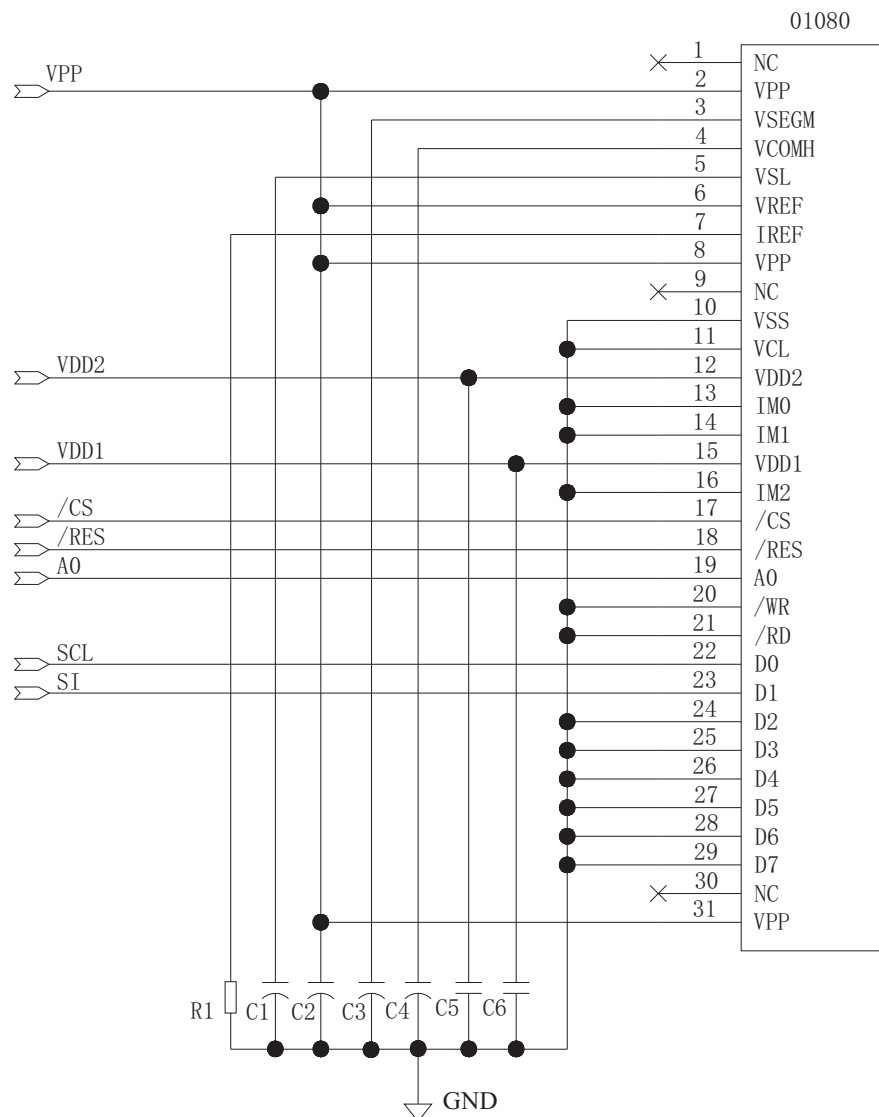
Recommended components

C1,C2,C3,C4: 4.7μF/25V.ROHS (Tantalum Capacitors)

C5,C6: 0.1uF-0603-X7R±10%.ROHS

R1: 0603 1/10W +/-5% 620Kohm.ROHS

(3) The configuration for 4-wire SPI mode, external VPP is shown in the following diagram:



