

AB-J096-P100R

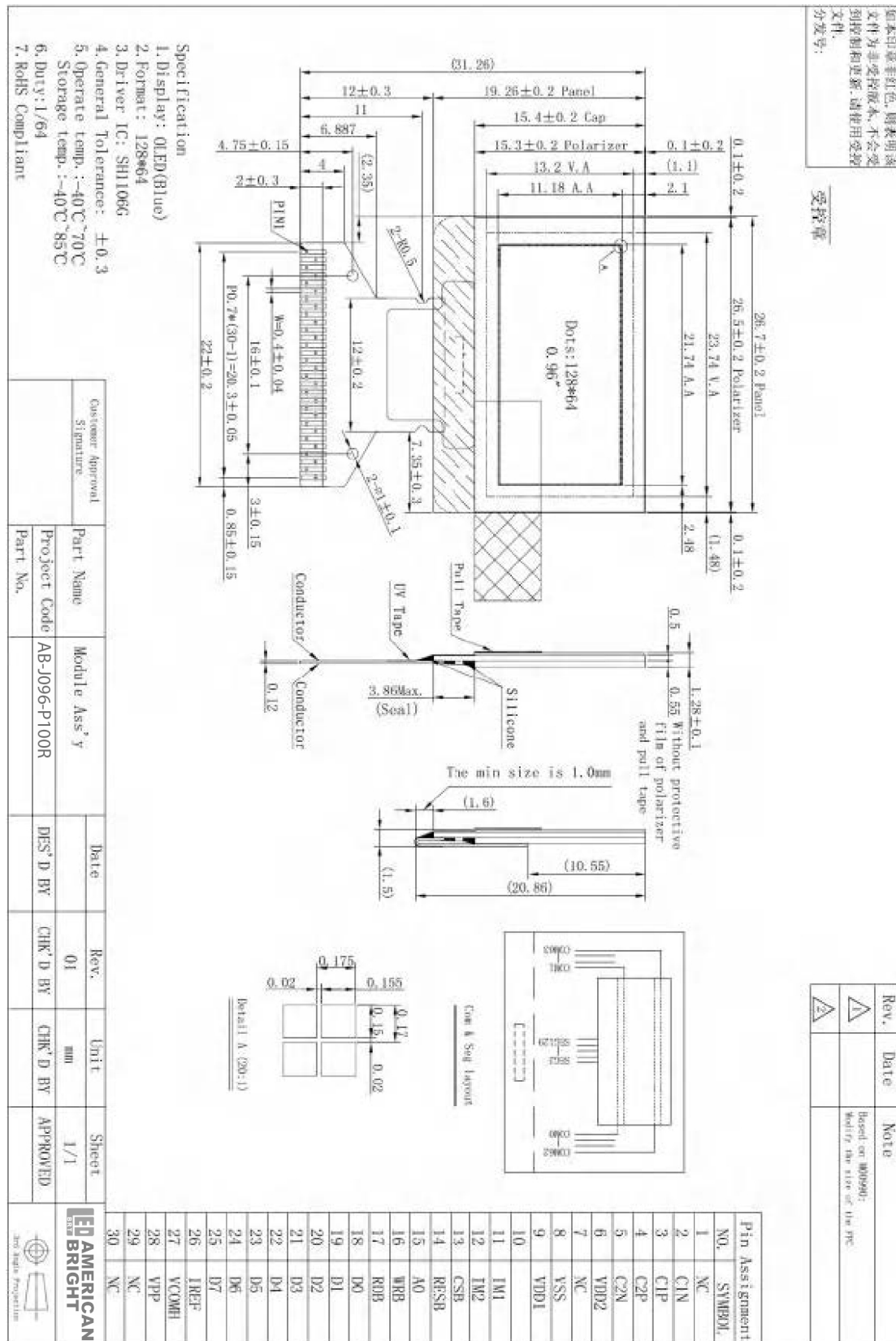
1. General Specification

This model is a monochrome OLED display module with 128×64 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.

No.	Item	Specification	Remark
1	LCD Size	0.96 inch (Diagonal)	
2	Driver Element	Monochrome OLED	
3	Display Mode	Blue	
4	View Direction	—	
5	Resolution	128 × 64	
6	Module Size	26.7 (W) × 31.26 (H) × 1.28 (D) mm	Note 1
7	Active Area	21.74 (W) × 11.18 (H) mm	
8	Dot Pitch	0.17 (W) × 0.175 (H) mm	
9	LCM Driver IC	SH1106G	
10	Interface Type	8-bit 8080, 8-bit 6800, 3/4-SPI, I2C	
11	With/Without RTP/CTP	—	
12	CTP Driver IC	—	
13	Panel Power Consumption	—	
14	Weight	1.27 ± 10% gram	

Note 1: Refer to Mechanical Drawing in Section 2.

2. Mechanical Drawing



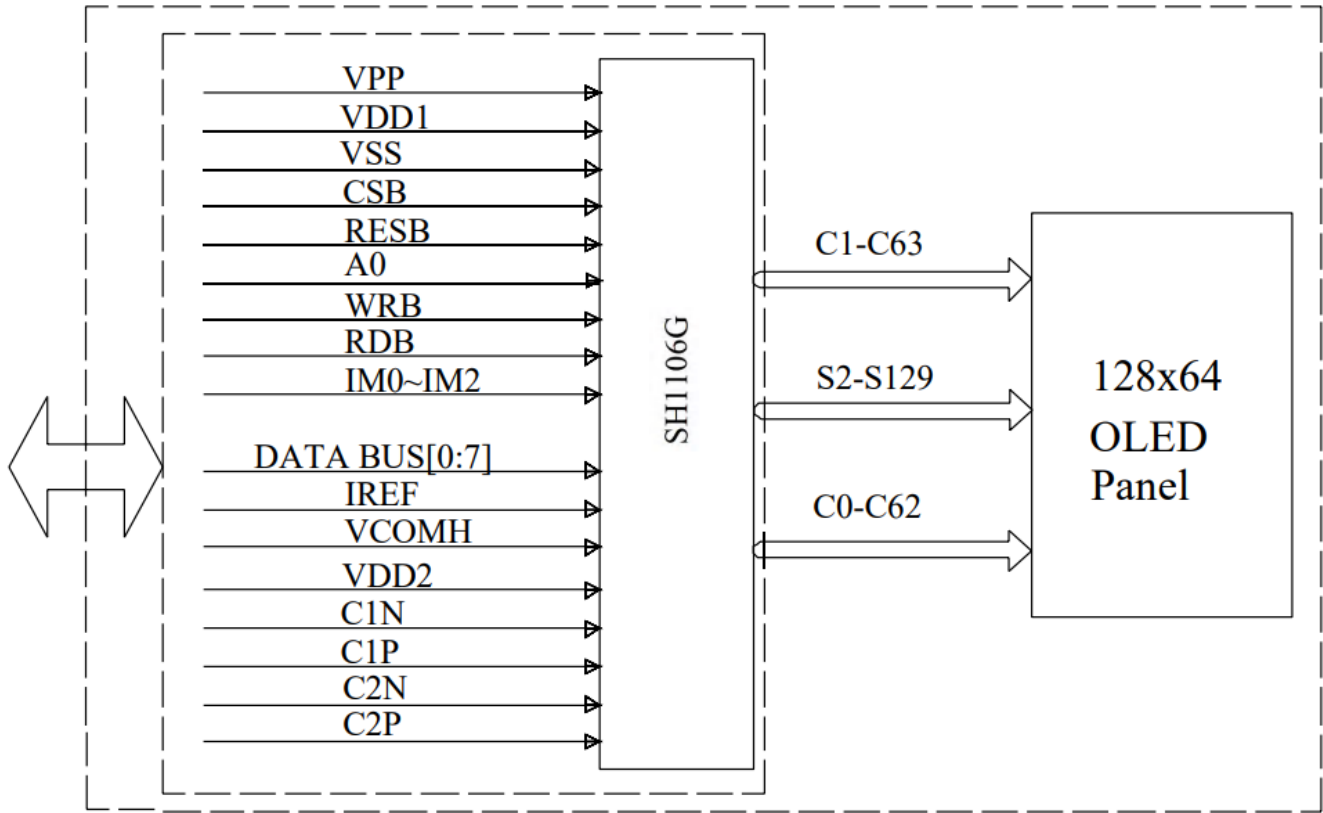
3. Pin Descriptions

30-pin FPC connector pin assignments for the JZUM0099H-30A module.

