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XYGStudy ESP32-S3-LCD-2.8C

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Model: ESP32-S3-LCD-2.8C

Brand: XYGStudy

1. INTRODUCTION

The ESP32-S3-LCD-2.8C is a versatile development board featuring an ESP32-S3 32-bit LX7 dual-core processor, a 2.8-inch round display with 480x480 resolution, and integrated WiFi and Bluetooth capabilities. This board is designed for rapid development of Human-Machine Interface (HMI) applications and other ESP32-S3 projects, supporting GUI programs like LVGL and offering various peripheral interfaces.

ESP32-S3 2.8" LCD Development Board

480×480 Resolution, Multiple Peripheral Interfaces



LX7 Dual-core Processor



2.4 GHz Wi-Fi



BLE 5



Onboard Antenna/
Antenna Connector



2.8"



Capacitive Touch
(touch version only)



480×480 Pixels



Buzzer



TF Card Slot



PCF85063 RTC



QMI8658
6-Axis IMU



Multiple Interfaces

An overview of the ESP32-S3 development board, showcasing its 2.8-inch round display, LX7 dual-core processor, 2.4 GHz Wi-Fi, BLE 5, onboard antenna, 2.8-inch size, capacitive touch, 480x480 pixels resolution, buzzer, TF card slot, PCF85063 RTC, QMI8658 6-axis IMU, and multiple interfaces.

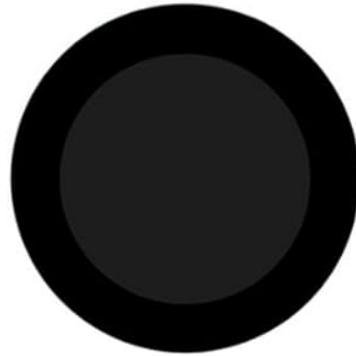
2. KEY FEATURES

- **Processor:** ESP32-S3 32-bit LX7 Dual-core Processor, up to 240MHz main frequency.
- **Connectivity:** Supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) with onboard antenna.
- **Memory:** Built-in 512KB SRAM and 384KB ROM, with onboard 16MB Flash and 8MB PSRAM.
- **Display:** Onboard 2.8-inch capacitive touch display with 480x480 resolution.
- **Touch Control:** Supports touch control via I2C interface with interrupt support (for touch version only).
- **Interfaces:** Adapts UART, I2C, and various IO interfaces, integrates full-speed USB port.
- **Onboard Sensors:** QMI8658 6-axis sensor (accelerometer and gyroscope), PCF85063 RTC sensor.
- **Storage:** Integrated TF card slot.
- **Power Management:** Battery recharge management module for 3.7V Li-ion batteries.
- **GUI Support:** Capable of smoothly running GUI programs such as LVGL for HMI development.

Version Options



ESP32-S3-LCD-2.8C
without touch control



ESP32-S3-Touch-LCD-2.8C
with touch control

Features

This product is a microcontroller development board with 2.4GHz WiFi and Bluetooth BLE 5 support, integrates high-capacity Flash and PSRAM. Onboard 2.8inch LCD screen can smoothly run GUI programs such as LVGL. Combined with various peripheral interfaces, suitable for the quick development of the HMI and other ESP32-S3 applications.

- Equipped with high-performance Xtensa 32-bit LX7 dual-core processor, up to 240MHz main frequency
- Supports 2.4GHz Wi-Fi (802.81 b/g/n) and Bluetooth 5 (LE), with onboard antenna
- Built-in 512KB SRAM and 384KB ROM, with onboard 16MB Flash and 8MB PSRAM
- Onboard 2.8inch LCD display, 480×480 resolution
- Supports touch control via I2C interface, with interrupt support (for touch version only)
- Adapting UART, I2C and some IO interfaces, integrates full-speed USB port
- Onboard QMI8658 6-axis sensor, RTC sensor, TF card slot and battery recharge management module, etc.
- Supports accurate control such as flexible clock and multiple power modes to realize low power consumption in different scenarios

This image illustrates the two available versions of the ESP32-S3-LCD-2.8C development board: one without touch control and the ESP32-S3-Touch-LCD-2.8C with capacitive touch control.