Pin connected to MCU interface: SCL, SI, A0, /RES, /CS

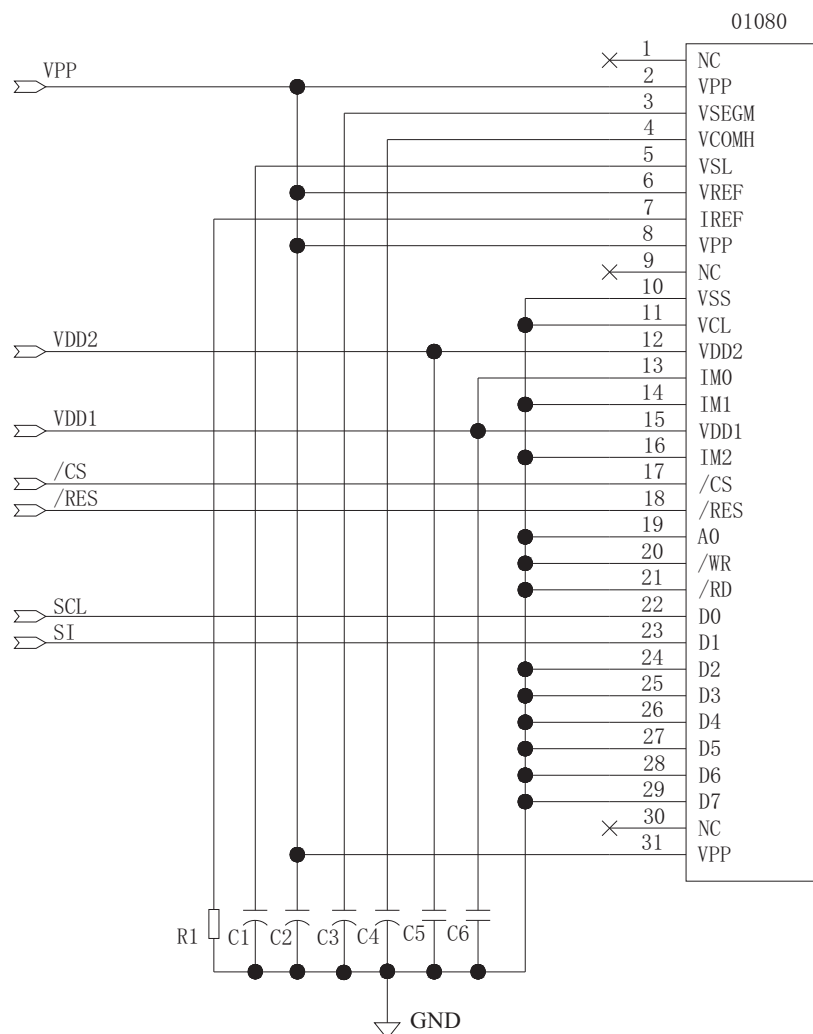
Recommended components

C1, C2, C3, C4: 4.7 μ F/25V.ROHS (Tantalum Capacitors)

C5, C6: 0.1 μ F-0603-X7R $\pm$ 10%.ROHS

R1: 0603 1/10W $\pm$ 5% 620Kohm.ROHS

(4) The configuration for 3-wire SPI mode, external VPP is shown in the following diagram:



Pin connected to MCU interface: SCL, SI, /RES, /CS

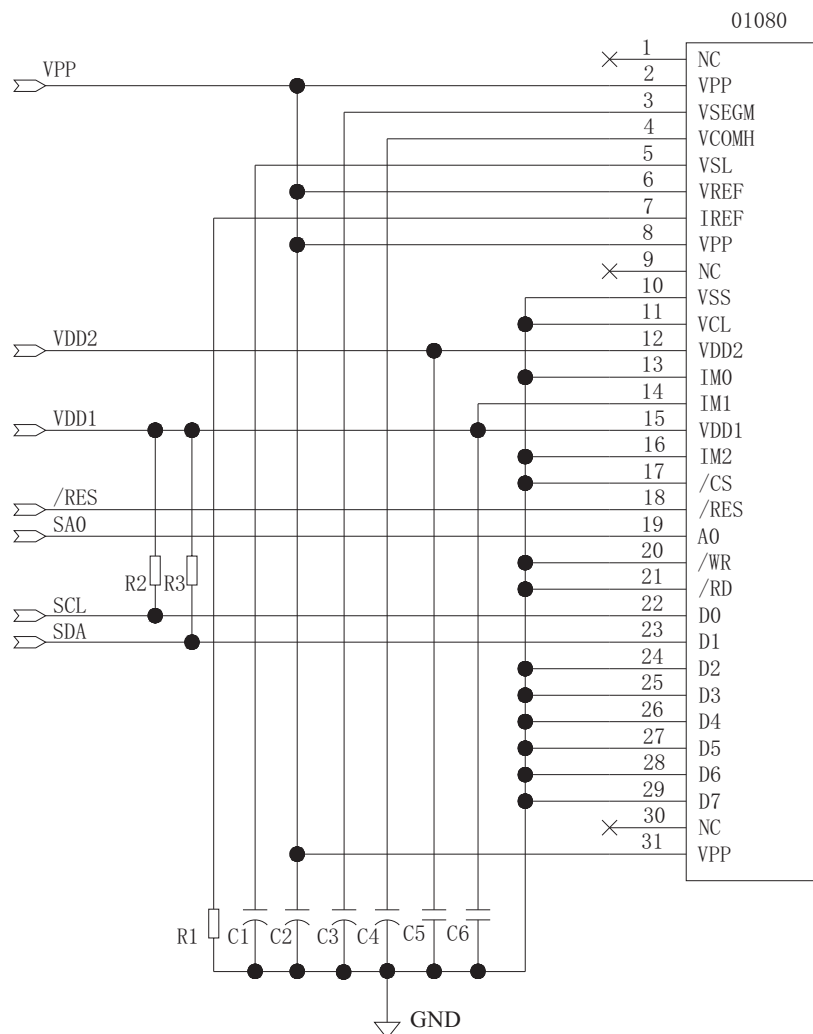
Recommended components

C1, C2, C3, C4: 4.7 μ F/25V.ROHS (Tantalum Capacitors)

C5, C6: 0.1 μ F-0603-X7R $\pm$ 10%.ROHS

R1: 0603 1/10W $\pm$ 5% 620Kohm.ROHS

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



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

SA0	I ² C Address
0	0x78
1	0x7a

Recommended components

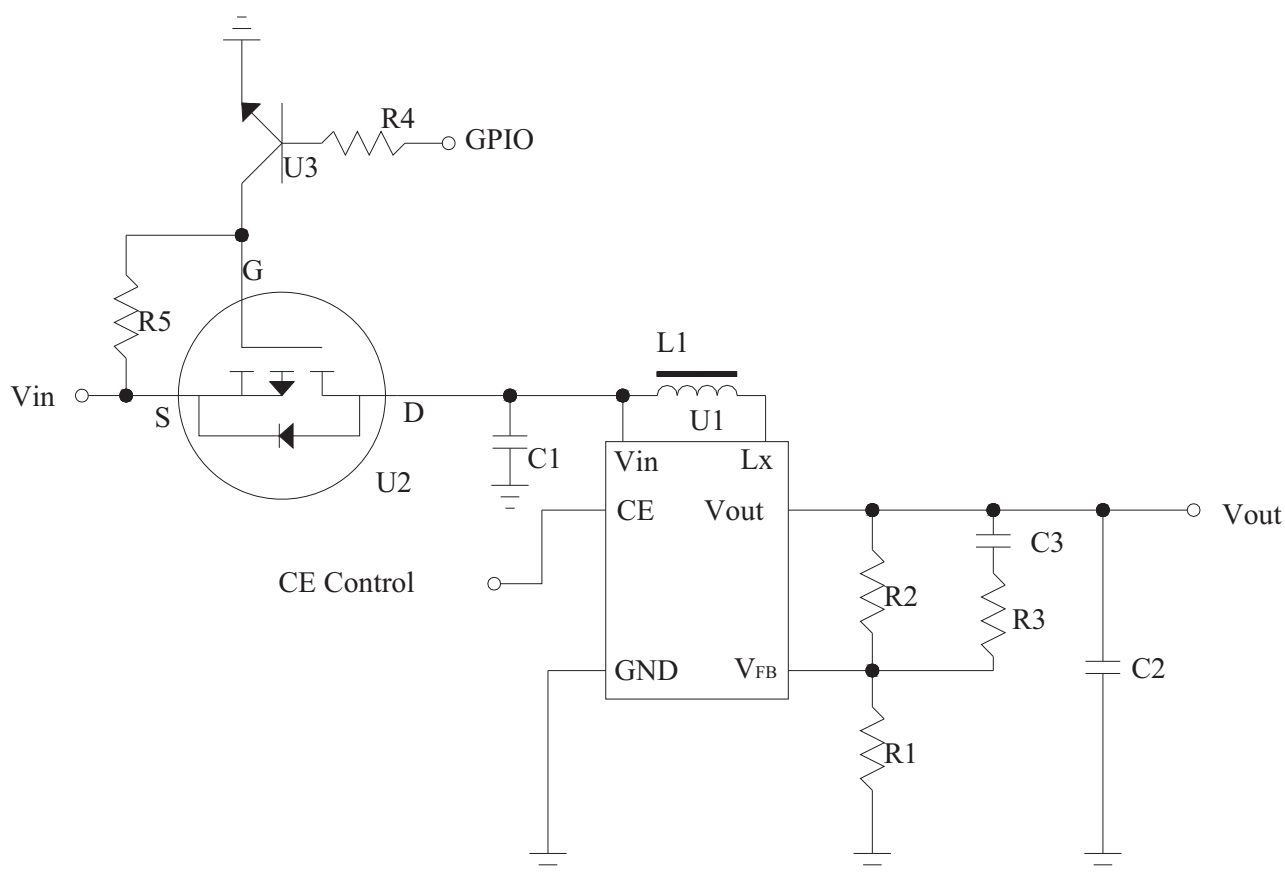
C1,C2,C3,C4: 4.7μF/25V.ROHS (Tantalum Capacitors)