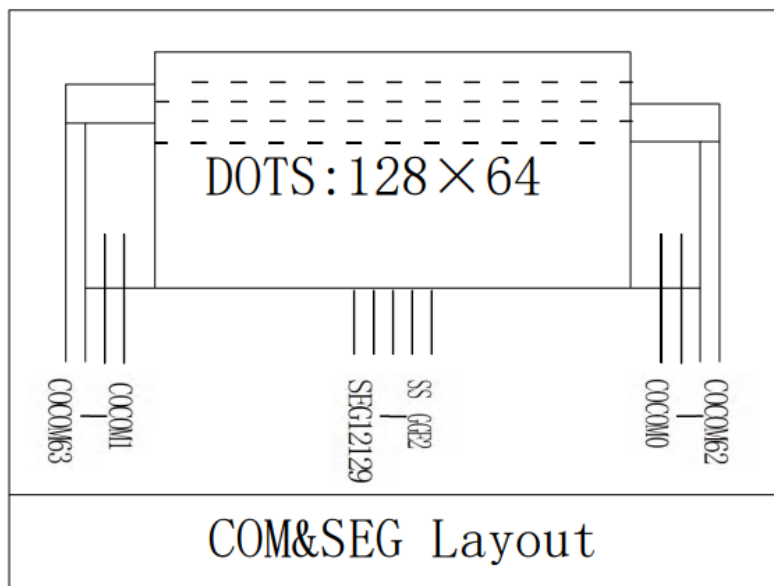
Pin No.	Pin Name	Description
1	NC (GND)	No connection (Ground)
2	C1N	Charge pump capacitor C1 negative
3	C1P	Charge pump capacitor C1 positive
4	C2P	Charge pump capacitor C2 positive
5	C2N	Charge pump capacitor C2 negative
6	VDD2	Charge pump regulator supply voltage
7	NC	No connection
8	VSS	Ground
9	VDD1	Logic supply voltage (1.65–3.5 V)
10	IM0	Interface mode selection bit 0
11	IM1	Interface mode selection bit 1
12	IM2	Interface mode selection bit 2
13	CSB	Chip select (active low)
14	RESB	Reset (active low)
15	A0	Data/Command select (or SA0 for I2C)
16	WRB	Write strobe (active low)
17	RDB	Read strobe (active low)
18	D0	Data bus bit 0 (or SCL for SPI/I2C)
19	D1	Data bus bit 1 (or SI/SDA for SPI/I2C)
20	D2	Data bus bit 2
21	D3	Data bus bit 3
22	D4	Data bus bit 4
23	D5	Data bus bit 5
24	D6	Data bus bit 6
25	D7	Data bus bit 7
26	IREF	Current reference for brightness adjustment
27	VCOMH	COM signal high voltage level
28	VPP	OLED operating voltage (external supply)
29	VLSS	OLED ground
30	NC (GND)	No connection (Ground)

4. Function Block Diagram

4.1 Function Block Diagram



4.2 Panel Layout Diagram



5. 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	4.3	V	IC maximum rating
OLED Operating Voltage	VPP	-0.3	14.5	V	IC maximum rating
Operating Temperature	Top	-40	70	°C	—
Storage Temperature	Tstg	-40	85	°C	—

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

Note (2): Permanent breakage of module may occur if used beyond the maximum rating. The module can be normally operated under the conditions according to Section 6 "Electrical Characteristics". Malfunction and reliability deterioration may occur if used beyond those conditions.

6. Electrical Characteristics

6.1 DC Electrical Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Logic Supply Voltage	VDD1	1.65	3.0	3.5	V	22±3°C, 55±15% R.H
OLED Driver Supply Voltage (Generated by Internal DC/DC)	VPP	—	8	—	V	22±3°C, 55±15% R.H
Charge Pump Regulator Supply Voltage	VDD2	3.0	3.7	4.2	V	22±3°C, 55±15% R.H
High-level Input Voltage	VIHC	0.8×VDD1	—	VDD1	V	
Low-level Input Voltage	VILC	VSS	—	0.2×VDD1	V	
High-level Output Voltage	VOHC	0.8×VDD1	—	VDD1	V	
Low-level Output Voltage	VOLC	VSS	—	0.2×VDD1	V	

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

6.2 Electro-Optical Characteristics

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Normal Mode Brightness (With Polarizer)	Lbr	All pixels ON (1)	80	100	—	cd/m ²	
Normal Mode Power Consumption	Pt	All pixels ON (1) VPP generated by internal DC/DC	—	124	148	mW	
Sleep Mode Current (VDD1 & VDD2)	ISP	During sleep, TA = +25°C, VDD1 = 3V, VDD2 = 3V	—	—	10	μA	
Sleep Mode Current (VPP)	ISP	During sleep, TA = +25°C, VPP = 9V (External)	—	—	10	μA	
C.I.E (Blue)	x	x, y (CIE 1931)	0.12	0.16	0.20	—	
	y		0.23	0.27	0.31	—	
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: VDD2: 3.7V (VPP Generated by Internal DC/DC)
- Contrast setting: 0x50
- Frame rate: 105 Hz
- Duty setting: 1/64

