

DisplayModule



DM-OLED15-635

1.5" 128 x 128 MONOCHROME
GRAPHIC OLED DISPLAY MODULE-
SPI

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1 Revision History

Date	Changes
2018-09-07	First release

2 Main Features

Item	Specification	Unit
Diagonal Size	1.5	inch
Display Mode	Passive Matrix OLED	-
Display Colors	Monochrome (16 Gray Scale)	Colors
Resolution	128 x 128	pixel
Controller IC	SSD1327	-
Interface	4line SPI	-
Active Area	26.86 x 26.86	mm
Module Dimension	47.00 x 34.00 x 2.7	mm
Weight	TBD	g

3 Pin Description

3.1 Panel Pin Description

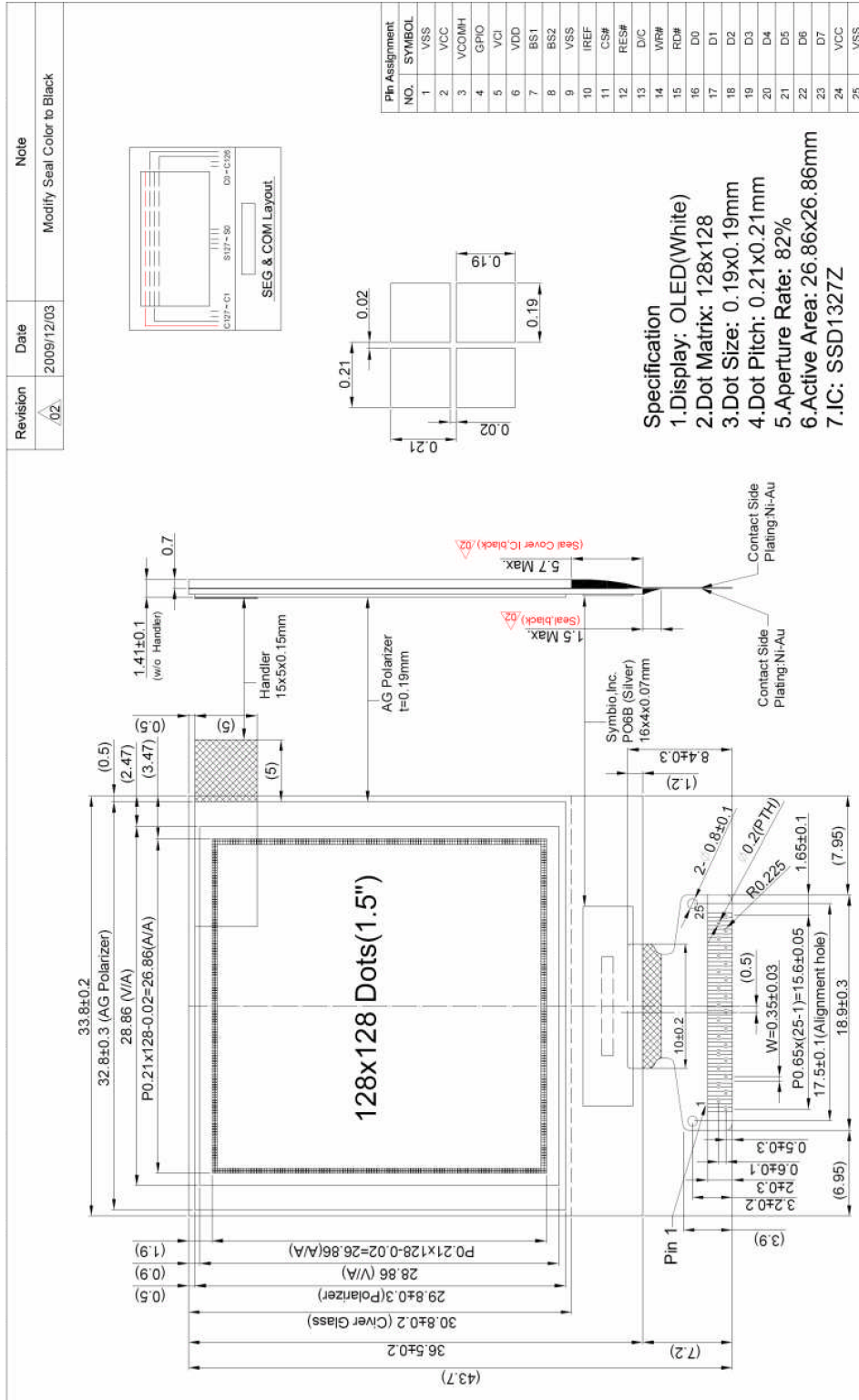
Pin No.	Symbol	Function Description
1	VSS	Ground
2	VCC	Power supply for analog circuit
3	VCOMH	Voltage Output High Level for COM Signal This pin is the input pin for the voltage output high level for COM signals. A capacitor should be connected between this pin and VSS.
4	GPIO	General I/O port.
5	VCI	Power supply for logic circuit
6	VDD	A capacitor should be connected between this pin and VSS
7	BS1	MCU bus interface selection pins
8	BS2	MCU bus interface selection pins
9	VSS	Ground
10	IREF	Reference current input pin. A resistor should be connected between this pin and VSS
11	CS#	Chip select input
12	RES#	Reset signal input. when it's low, initialization of SSD1327 is executed
13	D/C	Data/ Command control. Pull high for write/read display data. Pull low for write command or read status
14	WR#	MCU interface input. Data write operation is initiated when it's pull low
15	RD#	MCU interface input. Data read operation is initiated when it's pull low
16-23	D0-D7	Data bus(for parallel interface)
24	VCC	Power supply for analog circuit
25	VSS	Ground