3. PACKAGE CONTENTS

Verify that all items listed below are included in your package:

- ESP32-S3-LCD-2.8C Development Board x1
- SH1.0 12PIN cable (~100mm) x1
- SH1.0 4PIN cable (~100mm) x1 (2 pieces)

4. HARDWARE OVERVIEW

This section provides a detailed look at the components and interfaces available on the ESP32-S3-LCD-2.8C development board.

Weight: 0.06 kg

Package Content

ESP32-S3-LCD-2.8C

1. ESP32-S3-LCD-2.8C x1
2. SH1.0 12PIN cable ~100mm ×1
3. SH1.0 4PIN cable ~100mm (2pcs) ×1

1



2



3



A comprehensive diagram labeling the key components on the ESP32-S3-Touch-LCD-2.8C board.

Component Identification:

1. **ESP32-S3R8:** Dual-core processor, up to 240MHz operating frequency.
2. **QMI8658 attitude sensor:** 6-axis IMU (3-axis gyroscope and 3-axis accelerometer).
3. **TCA9554PWR:** GPIO expander chip.
4. **CH340C:** USB to UART with onboard automatic download circuit, enabling program burning without additional operations.
5. **16MB Flash:** Onboard storage for firmware and data.
6. **PCF85063 RTC chip:** Real-Time Clock for timekeeping.
7. **Battery recharge manager:** For managing 3.7V Li-ion battery charging.

8. **MP8761:** Low dropout regulator, 800mA output (Max).
9. **USB Type-C port:** For power supply, program burning, and debugging.
10. **MX1.25 battery header:** For 3.7V Lithium battery, supports charging and discharging.
11. **12PIN multi-functional pin header:** For various peripheral connections.
12. **IPEX1 connector:** To use external antenna via resoldering the resistor.
13. **TF card slot:** For external storage.
14. **3.7V battery holder:** For connecting rechargeable RTC battery.
15. **I2C header:** For I2C communication, only supports the I2C peripherals and cannot be mapped to other functions.
16. **UART header:** Only available when the USB to UART Type-C port is not connected.
17. **USB to UART Type-C port:** For power supply, program burning and debugging.
18. **Buzzer:** For audio feedback.
19. **Charge indicator:** Lithium battery charge indicator, lights up when charging, off when fully charged (light status is uncertain when the battery is not connected).
20. **Power indicator:** Indicates power status.
21. **Power supply control button:** For managing power.
22. **RESET button:** To reset the board.
23. **BOOT button:** For entering bootloader mode.