6.3 AC Electrical Characteristics

(1) 8080-Series MPU Parallel Interface Timing Characteristics

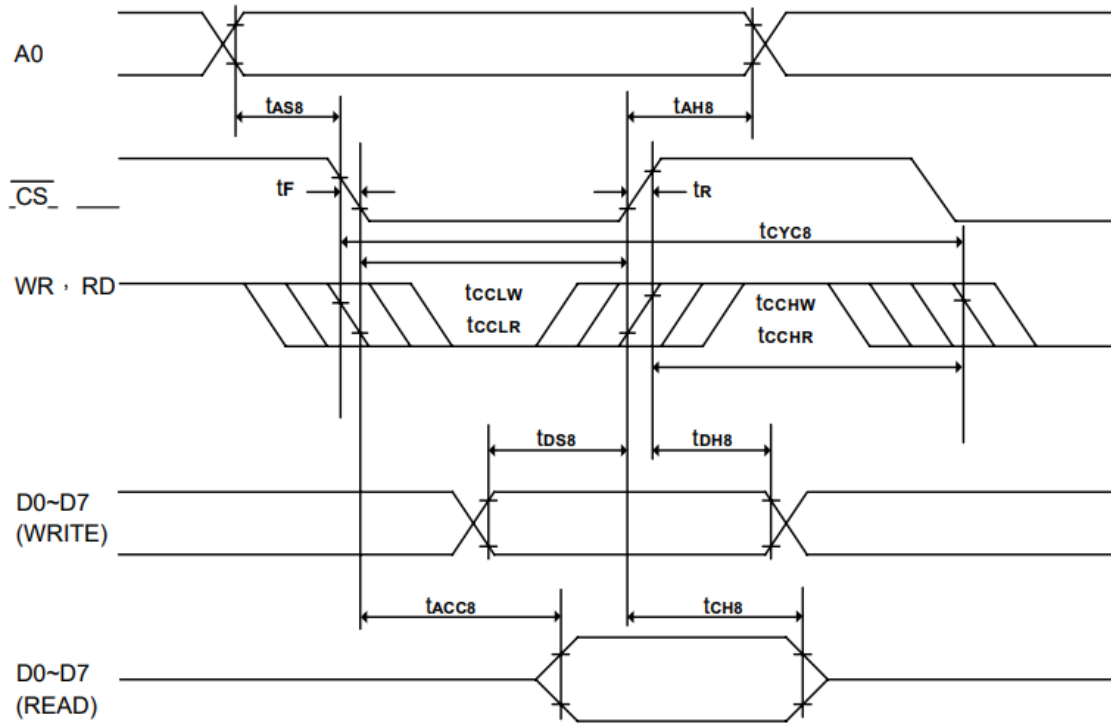
(VDD1 = 1.65V to 3.5V, TA = 25°C)

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	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 = 2.4V to 3.5V, TA = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tCYC8	System cycle time	300	—	—	ns	
tAS8	Address setup time	0	—	—	ns	
tAH8	Address hold time	0	—	—	ns	
tDS8	Data setup time	40	—	—	ns	
tDH8	Data hold time	15	—	—	ns	
tCH8	Output disable time	10	—	70	ns	CL = 100pF
tACC8	RD access time	—	—	140	ns	CL = 100pF
tCCLW	Control L pulse width (WR)	100	—	—	ns	
tCCLR	Control L pulse width (RD)	120	—	—	ns	
tCCHW	Control H pulse width (WR)	100	—	—	ns	
tCCHR	Control H pulse width (RD)	100	—	—	ns	
tR	Rise time	—	—	15	ns	
tF	Fall time	—	—	15	ns	

8080-series parallel interface characteristics



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(2) 6800-Series MPU Parallel Interface Timing Characteristics

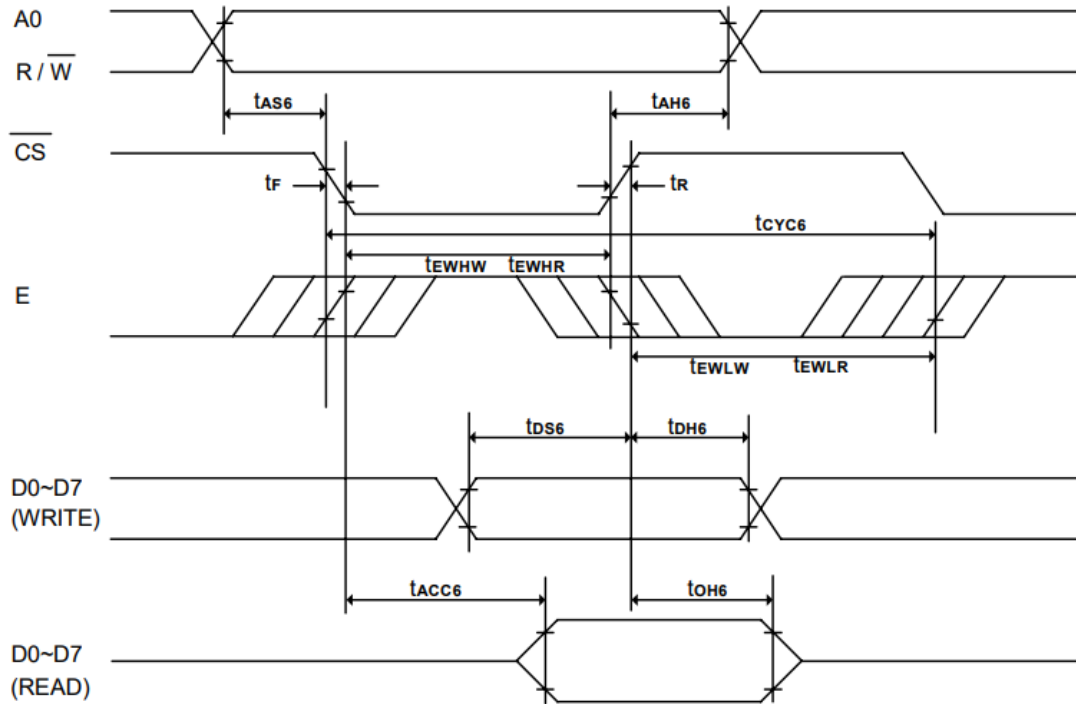
(VDD1 = 1.65V to 3.5V, TA = 25°C)

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 = 2.4V to 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	

6800-series parallel interface characteristics



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

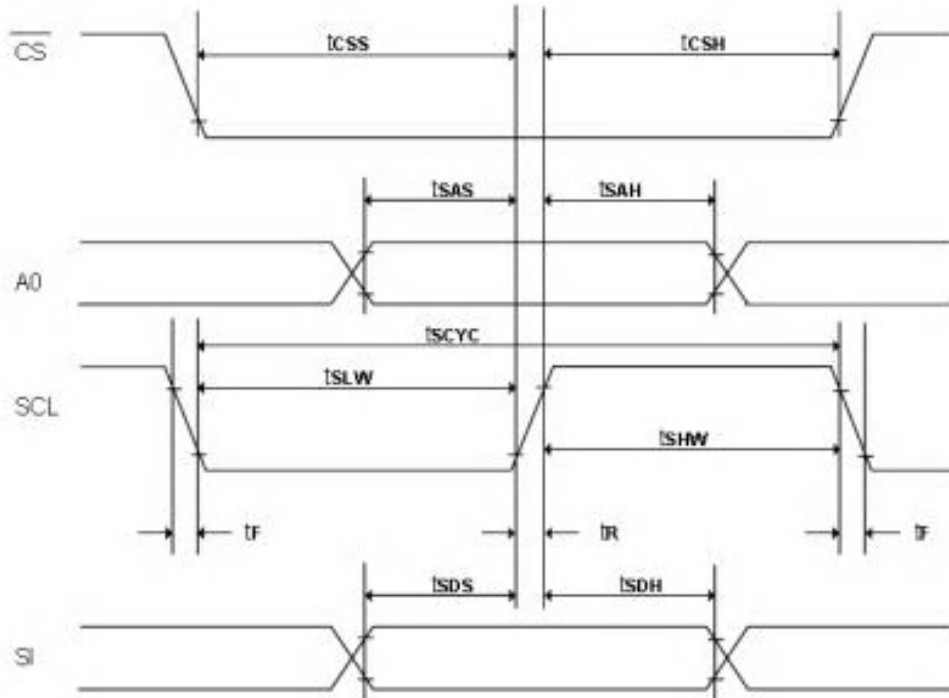
(VDD1 = 1.65V to 3.5V, TA = 25°C)

