waveshare 0.96inch OLED Display Module(C)

Waveshare 0.96inch OLED Module User Manual

Model: 0.96inch OLED Display Module(C)

1. Introduction

This user manual provides detailed instructions for the Waveshare 0.96inch OLED Module. This module features an embedded SSD1315 driver chip and supports both SPI and I2C communication protocols. It is designed for integration with various development boards, including Raspberry Pi, Arduino, and STM32.
The 0.96inch OLED Module is a compact display solution with a resolution of 128 × 64 pixels, offering clear visual output for your projects.

2. Product Features

- 0.96inch OLED Display Module with embedded SSD1315 Driver Chip.
- Resolution: 128 × 64 Pixels.
- Communication Interfaces: 4-wire SPI / I2C.
- Ultra-narrow bezel and compact size.
- Onboard voltage translator for versatile compatibility.
- Display Color: Upper yellow & lower blue (two-color display).
- Comes with online development resources and examples for Raspberry Pi, Arduino, and STM32.

3. Package Content

- 0.96inch OLED Module x1
- Jumper cable female-female 7PIN x1

Image: The 0.96inch OLED Module shown with the included 7-pin female-female jumper cable.

4. Specifications

Parameter	Value
Operating Voltage	3.3V/5V (IO high-level voltage is as same as the power supply.)
Communication Interface	4-wire SPI / I2C
Screen Type	OLED
Control Chip	SSD1315
Resolution	128 × 64 Pixels
Outline Dimensions	26.0mm × 26.0mm
Display Size	21.74mm × 11.18mm
Display Colors	Blue/White/Blue and Yellow (1/4 yellow on the top)
Operating Temperature	-20°C ~ 70°C
Storage Temperature	-30°C ~ 80°C
Viewing Angle	> 160°

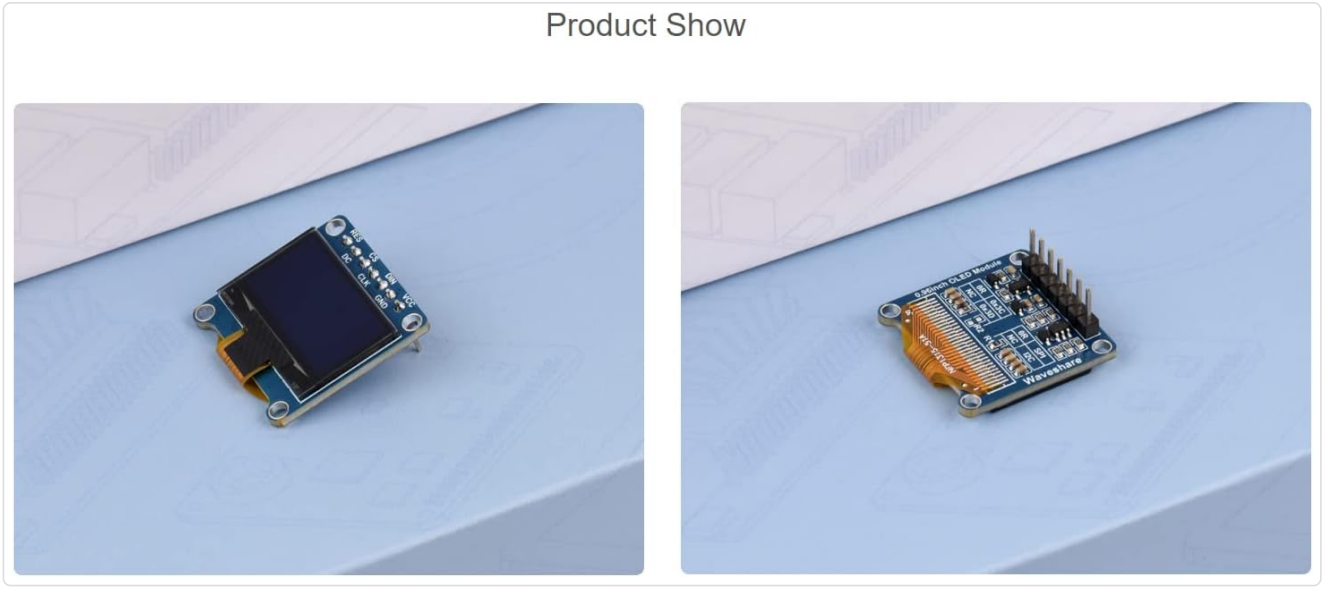


Image: Diagram showing the physical dimensions of the OLED module and a summary of its key specifications.