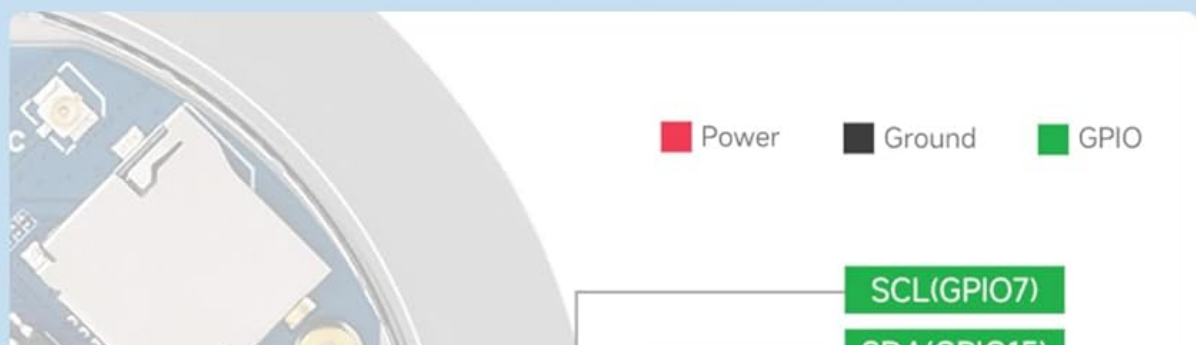
5. DISPLAY SPECIFICATIONS

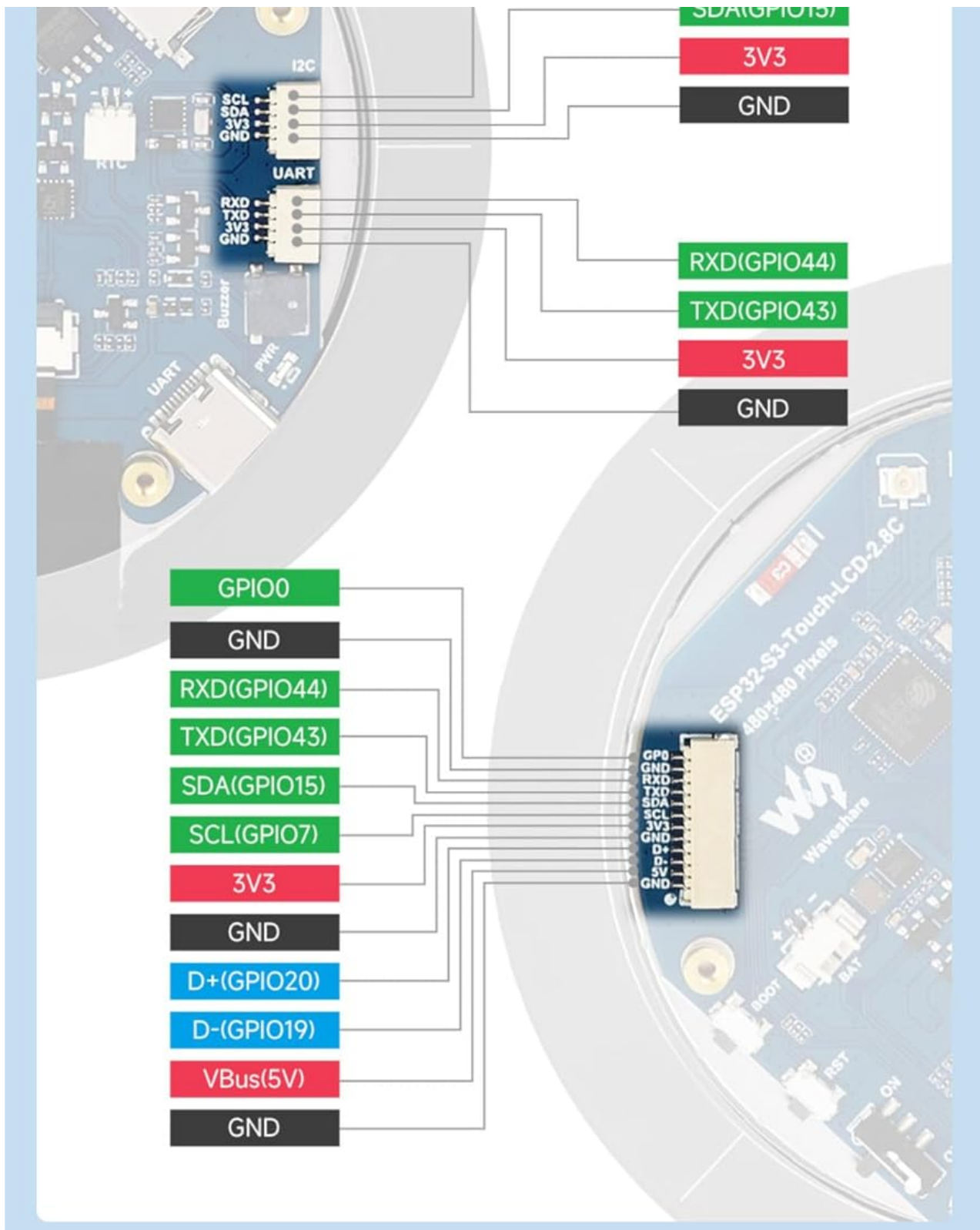
The ESP32-S3-LCD-2.8C features a high-quality round display. Below are its key parameters:

Parameter	Specification	Parameter	Specification
Display Panel	IPS	Display Size	2.8 inch
Resolution	480 × 480	Contrast Ratio	1200:1
Communication Interface	RGB	Driver IC	ST7701
Touch Interface (Touch Version Only)	I2C	Touch IC (Touch Version Only)	GT911

Supports Multiple Peripherals

Supports The Expansion Of Multiple Peripherals Via GPIO, UART And I2C Interfaces, Etc.