3.2 Module Pin Description

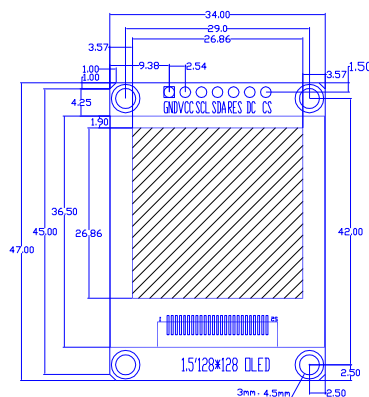
Pin No.	Symbol	Function Description
1	GND	Ground
2	VCC	Power Supply 3.3V
3	SCL	SPI Clock
4	SDA	SPI DATA
5	RES	OLED reset Pin.
6	D/C	Data/Command Control This pin is Data/Command control pin.
7	CS	Chip Select This pin is pulled low to active. Connect to ground if no used .

4 Mechanical Drawing

4.1 Panel Mechanical Drawing



4.2 Module Mechanical Drawing



5 Electrical Characteristics

Item	Symbol	Condition	Min	Typ.	Max	Unit
Power supply	VCC		2.6	3.3	3.5	V
Supply Voltage for Display(for OLED Panel)	Voled		14.25	15	15.5	V
VCC Supply Current	ICC	VCI = 3.5V, Vold = 18V, Display ON, No panel attached, contrast = FF	External VDD= 2.5V	600	750	uA
Low Level Input Voltage	V _{IL}	I _{out} =100uA	0	-	0.2x VCI	V
High Level Input Voltage	V _{IH}	VCI=VCC	0.8x VCI	-	VCI	V
Low Level Output Voltage	V _{OL}		0	-	0.1x VCI	V
High Level Output Voltage	V _{OH}		0.9x VCI	-	VCI	V
Operating Maximum Temperature	TOP		-40		70	°C
Storage Maximum Temperature	TST		-40		85	°C

6 Optical Characteristics

Item	Symbol	Min	Typ	Max	Unit
View Angles		160		-	°
Response Time (25 °C)	Tr + Tf		10		ns
Brightness	Lbr	70	90	-	cd/m ²
Dark room Contrast Ratio	CR	2000:1	-	-	

7 MCU Serial Interface

7.1 MCU Serial Interface (4-wire SPI)

The serial interface consists of serial clock SCLK, serial data SDIN, D/C#, CS#. In SPI mode, D0 acts as SCLK, D1 acts as SDIN. For the unused data pins, D2 should be left open. The pins from D3 to D7, E and R/W# can be connected to an external ground