C5,C6: 0.1uF-0603-X7R±10%.ROHS

R1: 0603 1/10W +/-5% 620Kohm.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 +/-1% 110Kohm.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

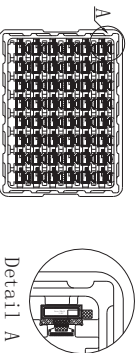
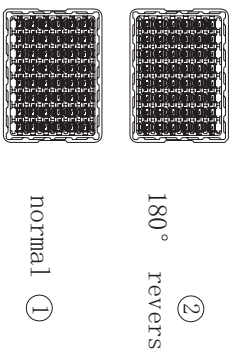
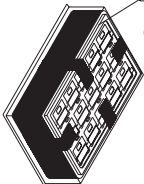
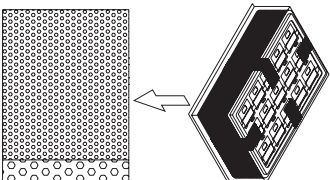
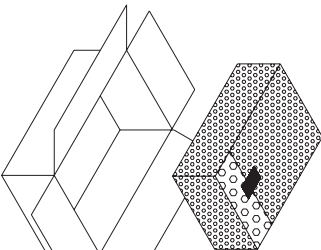
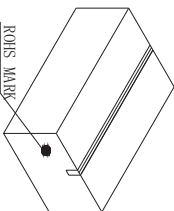
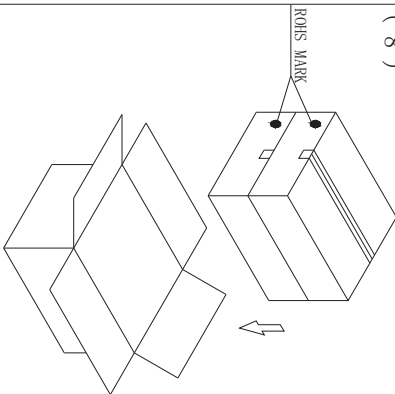
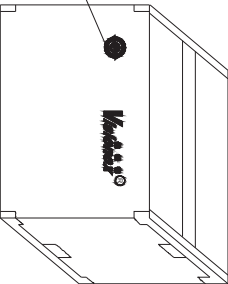
9.4 Display Control Instruction

Refer to SH1122G IC Specification.