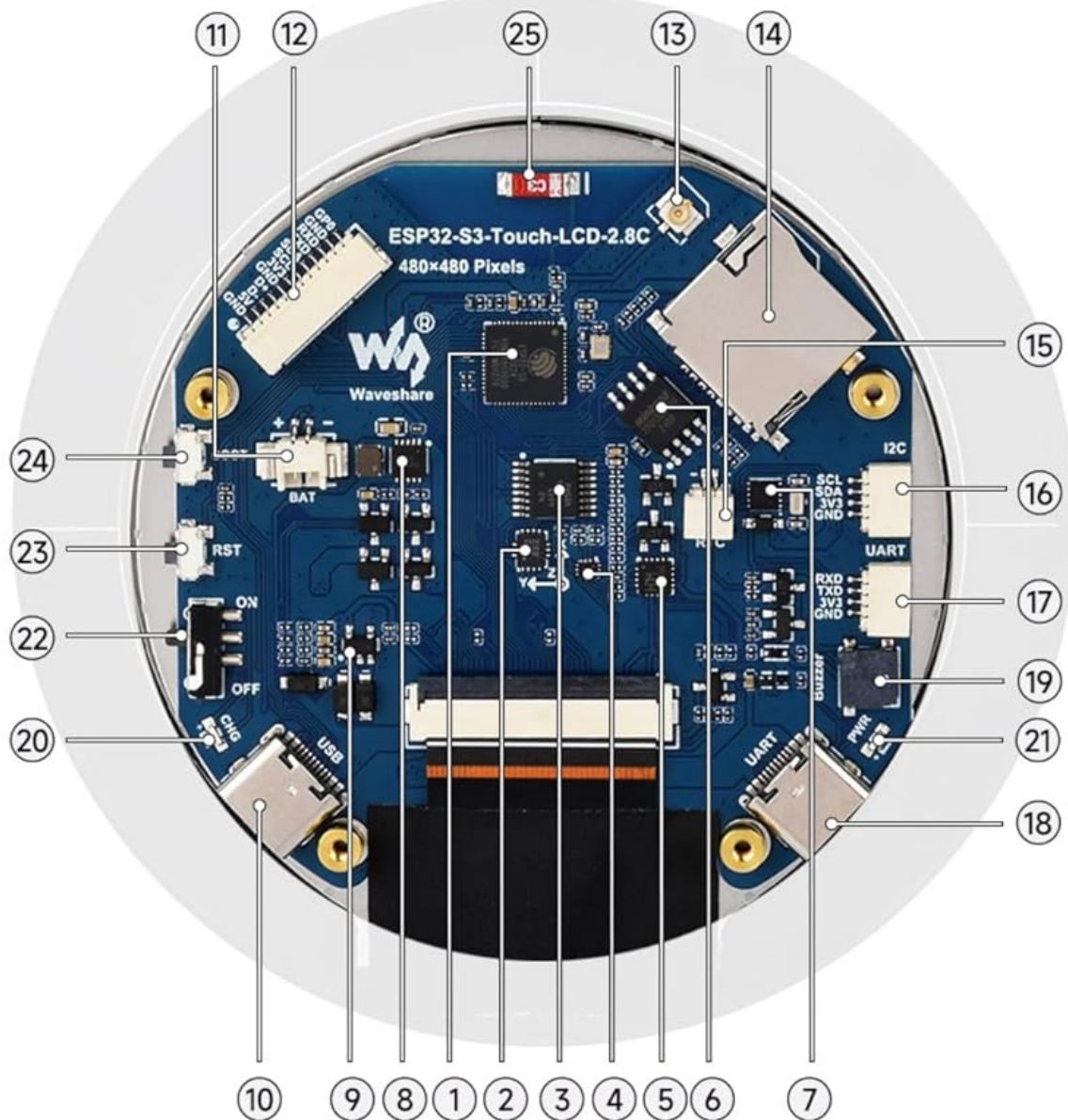


This image showcases the wide 160-degree viewing angle and vibrant display quality of the IPS panel integrated into the ESP32-S3 development board.

6. DEVELOPMENT ENVIRONMENTS

The ESP32-S3-LCD-2.8C development board supports various development environments, making it accessible for both beginners and experienced developers.