Function	E(RD#)	R/W#(WR#)	CS#	D/C#	D0
Write command	Tie LOW	Tie LOW	L	L	↑
Write data	Tie LOW	Tie LOW	L	H	↑

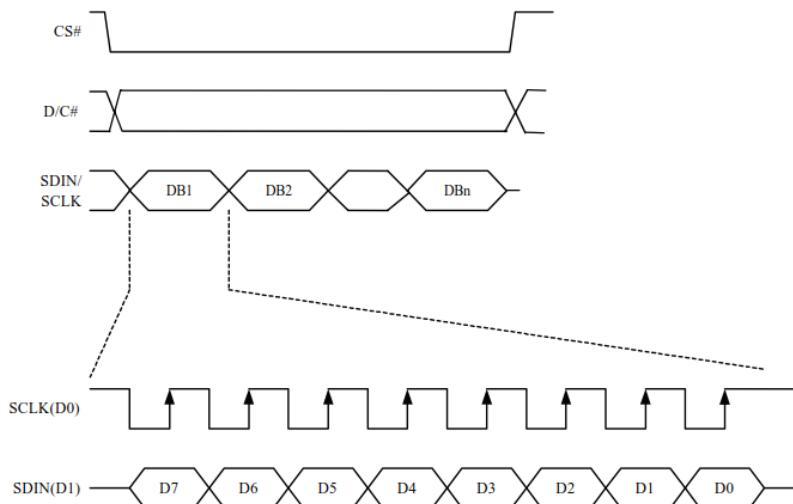
Note

⁽¹⁾ H stands for HIGH in signal

⁽²⁾ L stands for LOW in signal

SDIN is shifted into an 8-bit shift register on every rising edge of SCLK in the order of D7, D6, ... D0. D/C# is sampled on every eighth clock and the data byte in the shift register is written to the Graphic Display Data RAM (GDDRAM) or command register in the same clock.

Under serial mode, only write operations are allowed.



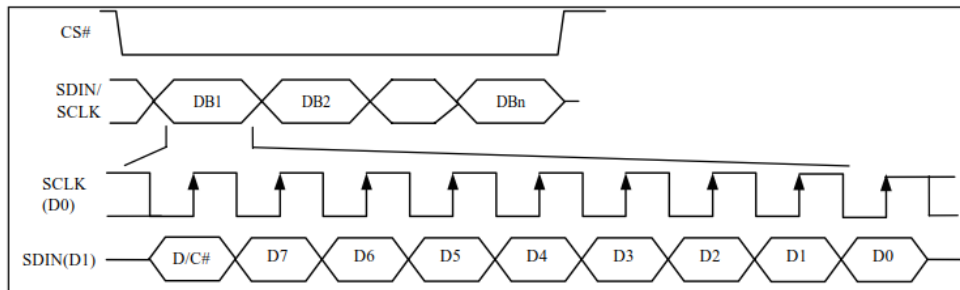
7.2 MCU Serial Interface (3-wire SPI)

The 3-wire serial interface consists of serial clock SCLK, serial data SDIN and CS#.

In 3-wire SPI mode, D0 acts as SCLK, D1 acts as SDIN. For the unused data pins, D2 should be left open. The pins from D3 to D7, R/W# (WR#), E(RD#) and D/C# can be connected to an external ground.

The operation is similar to 4-wire serial interface while D/C# pin is not used. There are altogether 9-bits will be shifted into the shift register on every ninth clock in sequence: D/C# bit, D7 to D0 bit. The D/C# bit (first bit of the sequential data) will determine the following data byte in the shift register is written to the Display Data RAM (D/C# bit = 1) or the command register (D/C# bit = 0). Under serial mode, only write operations are allowed.