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	CS setup time	240	—	—	ns	
tCSH	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 = 2.4V to 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	CS setup time	120	—	—	ns	
tCSH	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	

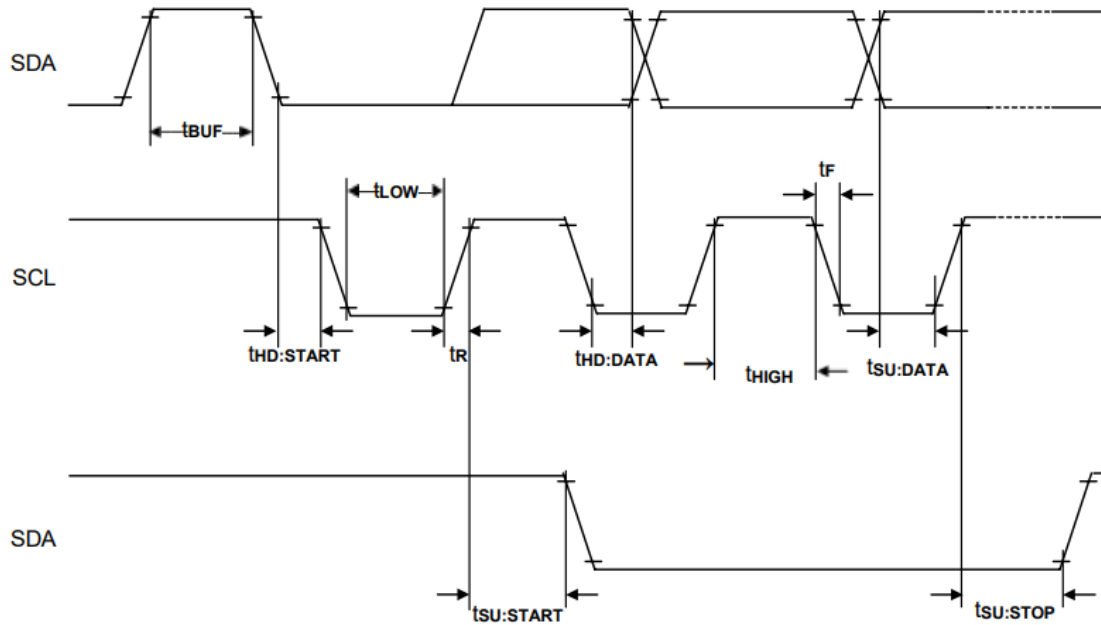
AB-J096-P100R



AB-J096-P100R
(4) I2C Interface Timing Characteristics

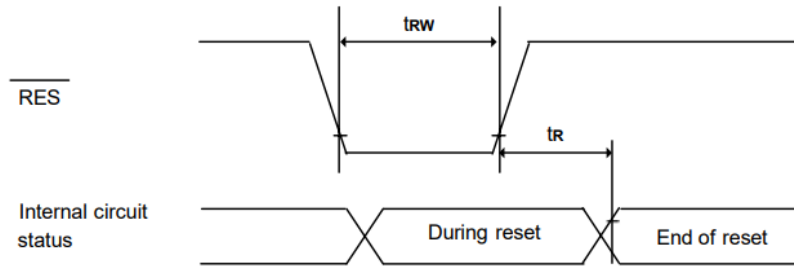
(VDD1 = 1.65V to 3.5V, TA = 25°C)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
fSCL	SCL clock frequency	DC	—	400	kHz	
TLOW	SCL clock Low pulse width	1.3	—	—	μs	
THigh	SCL clock H pulse width	0.6	—	—	μs	
TSU:data	Data setup time	100	—	—	ns	
THD:data	Data hold time	0	—	0.9	μs	
Tr	SCL, SDA rise time	—	—	300	ns	20+0.1Cb
Tf	SCL, SDA fall time	—	—	300	ns	20+0.1Cb
Cb	Capacity load on each bus line	—	—	400	pF	
TSU:START	Setup time for re-START	0.6	—	—	μs	
THD:start	START hold time	0.6	—	—	μs	
TSU:stop	Setup time for STOP	0.6	—	—	μs	
TBUF	Bus free time between STOP and START	1.3	—	—	μs	

Serial Interface characteristics


7. Functional Specification and Application Circuit

7.1 Reset Timing



(VDD1 = 1.65 - 3.5V, $T_A = +25^\circ\text{C}$)

(VDD1 = 1.65–3.5V, $T_A = +25^\circ\text{C}$)

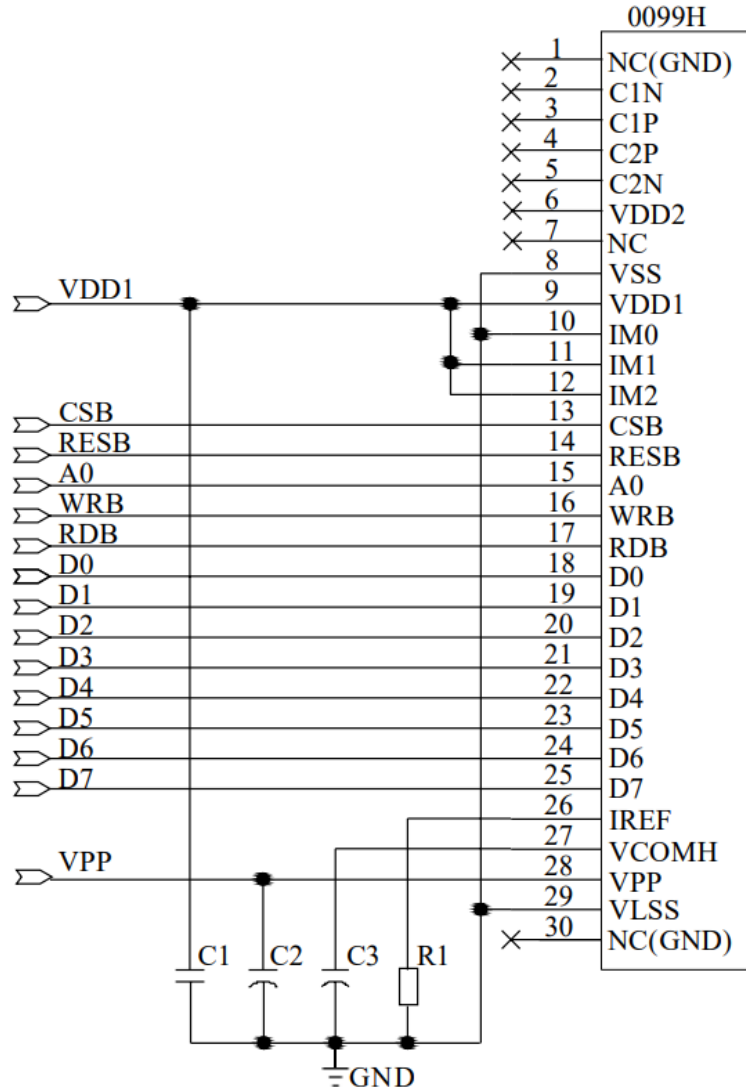
Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tR	Reset time	—	—	2.0	μs	
tRW	Reset low pulse width	10.0	—	—	μs	

(VDD1 = 2.4–3.5V, $T_A = +25^\circ\text{C}$)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Condition
tR	Reset time	—	—	1.0	μs	
tRW	Reset low pulse width	5.0	—	—	μs	