What's On Board



- 1. **ESP32-S3R8**
Dual-core processor, up to 240MHz operating frequency
- 2. **QST attitude sensor**
QMI8658 (6-axis IMU includes a 3-axis gyroscope and a 3-axis accelerometer)
- 3. **TCA9554PWR**
GPIO expander chip
- 4. **FSUSB42UMX**
UART selection chip, the 4-pin UART header is disabled when connected to the UART Type-C port
- 5. **CH343P**
USB to UART with onboard automatic download circuit, enabling program burning without additional operations
- 6. **16MB Flash**
- 7. **RTC chip**
PCF85063 RTC chip
- 8. **Battery recharge manager**
- 9. **ME6217C33M5G**
Low dropout regulator, 800mA output (Max.)
- 10. **USB Type-C port**
- 11. **MX1.25 battery header**
MX1.25 2PIN connector, for 3.7V Lithium battery, supports charging and discharging
- 12. **12PIN multi-functional pin header**
- 13. **IPEX1 connector**
Switching to use external antenna via resoldering the resistor
- 14. **TF card slot**
- 15. **RTC battery header**
for connecting rechargeable [RTC battery](#).
- 16. **I2C header**
connecting with internal chip, only supports the I2C peripherals and cannot be mapped to other functions
- 17. **UART header**
only available when the USB to UART Type-C port is not connected
- 18. **USB TO UART Type-C port**
for power supply, program burning and debugging
- 19. **Buzzer**
- 20. **Charge indicator**
Lithium battery charge indicator, lights up when charging, off when fully charged (the light status is uncertain when the battery is not connected)
- 21. **Power indicator**
- 22. **Battery power supply control button**
- 23. **RESET button**
- 24. **BOOT button**

This image highlights the compatibility of the ESP32-S3 board with popular development frameworks.

ESP-IDF

The Espressif IoT Development Framework (ESP-IDF) is the official development framework for the ESP32-S3. It provides a comprehensive set of tools, libraries, and examples for developing robust and efficient applications. It supports IDEs such as Eclipse and VSCode.

Arduino IDE

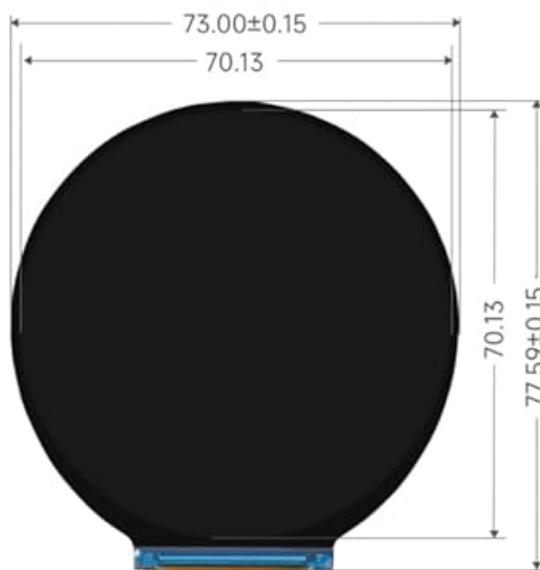
For users familiar with the Arduino ecosystem, the ESP32-S3 can be programmed using the Arduino IDE. This platform offers a simpler, more accessible approach to development, ideal for rapid prototyping and projects that benefit from the extensive Arduino library collection.

7. CONNECTIVITY AND PINOUT

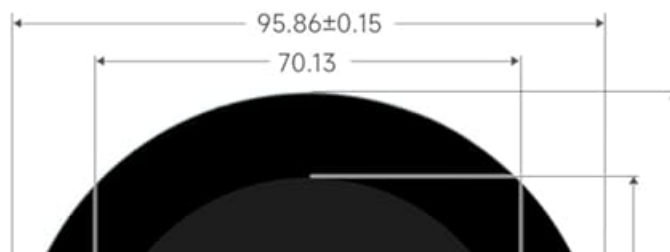
The ESP32-S3-LCD-2.8C board offers various GPIOs and communication interfaces for connecting external peripherals. Refer to the pinout diagram for detailed connections.