9.5 Recommended Software Initialization

```
void Init_IC()
{
    Write_Command(0xAE);    //Set Display Off
    Write_Command(0xB0);    //Row address Mode Setting
    Write_Command(0x00);
    Write_Command(0x10);    //Set Higher Column Address of display RAM
    Write_Command(0x00);    //Set Lower Column Address of display RAM
    Write_Command(0xD5);    //Set Display Clock Divide Ratio/Oscillator Frequency
    Write_Command(0x50);    //50 125hz
    Write_Command(0xD9);    //Set Discharge/Precharge Period
    Write_Command(0x22);
    Write_Command(0x40);    //Set Display Start Line
    Write_Command(0x81);    //The Contrast Control Mode Set
    Write_Command(0x26);
    Write_Command(0xA0);    //Set Segment Re-map
    Write_Command(0xC8);    //Set Common Output Scan Direction
    Write_Command(0xA4);    //Set Entire Display OFF/ON
    Write_Command(0xA6);    //Set Normal/Reverse Display
    Write_Command(0xA8);    //Set Multiplex Ration
    Write_Command(0x3F);
    Write_Command(0xAD);    //DC-DC Setting
    Write_Command(0x80);    //DC-DC is disable
    Write_Command(0xD3);    //Set Display Offset
    Write_Command(0x00);
    Write_Command(0xDB);    //Set VCOM Deselect Level
    Write_Command(0x30);
    Write_Command(0xDC);    //Set VSEGM Level
    Write_Command(0x30);
    Write_Command(0x33);    //Set Discharge VSL Level 1.8V
    Write_Command(0xAF);    //Set Display On
}
```

10 Package Specification

(1) Tray Type:01080-MT6-A	(2)	(3) order①、② ①、② fix trays with tape 616 pcs of 1 small carton 1 tray contain 28 pcs 22 contained trays, 1 empty tray	(4) Use vacuum bag to package the tray and add 5 bags of desiccant into the vacuum bag *5
			
(5) After tray be packaged, wrap the package in a bubble bag and seal with scotch tape.	(6)	(7)	(8)
			
(9) 44 contained trays, 2 empty trays, Package quantity products: 1232 pcs of 1 big carton	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  .		
	Package finished L410*W310*L272 mm		