5. Control Interface Pinout

The OLED module features the following control pins:

- **RES:** Reset pin, active low.
- **DC:** Data/Command selection pin (high for data, low for command).
- **CS:** Chip selection pin, active low.
- **CLK:** Clock input pin for communication.
- **DIN:** Data input pin.
- **GND:** Ground connection.
- **VCC:** Power supply input (3.3V / 5V).

Hardware Connection

Connecting With Raspberry Pi Via SPI Interface

When connecting to the Raspberry Pi, choose to connect with a 7PIN cable, please refer to the pin correspondence table below:

Raspberry Pi Pins

OLED	Raspberry Pi	
	BCM2835	Board
VCC	3.3V	3.3V
GND	GND	GND
DIN	MOSI / SDA	19 / 3
CLK	SCLK / SCL	23 / 5
CS	CE0	24
DC	25	22
RES	27	13

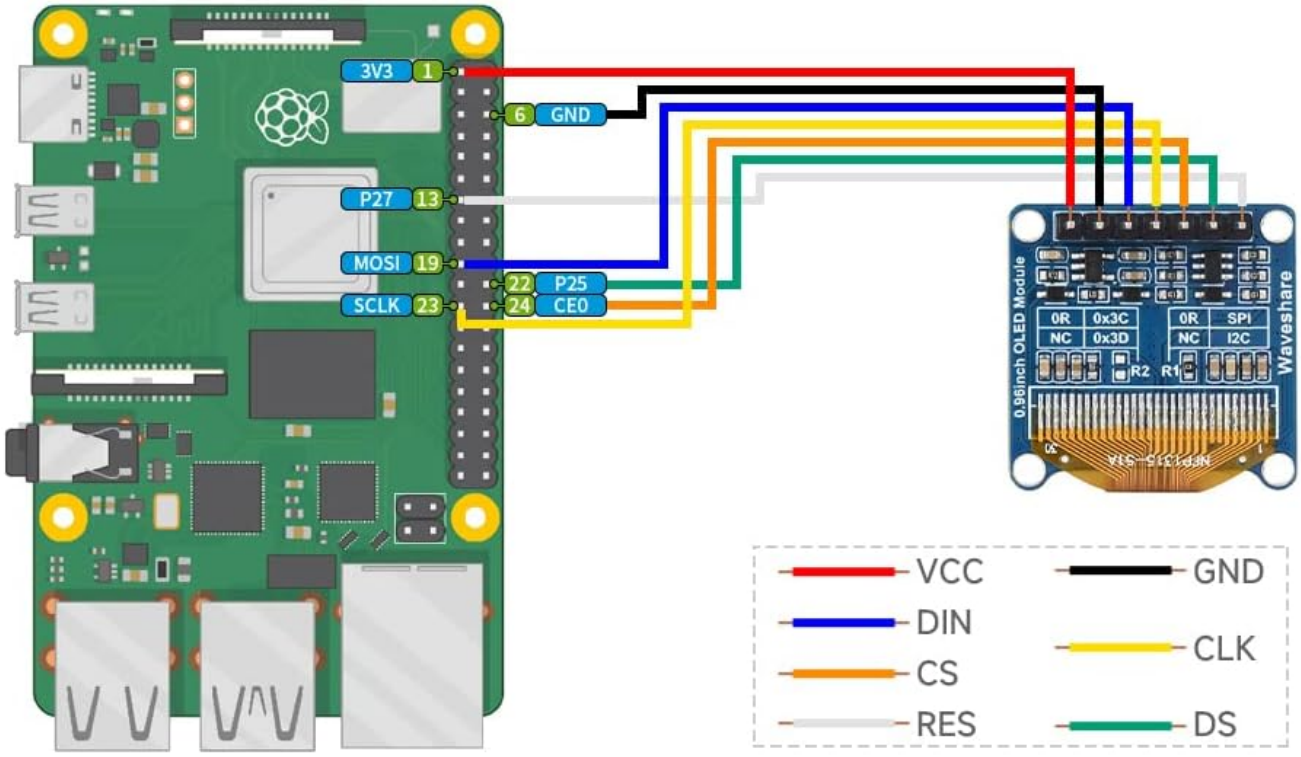


Image: Front view of the 0.96inch OLED module, highlighting the pin labels (RES, CS, DIN, VCC, DC, CLK, GND) and a sample display showing time and date.