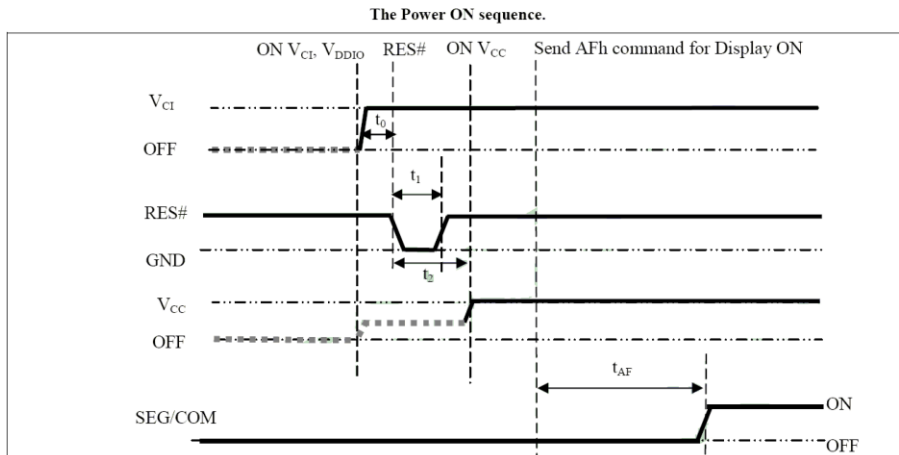
Function	E(RD#)	R/W#(WR#)	CS#	D/C#	D0	
Write command	Tie LOW	Tie LOW	L	Tie LOW	↑	Note (¹) L stands for LOW in signal
Write data	Tie LOW	Tie LOW	L	Tie LOW	↑	



8 Power on/off sequence

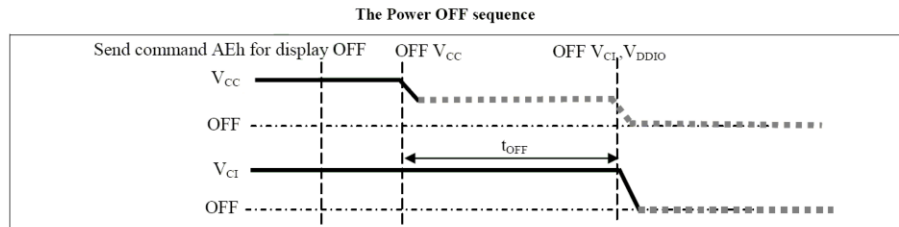
Power ON sequence:

1. Power ON V_{CI} .
2. After V_{CI} becomes stable, set wait time at least 1ms (t_0) for internal V_{DD} become stable. Then set RES# pin LOW (logic low) for at least 100us (t_1)⁽⁴⁾ and then HIGH (logic high).
3. After set RES# pin LOW (logic low), wait for at least 100us (t_2). Then Power ON V_{CC} .⁽¹⁾
4. After V_{CC} become stable, send command AFh for display ON. SEG/COM will be ON after 200ms(t_{AF}).



Power OFF sequence:

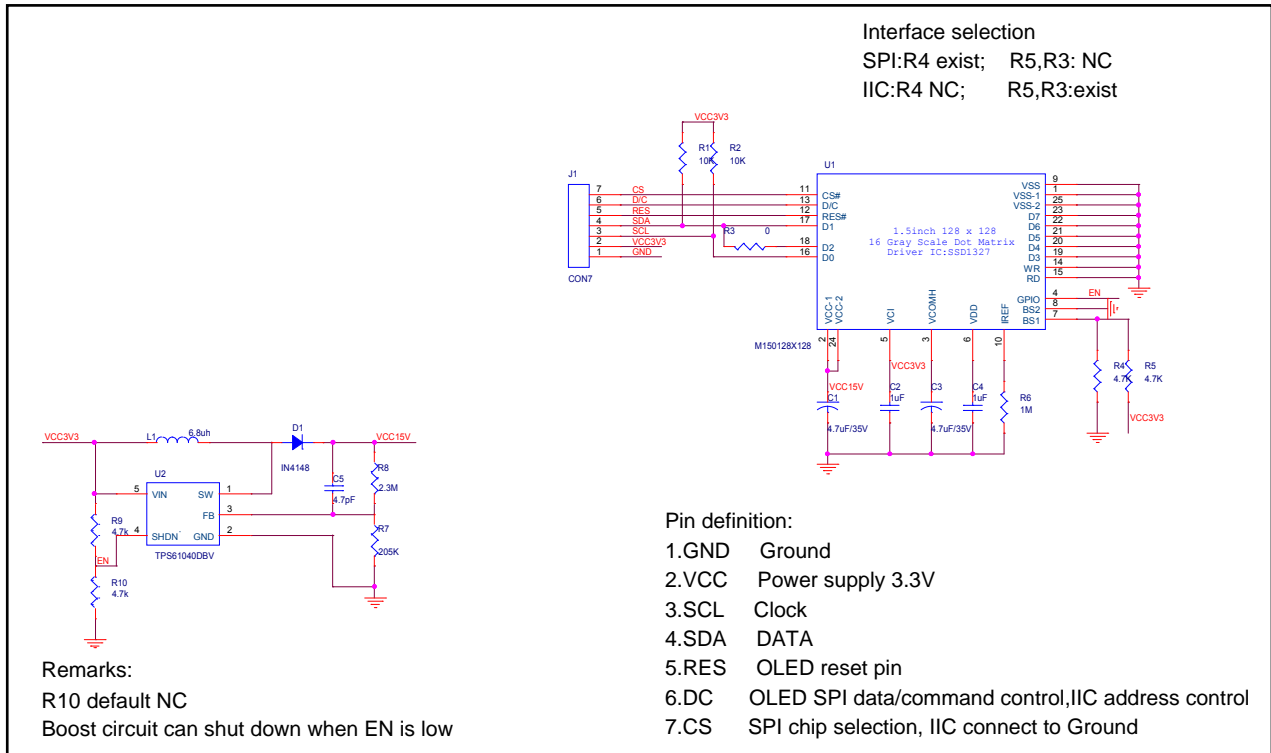
1. Send command AEh for display OFF.
2. Power OFF V_{CC} .^{(1), (2), (3)}
3. Wait for t_{OFF} . Power OFF V_{CI} . (where Minimum $t_{OFF}=80ms$ ⁽⁵⁾, Typical $t_{OFF}=100ms$)



Note:

- (1) Since an ESD protection circuit is connected between V_{CI} and V_{CC} , V_{CC} becomes lower than V_{CI} whenever V_{CI} is ON and V_{CC} is OFF as shown in the dotted line of V_{CC} in above figures.
- (2) V_{CC} should be kept disable when it is OFF.
- (3) Power pins (V_{CI} , V_{CC}) can never be pulled to ground under any circumstance.
- (4) The register values are reset after t_1 .
- (5) V_{CI} should not be Power OFF before V_{CC} Power OFF

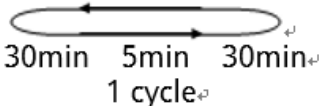
9 Module Schematic



10 Command Table

Please check in driver IC DATASHEET

11 Reliability

Test Item	Content of Test	Test Condition	Note
High Temperature Storage	Endurance test applying the high storage temperature for a long time.	85°C 200hrs	2
Low Temperature Storage	Endurance test applying the high storage temperature for a long time.	-40°C 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70°C 200hrs	-
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-40 °C 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60°C,90%RH max, for 96hrs under no-load condition excluding the polarizer. Then taking it out and drying it at normal temperature.	60°C,90%RH 96hrs	1,2
Thermal Shock Resistance	The sample should be allowed stand the following 10 cycles of operation 	-40°C/85°C 10 cycles	-
Vibration Test	Endurance test applying the vibration during transportation and using	Total fixed amplitude: 15mm; Vibration: 10~55Hz; One cycle 60 seconds to 3 directions of X, Y, Z, for each 16 minutes.	3
Static Electricity Test	Endurance test apply the electric stress to the terminal.	VS=800V, RS=1.5kΩ, CS=100pF, 1 time.	-

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal. Temperature and humidity after remove from the rest chamber.

Note3: Test performed on product itself, not inside a container.

12 Warranty and Conditions

<http://www.displaymodule.com/pages/faq> HYPERLINK
"http://www.displaymodule.com/pages/faq"