



# 1.5inch RGB OLED Module

## User Manual

### OVERVIEW

This is a general RGB OLED display Module, 1.5inch diagonal, 128x128 pixels, 16-bit high color (65K colors), with embedded controller, communicating via SPI interface.

### SPECIFICATIONS

- Driver: SSD1351
- Interface: 4-wire SPI, 3-wire SPI
- Display color: RGB, 65K colors
- Resolution: 128x128
- Operating voltage: 3.3V/5V

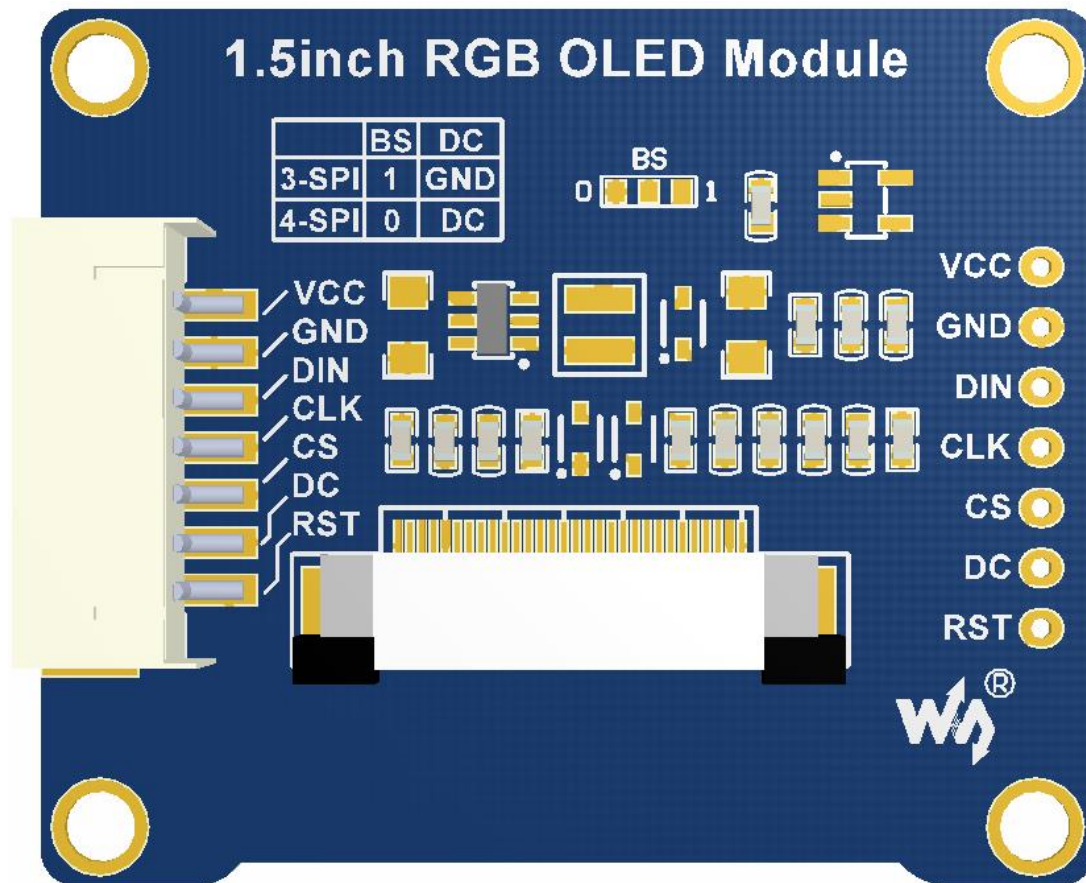
### INTERFACE

Symbol	Description
VCC	Power (3.3~5V input)
GND	Ground
DIN	Data input

CLK	Clock data input
CS	Chip selection, low active
DC	4-wire SPI: Data/Command selection (high for data, low for command)  3-wire SPI: Connects to GND, keeps low
RST	Reset, low active

### HARDWARE SETTING

This OLED supports two communication types: 4-wire SPI and 3-wire SPI. There is solderable resistor on the backside, you can change it for related SPI.



Factory setting is 4-wire SPI, that is BS0 set to 0.

Note: The table show the connection of pins

	BS	CS	D/C	DIN	CLK
4-wire SPI	0	Chip selection	D/C	MOSI	SCK
3-wire SPI	1	Chip selection	GND	MOSI	SCK

**4-wire SPI:** (Factory setting), BS set to 0 connect to GND. DIN should be connected to MOSI, and CLK should be connected to SCK.

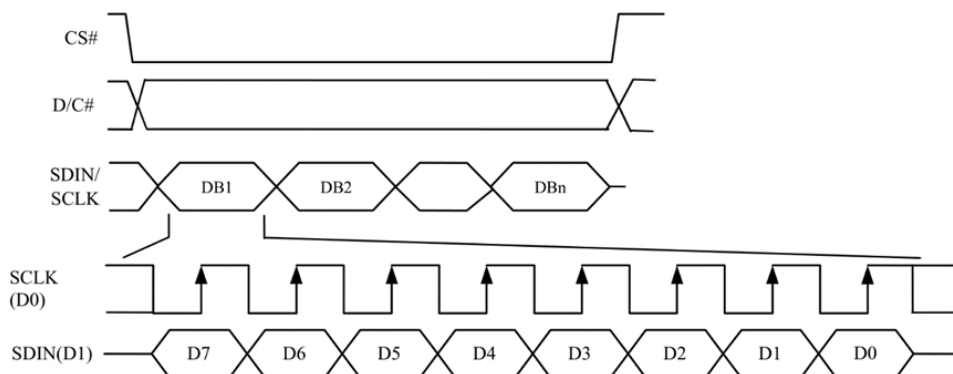
**3-wire SPI:** BS set to 1 connect to VCC, D/C should be connected to GND. DIN connect to MOSI and CLK connect to SCK.