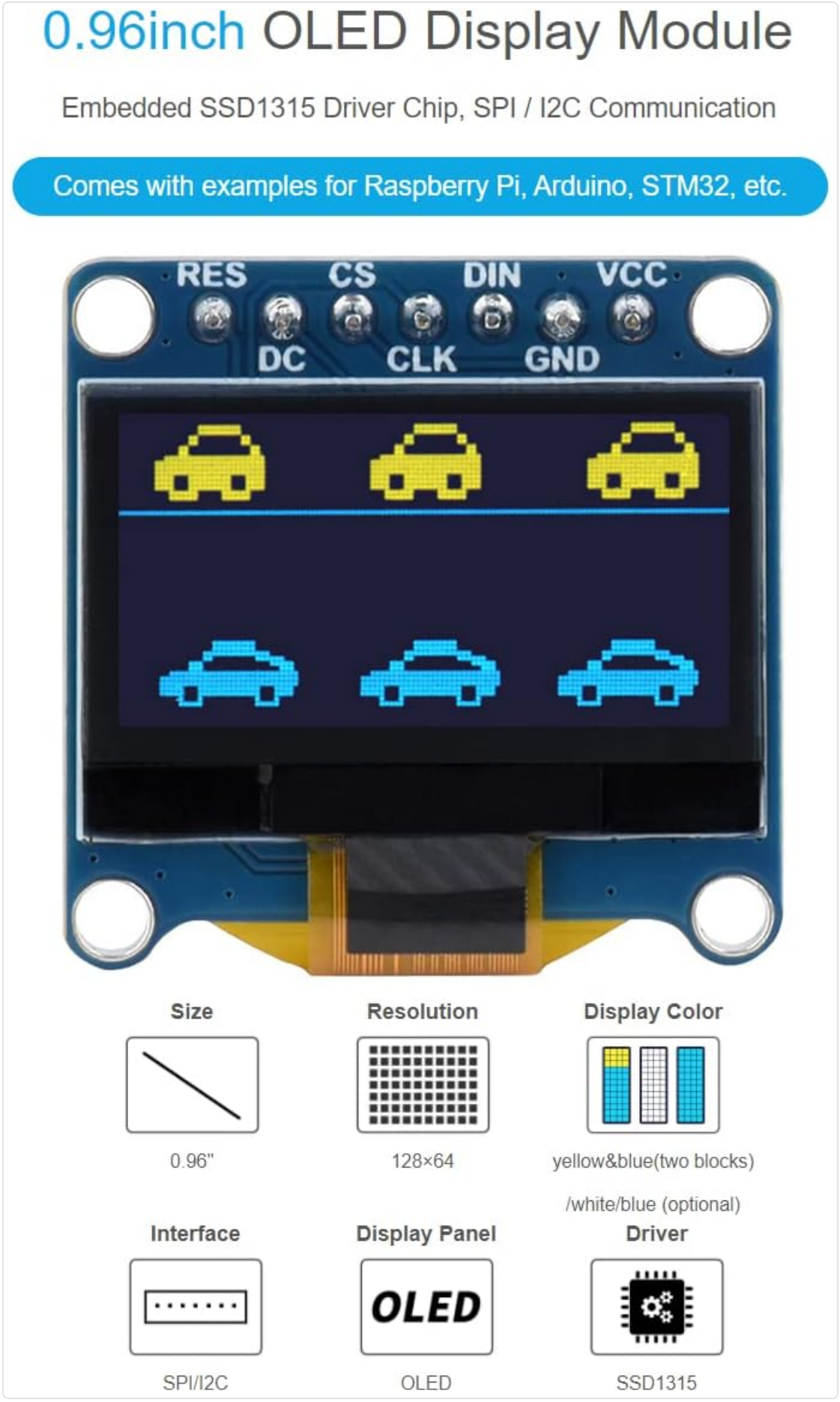


Image: Back view of the 0.96inch OLED module, illustrating the solder pads for configuring SPI or I2C communication modes.

6. Hardware Connection and Setup

6.1. Connecting with Raspberry Pi via SPI Interface

When connecting the OLED module to a Raspberry Pi, use a 7-pin cable and refer to the pin correspondence table below for proper wiring.

OLED Pin	BCM2835 (Raspberry Pi)	Board Pin (Raspberry Pi)
VCC	3.3V	3.3V
GND	GND	GND
DIN	MOSI / SDA	19 / 3
CLK	SCLK / SCL	23 / 5
CS	CE0	24
DC	25	22
RES	27	13

Hardware Connection

Connecting With Arduino Board Via SPI Interface

The demos we provide are based on UNO PLUS, and the connections provided correspond to the pins of UNO PLUS, if you need to port the demo, please connect according to the actual pins:

Arduino UNO Connection Pin Correspondence

OLED	UNO
VCC	3.3V/5V
GND	GND
DIN	SPI:D11 / I2C:SDA
CLK	SPI:D13 / I2C:SCL
CS	D10
DC	D7
RST	D8

Four-wire SPI wiring diagram:

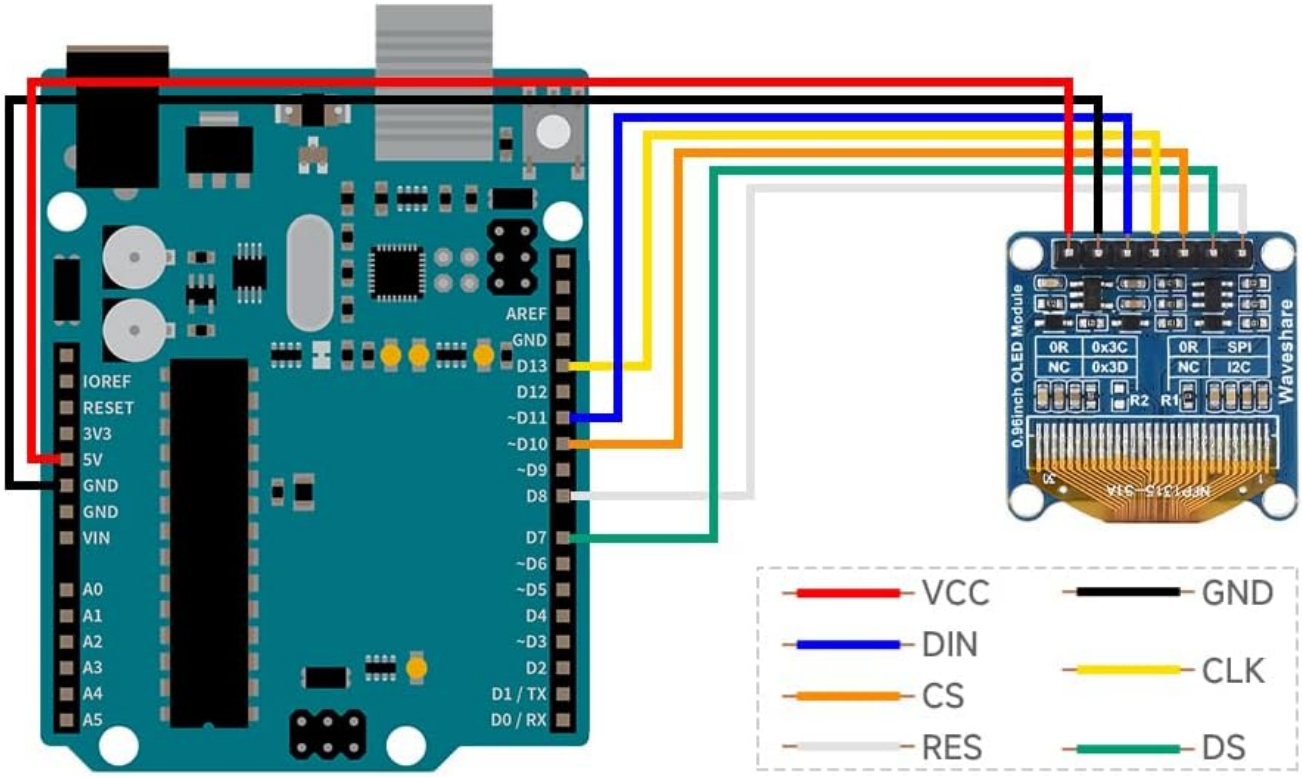


Image: Visual guide demonstrating the correct wiring connections between the 0.96inch OLED module and a Raspberry Pi board using the SPI interface.

6.2. Connecting with Arduino Board via SPI Interface

The provided demos are based on Arduino UNO PLUS. For other Arduino boards, connect the pins according to the actual pinout of your board. Refer to the Arduino UNO connection pin correspondence table below.

OLED Pin	**UNO Pin**
VCC	3.3V/5V

OLED Pin	UNO Pin
GND	GND
DIN	SPI:D11 / I2C:SDA
CLK	SPI:D13 / I2C:SCL
CS	D10
DC	D7
RST	D8

Hardware Connection

Connect with STM32

The demos we provide are based on the STM32F103RBT6, and the connections provided correspond to the pins of the STM32F103RBT6, so if you need to port the demo, please connect the pins according to the actual pins:

STM32F103RBT6 Connection Pin Correspondence

OLED	STM32
VCC	3.3V
GND	GND
DIN	SPI:PA7 / I2C:PB9 / I2C_SOFT: PC8
CLK	SPI:PA5 / I2C:PB8 / I2C_SOFT: PC6
CS	PB6
D/C	PA8
RES	PA9

- Four-wire hardware SPI wiring diagram:

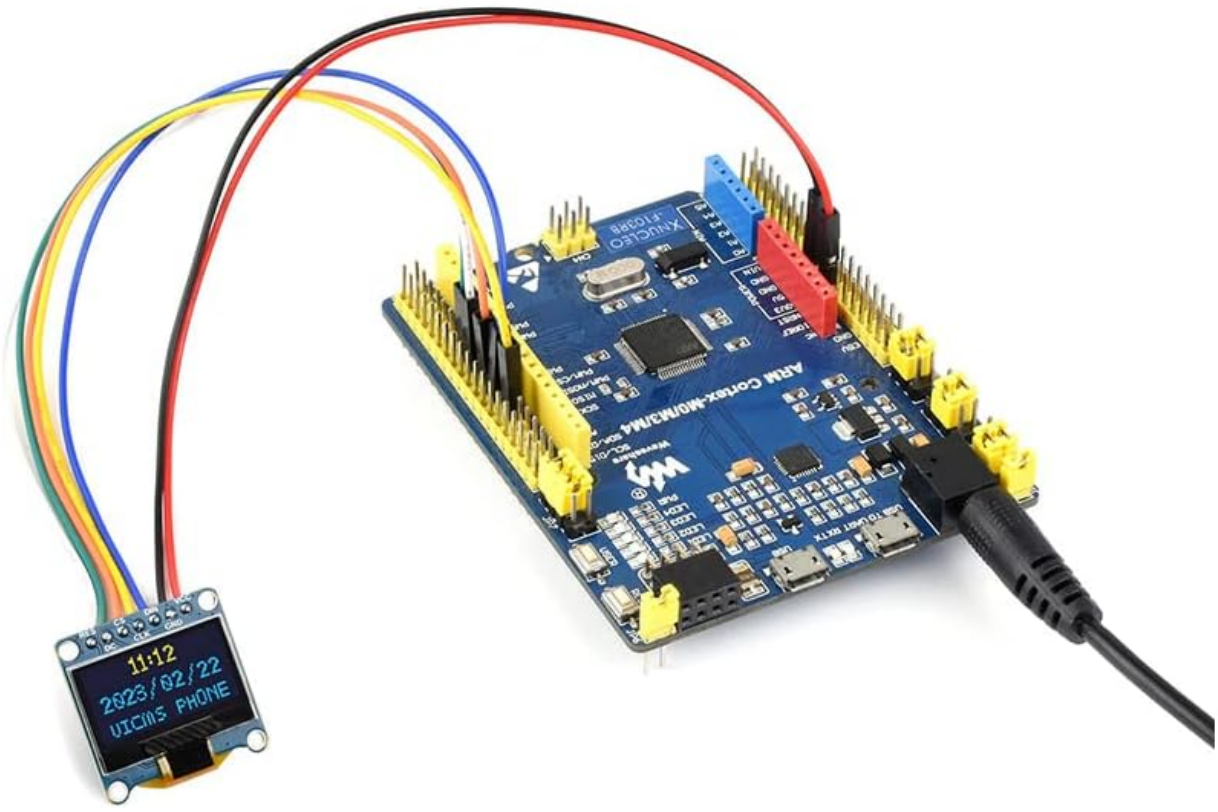