7.2 Application Circuit

7.2.1 (1) 8080 Interface Mode (External VPP)

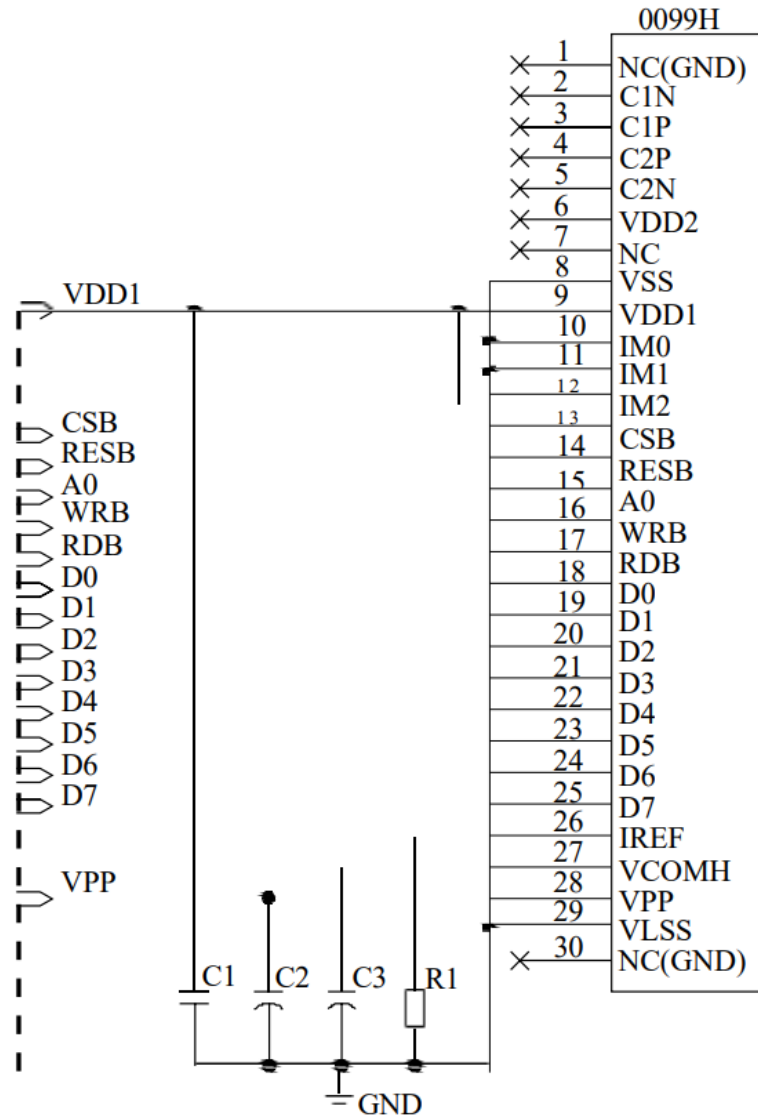


Pin connected to MCU interface: CSB, RESB, A0, WRB, RDB, D0~D7

Under external VPP Mode, the Charge Pump Setting (ADh) must be set as: ADh: 8Ah (Disable Charge Pump)

Recommended components: C1: 0.1 μ F-0603-X7R $\pm$ 10% RoHS; C2, C3: 4.7 μ F/16V RoHS (Tantalum Capacitors); R1: 0603 1/10W $\pm$ 5% 390K Ω RoHS

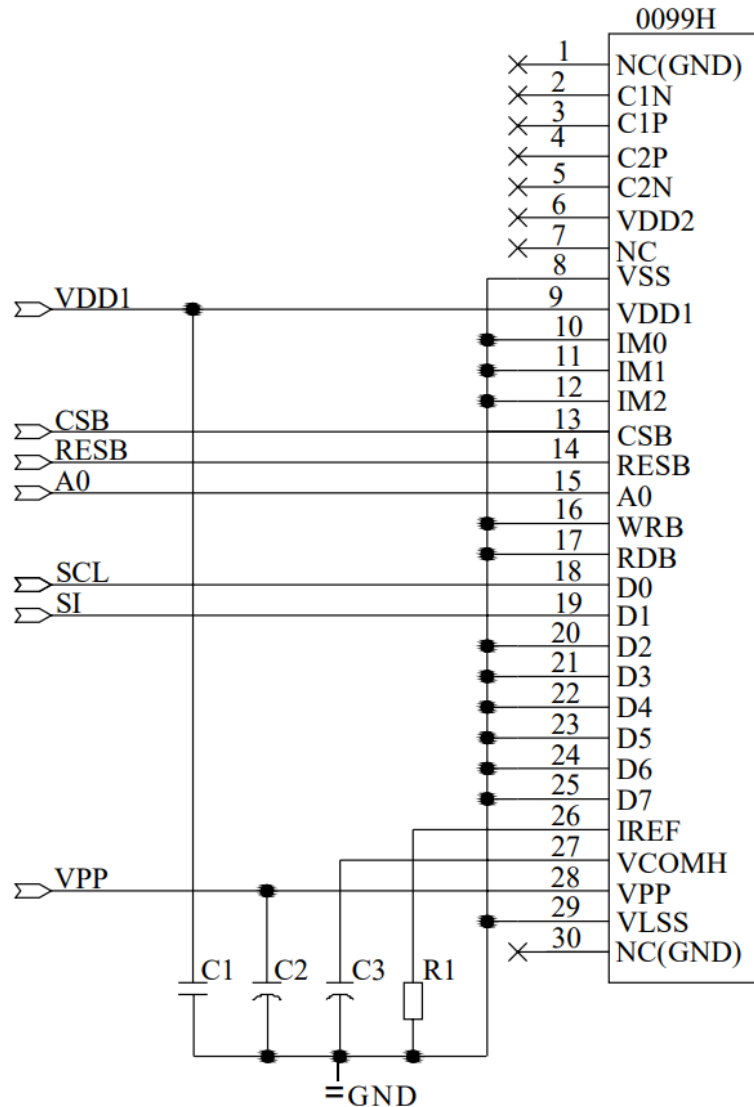
7.2.1 (2) 6800 Interface Mode (External VPP)



Pin connected to MCU interface: CSB, RESB, A0, WRB, RDB, D0~D7

Under external VPP Mode, the Charge Pump Setting (ADh) must be set as: ADh: 8Ah (Disable Charge Pump)

Recommended components: C1: 0.1μF-0603-X7R±10% RoHS; C2, C3: 4.7μF/16V RoHS (Tantalum Capacitors); R1: 0603 1/10W ±5% 390KΩ RoHS