## WORKING PROTOCOL

SSD1351 is a Dot Matrix OLED/PLED controller for 128RGB\*128 screen, embed 128\*128\*128 bits SRAM as display buffer. It supports 265k and 65k gray scale. Interface supports 8080, 8bit 6800, 3-wire SPI, 4-wire SPI and so on.

For reducing the size and save IO resources, 1.5inch RGB OLED uses 4-wire SPI and 3-wire SPI communication.

## 4WIRE-SPI



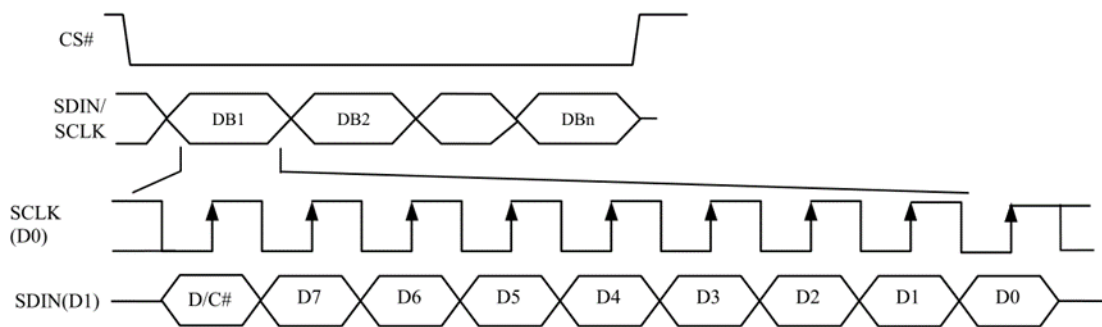
Using 4-wire SPI, you should first set the DC to 1 or 0 and then send data.

If DC=1, the data sent is stored to SRAM of SSD1351 as display data. In this mode, the length of data should be more than 1 byte.

If DC=0, the data sent is used as control command, the length of command is usually 1 byte.

**For more details, please refer to SSD1352 Datasheet Figure 8-5**

### 3-WIRE SPI



The difference between 3-wire SPI and 4-wire SPI is that 3-wire adds one bit before the transmitting byte for stand of command/data instead of DC pin.

If you use 3-wire SPI, make sure the DC pin is connected to GND. And the data transmitted are 9bit instead of 8bit.

## HOW TO USE

STM32, Arduino and Raspberry Pi sample code is provided for this OLED. The sample code is used to draw shapes and display string.

### STM32

#### CONNECTION:

The demo code is based on XNUCLEO-F103RB

1.5inch RGB OLED	XNUCLEO-F103RB
VCC	3V3/5V
GND	GND
DIN	D11(PA7)
CLK	D13(PA5)
CS	D10(PB6)
DC	D7(PA8)
RST	D8(PA9)

#### FILES:

Project is built for MDK-ARM v5, generated by sTM32CubeMx.

#### ../Src:

*OLED\_Driver.cpp*: Bottom interface of OLED, provide the function of initialization and basic display and configuration.

*OLED\_GFX.cpp*: Display functions for OLED

*ASCII\_Font.h*: Font library, provide two English fonts (5\*8 and 8\*16)for display.

## ARDUINO

### CONNECTION

Demo code is based on UNO PLUS

1.5inch RGB OLED	UNO PLUS
VCC	3V3/5V
GND	GND
DIN	D11
CLK	D13
CS	D10
DC	D7
RST	D8

### FILES

*OLED\_Driver.cpp*: Bottom interface of OLED , provide the function of initialization and basic display and configuration.

*OLED\_GFX.cpp*: Display functions for OLED

*ASCII\_Font.h*: Font library, and a 5\*7 array for OLED display data.

## RASPBERRY PI

## CONNECTION

Demo code is based on Raspberry Pi 3B

功能引脚	开发板
VCC	3V3/5V
GND	GND
DIN	MOSI
CLK	SCK
CS	CE0
DC	24(BCM)
RST	25(BCM)

## SETTING

1. Enable SPI interface of Raspberry Pi

```
sudo raspi-config
```

Choose Interfaces Options->SPI->yes

2. Install libraries

For libraries installing, please refer to:

[https://www.waveshare.com/wiki/Libraries\\_Installation\\_for\\_RPi](https://www.waveshare.com/wiki/Libraries_Installation_for_RPi)

## FILES

You need to copy the demo code (Raspberry Pi one) to your Pi. We copy to **/home/pi** of Raspberry Pi.

Enter the folder (demo code) and execute **ls**:

```
pi@raspberrypi:~/oled_test $ ls  
cambriab.ttf main.py OLED_Driver.py picture1.jpg picture2.jpg picture3.jpg
```

*cambriab.ttf*: Font file for string display.

*mian.py*: Main function file.

You can use command **sudo python main.py** to run the demo code.



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