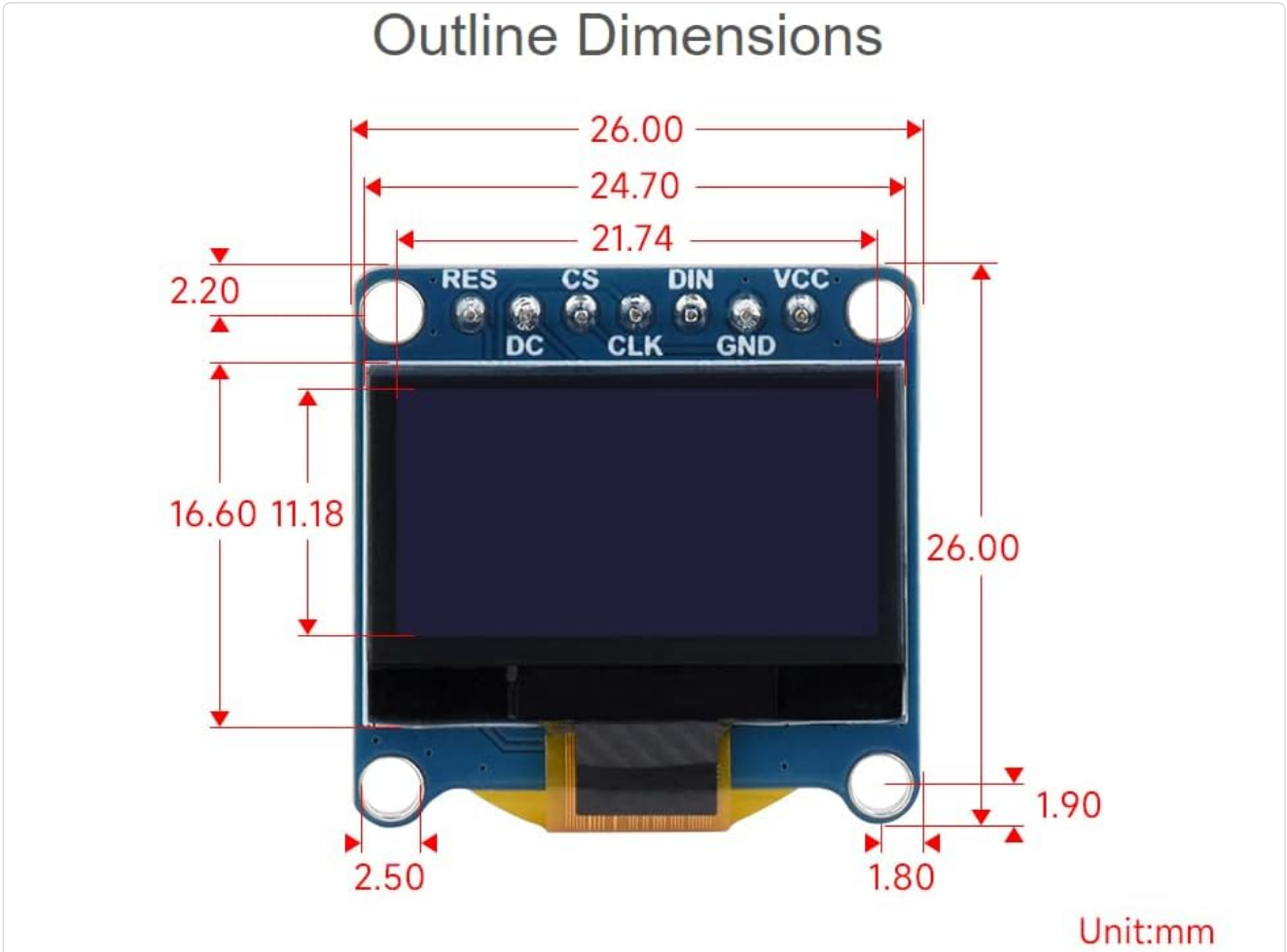