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

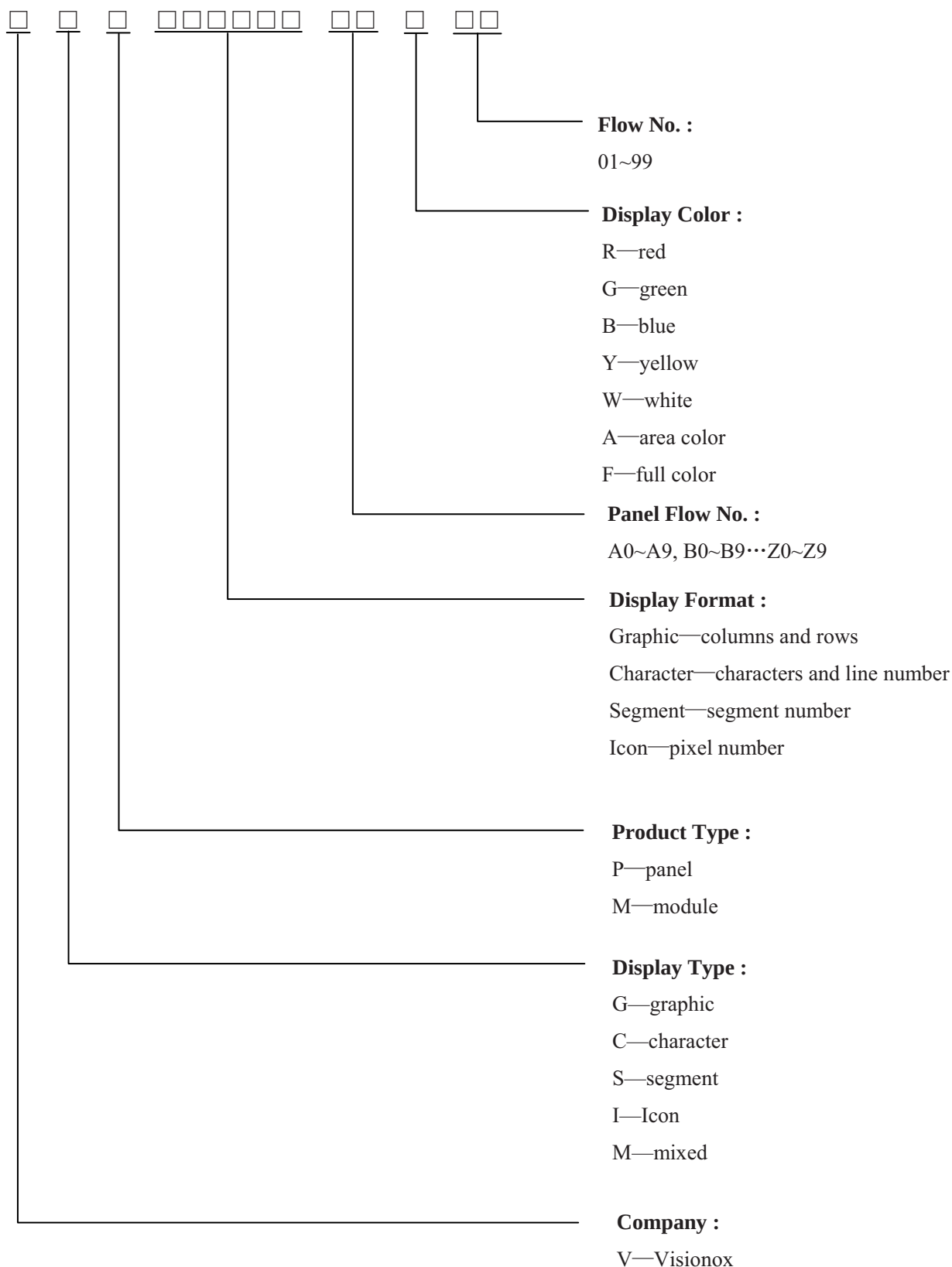
End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

ITEM	MIN	MAX	UNIT	CONDITION
Operation Life Time	10,000	-	hrs	100 cd/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: $55 \pm 15\% \text{R.H}$

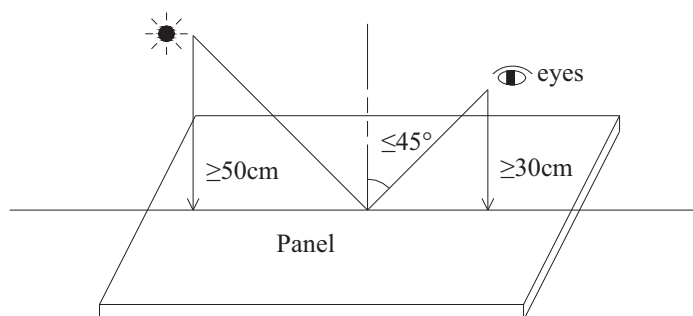
Fluorescent Lamp: 30W

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

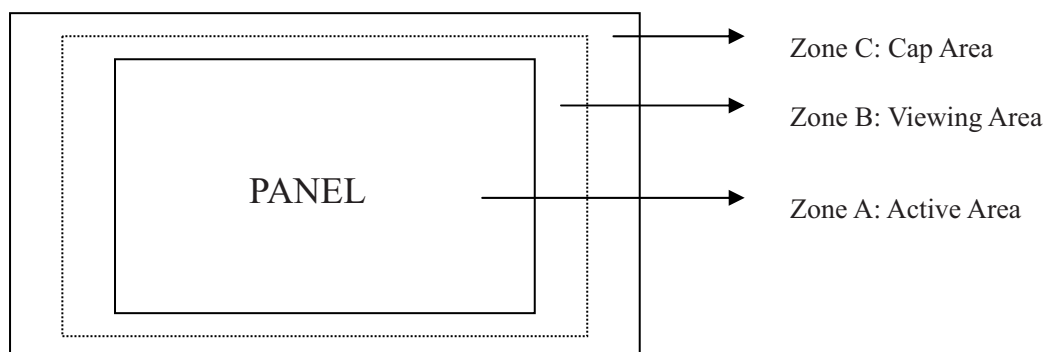
Distance between the Panel & Eyes: $\geq 30\text{cm}$