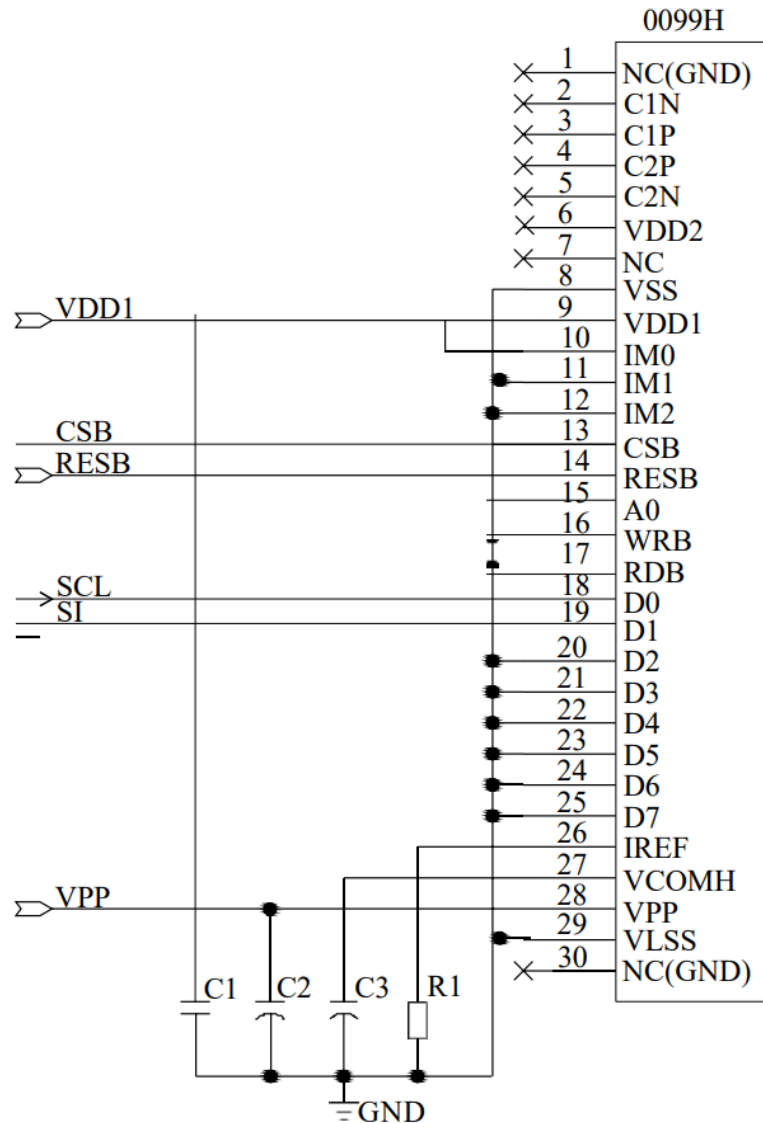
7.2.1 (3) 4-Wire SPI Interface Mode (External VPP)


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

Under external VPP Mode, the Charge Pump Setting (ADh) must be set as: ADh: 8Ah (Disable Charge Pump)

Recommended components: C1: 0.1 μ F-0603-X7R $\pm$ 10% RoHS; C2, C3: 4.7 μ F/16V RoHS (Tantalum Capacitors); R1: 0603 1/10W $\pm$ 5% 390K Ω RoHS

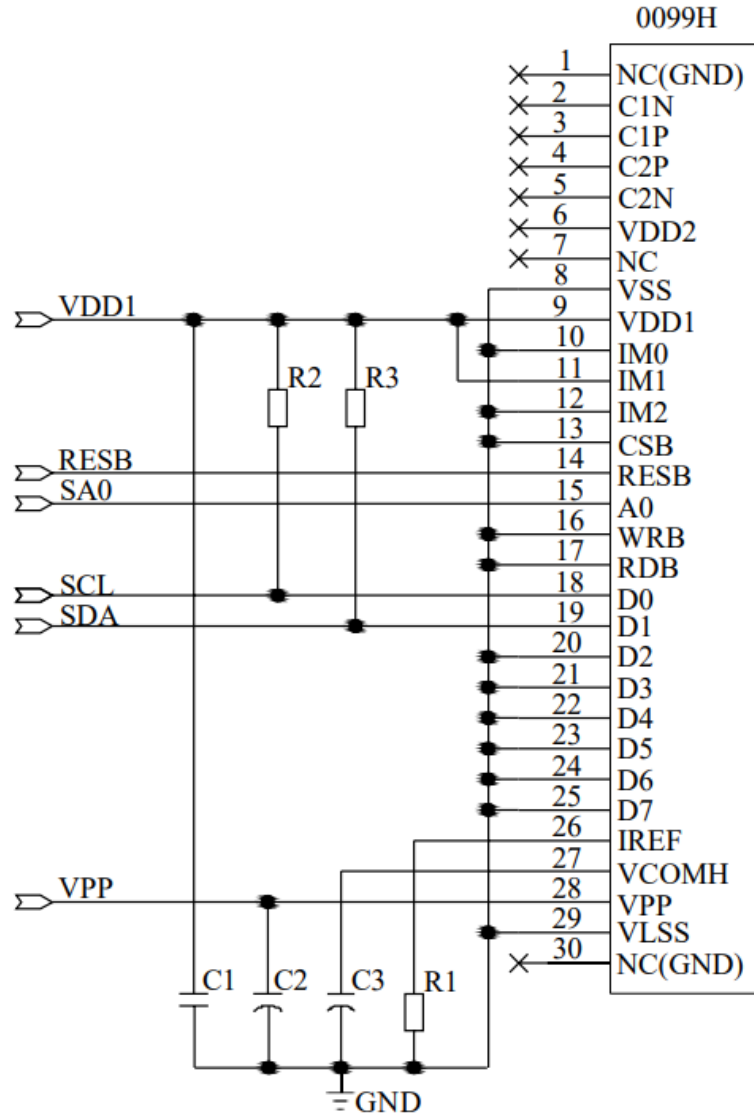
7.2.1 (4) 3-Wire SPI Interface Mode (External VPP)



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

Under external VPP Mode, the Charge Pump Setting (ADh) must be set as: ADh: 8Ah (Disable Charge Pump)

Recommended components: C1: 0.1μF-0603-X7R±10% RoHS; C2, C3: 4.7μF/16V RoHS (Tantalum Capacitors); R1: 0603 1/10W ±5% 390KΩ RoHS

7.2.1 (5) I2C Interface Mode (External VPP)


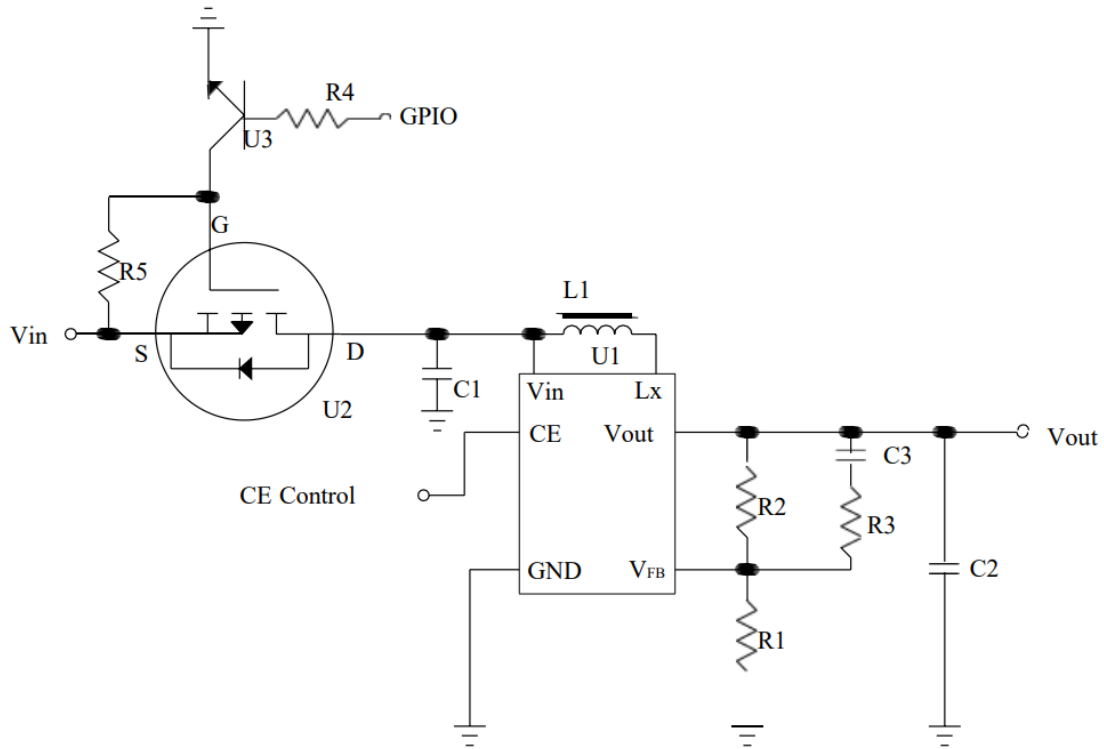
Pin connected to MCU interface: SCL, SDA, RESB, SA0