Image: Visual guide demonstrating the correct wiring connections between the 0.96inch OLED module and an Arduino UNO board using the SPI interface.

6.3. Connecting with STM32

The provided demos are based on the STM32F103RBT6. If you need to port the demo to a different STM32 board, please connect the pins according to the actual pinout of your specific board. Refer to the STM32F103RBT6 connection pin correspondence table below.

OLED Pin	STM32 Pin
VCC	3.3V
GND	GND
DIN	SPI:PA7 / I2C:PB9 / I2C_SOFT: PC8
CLK	SPI:PA5 / I2C:PB8 / I2C_SOFT: PC6
CS	PB6
D/C	PA8
RES	PA9



Specifications

OPERATING VOLTAGE	3.3V / 5V	DISPLAY PANEL	OLED
RESOLUTION	128 × 64 pixels	PIXEL SIZE	0.15 × 0.15 mm
COMMUNICATION INTERFACE	4-wire SPI / I2C	DRIVER	SSD1315
DISPLAY SIZE	21.74 × 11.18 mm	MODULE SIZE	26.00 × 26.00mm
DISPLAY COLOR	(C): upper yellow & lower blue; (D): white; (E): blue		

Image: Visual guide demonstrating the correct wiring connections between the 0.96inch OLED module and an STM32 development board.

7. Operating Considerations

To ensure optimal performance and longevity of your OLED module, please observe the following:

- **Power Connection:** Be careful not to reverse the power connection (VCC and GND) as this can damage the module.
- **Self-Luminous Display:** OLED displays are self-luminous and do not have a backlight. Simply connecting VCC and GND will not illuminate the display. You must use program control to highlight the OLED and display content.
- **Image Retention:** Avoid displaying the same static screen content for prolonged periods. Continuous display

of static images can lead to residual images (burn-in) and potentially damage the OLED panel.

8. Troubleshooting & FAQ

Q: How many volts can the OLED module be used in a system?
A: The OLED module is designed for use in a 3.3V system by default. However, extensive testing has shown that it functions reliably in a 5V system as well.

Q: How many hours does the OLED module last?
A: Under normal operating conditions, the OLED module typically has a lifespan of approximately 50,000 hours.

Q: OLED module connected to the power supply why does not light?
A: OLED displays are self-luminous and do not have a backlight. The display will not light up by simply connecting VCC and GND. You must use program control to initialize the display and send data to illuminate the OLED and show content.

9. Support

For further assistance, development resources, or if you encounter any problems, please contact Waveshare support. Online development resources are available to help you get started with your projects.
Visit the official Waveshare store for more information:Waveshare Store