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

(See the sketch below)

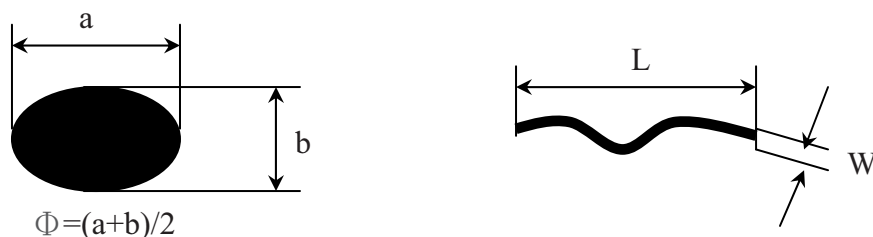


13.3 Quality Assurance Zones



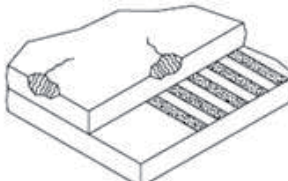
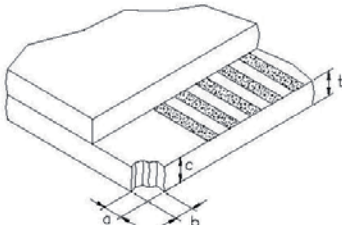
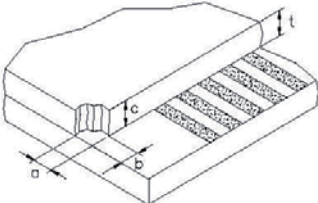
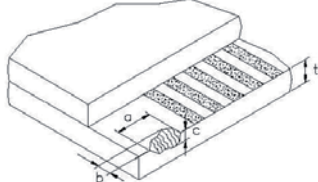
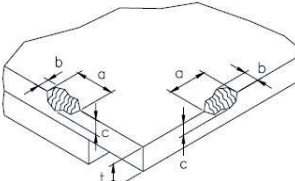
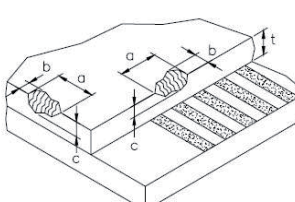
13.4 Inspection Standard

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><tr><td rowspan="2">Average Diameter (mm)</td><td colspan="2">Acceptable Number</td></tr><tr><td>Zone A,B</td><td>Zone C</td></tr><tr><td>$\Phi \leq 0.15$</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></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><tr><td rowspan="2">Width (mm)</td><td rowspan="2">Length (mm)</td><td colspan="2">Acceptable Number</td></tr><tr><td>Zone A,B</td><td>Zone C</td></tr><tr><td>$W \leq 0.03$</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></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><tr><td rowspan="2">Average Diameter (mm)</td><td colspan="2">Acceptable Number</td></tr><tr><td>Zone A,B</td><td>Zone C</td></tr><tr><td>$\Phi > 0.5$</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></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><tr><td>Average Diameter (mm)</td><td colspan="2">Acceptable Number</td></tr><tr><td>$\Phi \leq 0.5$</td><td colspan="2">Ignore</td></tr><tr><td>$0.5 < \Phi \leq 1.0$</td><td colspan="2">3</td></tr><tr><td>$\Phi > 1.0$</td><td colspan="2">0</td></tr></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																					

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

II . Displaying Defects

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

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