Under external VPP Mode, the Charge Pump Setting (ADh) must be set as: ADh: 8Ah (Disable Charge Pump)

I2C Address: SA0 = 0 → 0x78; SA0 = 1 → 0x7A

Recommended components: C1: 0.1μF-0603-X7R±10% RoHS; C2, C3: 4.7μF/16V RoHS (Tantalum Capacitors); R1: 0603 1/10W ±5% 390KΩ RoHS; R2, R3: 0603 1/10W ±5% 10KΩ RoHS

7.3 External DC-DC Application Circuit



Recommended Components:

Component	Specification
C1	1 μ F-0603-X7R $\pm$ 10% RoHS
C2	1 μ F-0603-X7R $\pm$ 10% RoHS
C3	220pF-0603-X7R $\pm$ 10% RoHS
R1	0603 1/10W $\pm$ 5% 10K Ω RoHS
R2	0603 1/10W $\pm$ 5% 70K Ω RoHS
R3	0603 1/10W $\pm$ 5% 2K Ω RoHS
R4	0603 1/10W $\pm$ 5% 1K Ω RoHS
R5	0603 1/10W $\pm$ 5% 10K Ω RoHS
L1	22 μ H
U1	R1200
U2	FDN338P
U3	8050

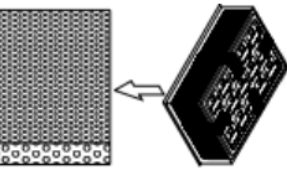
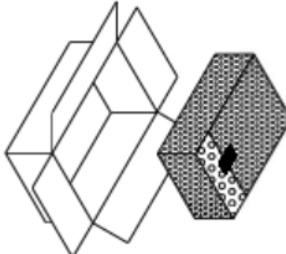
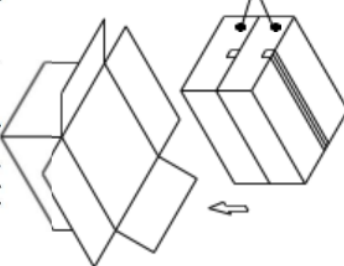
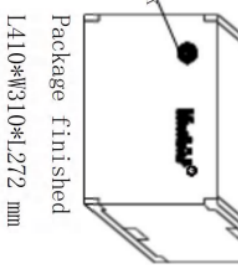
7.4 Display Control Instruction

Refer to SH1106G IC Specification.

7.5 Recommended Software Initialization

```
void Init_IC()
{
    Write_Command(0xAE); // Set Display Off
    Write_Command(0xD5); // display divide ratio/osc. freq. mode
    Write_Command(0x80);
    Write_Command(0xA8); // multiplex ratio mode: 63
    Write_Command(0x3F);
    Write_Command(0xD3); // Set Display Offset
    Write_Command(0x00);
    Write_Command(0x40); // Set Display Start Line
    Write_Command(0xAD); // DC-DC Control Mode Set
    Write_Command(0x8B); // DC-DC ON/OFF Mode Set
    Write_Command(0x32); // Set Pump voltage value
    Write_Command(0xA1); // Segment Remap
    Write_Command(0xC8); // Set COM Output Scan Direction
    Write_Command(0xDA); // common pads hardware: alternative
    Write_Command(0x12);
    Write_Command(0x81); // contrast control
    Write_Command(0x50);
    Write_Command(0xD9); // set pre-charge period
    Write_Command(0x1F);
    Write_Command(0xDB); // VCOM deselect level mode
    Write_Command(0x40);
    Write_Command(0xA4); // Set Entire Display On/Off
    Write_Command(0xA6); // Set Normal Display
    Write_Command(0xAF); // Set Display On
}
```

8. Package Specification

(1) Tray Type: 00693-MT6-A 	(2)  TRAY	(3) order ①, ②, ③, ④ fix trays with tape 1056 pcs of 1 small carton 1 tray contain 48 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)  small carton package L390*W290*L120 mm	(8)  2 small cartons in 1 big carton
(9) 49/4 contained trays, 2 empty trays, Package quantity products: 2112 pcs of 1 big carton  Package finished L410*W310*L272 mm	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 .		

9. Reliability

9.1 Reliability Test

No.	Item	Condition	Quantity
1	High Temperature (Non-operation)	85°C, 240 hrs	4
2	Low Temperature (Non-operation)	-40°C, 240 hrs	4
3	High Temperature (Operation)	70°C, 240 hrs	4
4	Low Temperature (Operation)	-40°C, 240 hrs	4
5	High Temperature / High Humidity (Operation)	60°C, 90% RH, 240 hrs	4
6	Thermal Shock (Non-operation)	-40°C~85°C (-40°C/30min; transit/3min; 85°C/30min; transit/3min) 1 cycle: 66 min, 30 cycles	4
7	Vibration	Frequency: 5~50 Hz, 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 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.

9.2 Lifetime

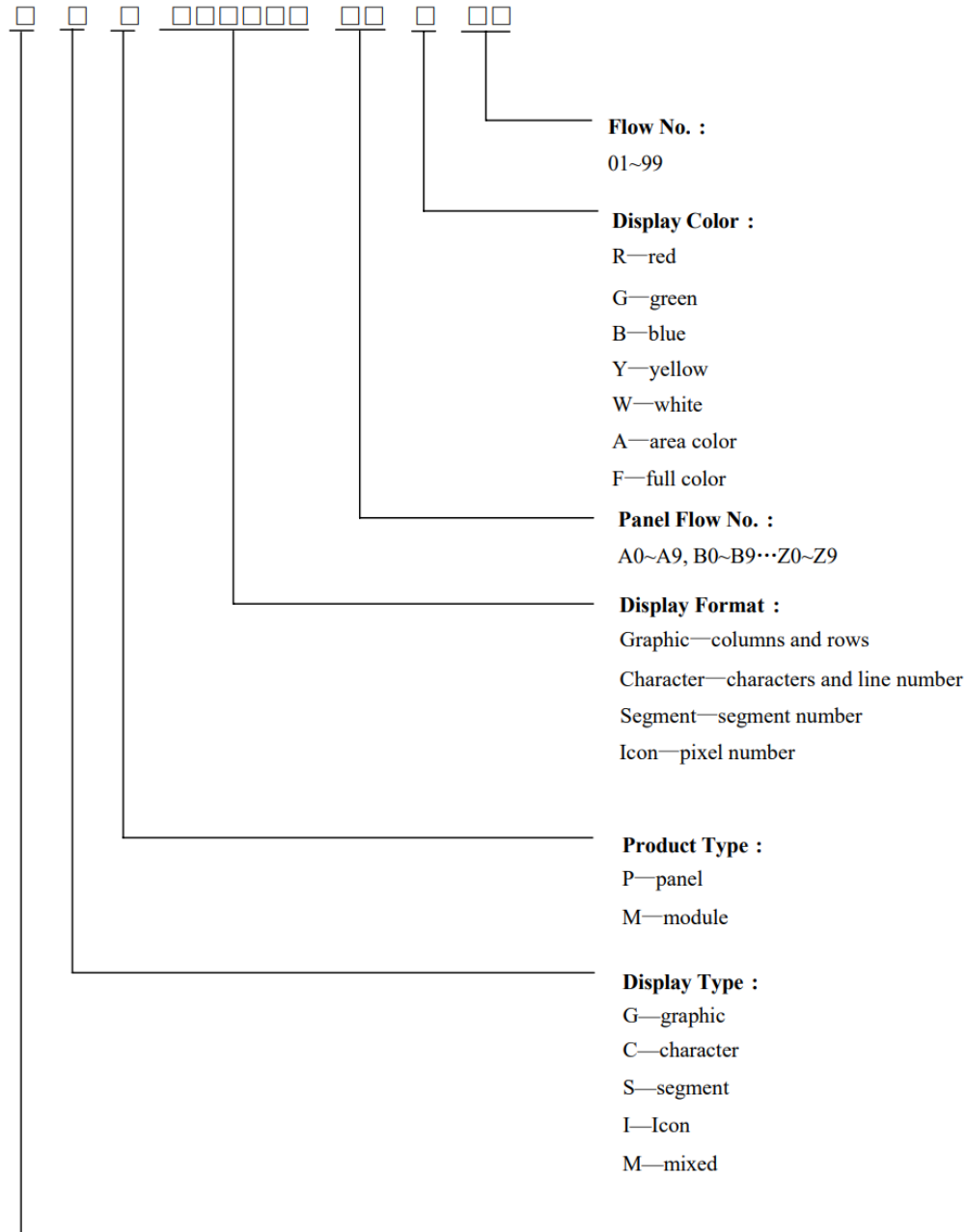
End of lifetime is specified as 50% of initial brightness and the test pattern at operating condition is 50% alternating checkerboard.

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

9.3 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.

10. Illustration of OLED Product Name



11. Outgoing Quality Control Specifications

11.1 Sampling Method

- (1) GB/T 2828.1-2003 / ISO 2859-1:1999, Inspection Level II, normal inspection, single sample inspection
- (2) AQL: Major 0.65; Minor 1.0

11.2 Inspection Conditions

The environmental conditions for test and measurement are performed as follows:

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

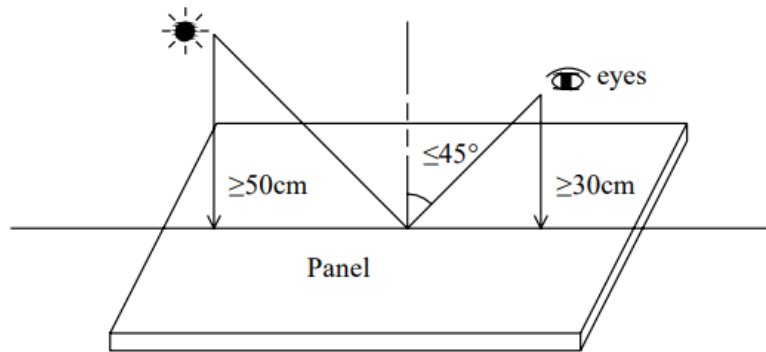
Humidity: $55 \pm 15\%$ R.H

Fluorescent Lamp: 30W

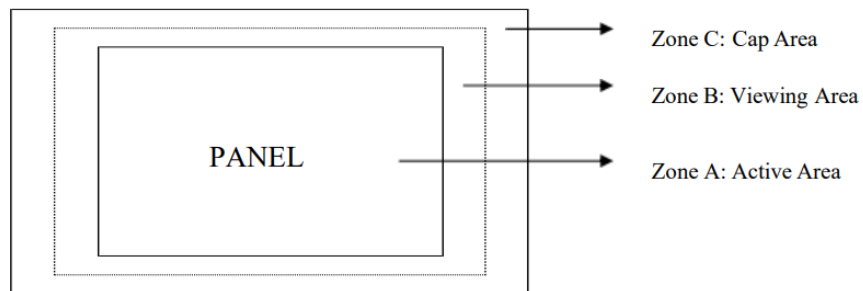
Distance between Panel & Lamp: $\geq 50\text{ cm}$

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

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

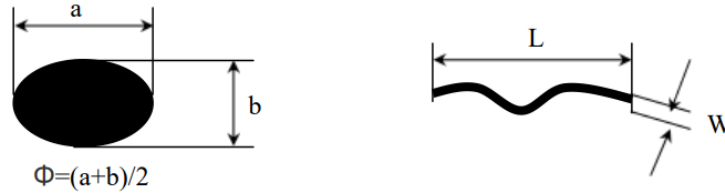


11.3 Quality Assurance Zones



11.4 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	Average Diameter (mm) / Acceptable Number: $\Phi \leq 0.15$: Ignore $0.15 < \Phi \leq 0.30$: Zone A,B: 3; Zone C: Ignore $\Phi > 0.30$: 0	Minor
2	Scratch/line on the glass/Polarizer	Width (mm) / Length (mm) / Acceptable Number: $W \leq 0.03$: Ignore $0.03 < W \leq 0.08$, $L \leq 5.0$: Zone A,B: 3; Zone C: Ignore $W > 0.08$: 0	Minor
3	Polarizer Bubble	Average Diameter (mm) / Acceptable Number: $\Phi > 0.5$: 0 $0.2 < \Phi \leq 0.5$: Zone A,B: 3; Zone C: Ignore $\Phi \leq 0.2$: Ignore	Minor
4	Any Dirt & Scratch on Polarizer's Protective Film	Ignore for not affecting the polarizer.	Acceptable
5	Any Dirt on Cap Glass	Average Diameter (mm) / Acceptable Number: $\Phi \leq 0.5$: Ignore $0.5 < \Phi \leq 1.0$: 3 $\Phi > 1.0$: 0	Minor

AB-J096-P100R
II. Displaying Defects

No.	Item	Criteria	Classification
1	Black/White spot, Dirty spot, Foreign matter	Average Diameter (mm) / Pieces Permitted: $\Phi \leq 0.10$: Ignore $0.10 < \Phi \leq 0.20$: Zone A,B: 3; Zone C: Ignore $\Phi > 0.20$: 0	Minor
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

12. Precautions for Operation and Storage

12.1 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 handling. When the surface of the polarizer of OLED Module is contaminated, please wipe it off gently by using moistened 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 higher voltage leads to 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, deteriorated display quality and electrochemical reaction then leads to shorter lifetime and permanent damage to the module. 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.
- (8) Flicker could become visible at full-on display. It disappears when frame frequency increases, but brightness decreases too.

12.2 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.

12.3 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.

12.4 Warranty Period

American Bright Optoelectronics Corp. warrants for a period of 12 months from the shipping date when stored or used under normal conditions.