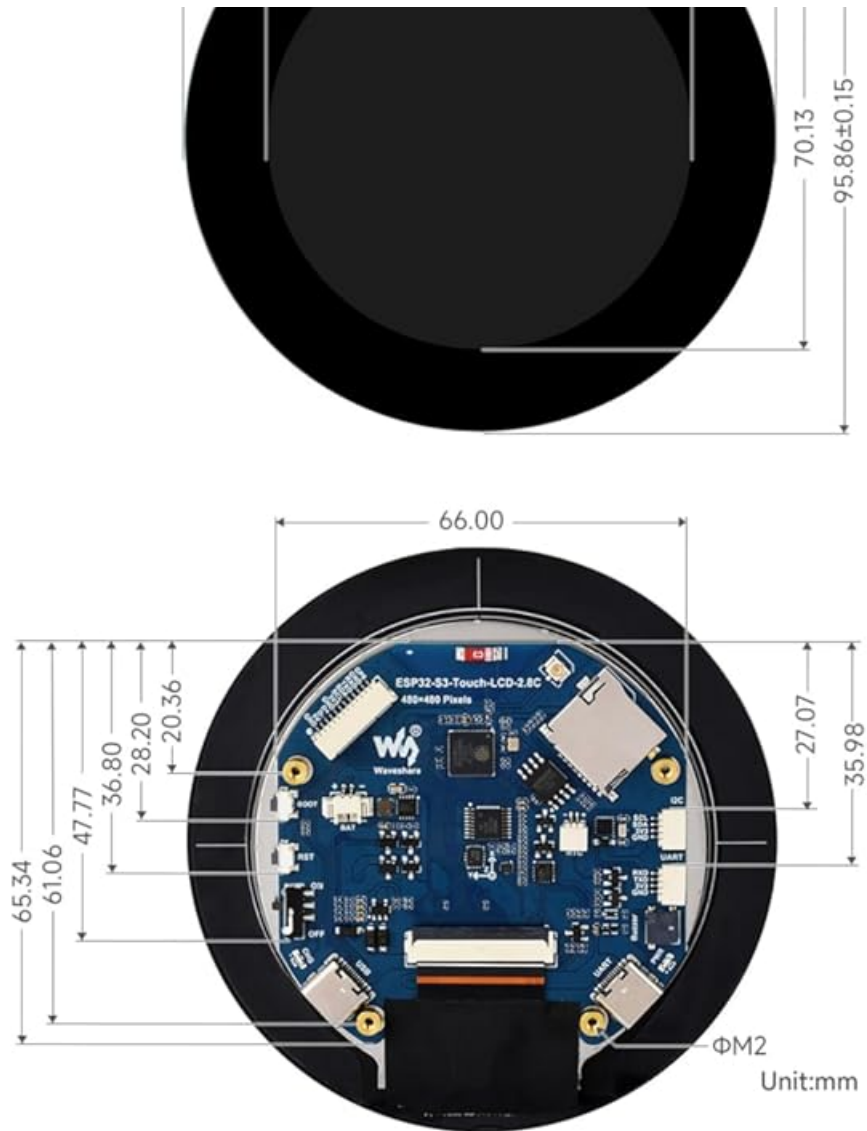
Outline Dimensions

ESP32-S3-LCD-2.8C



ESP32-S3-Touch-LCD-2.8C





A detailed pinout diagram illustrating how to connect various peripherals via GPIO, UART, and I2C interfaces, with color-coded labels for Power (red), Ground (black), and GPIO (green).

8. APPLICATION EXAMPLES

The ESP32-S3-LCD-2.8C is suitable for a wide range of applications, particularly those requiring a compact display and wireless connectivity.

IPS Display Panel

Excellent Display Performance, 160° Viewing Angle





160°



Supports ESP-IDF, Arduino IDE

Comprehensive SDK, Dev Resources, And Tutorials To Help You Easily Get Started



ESP-IDF

With free open source development tools, supports IDEs such as Eclipse and VSCode, easier for developers to use.



Arduino IDE

Arduino IDE is an open source electronic prototyping platform, convenient and flexible, easy to get started. After a simple learning, you can start to develop quickly.

This image demonstrates potential applications, such as creating Human-machine Interfaces (HMI) and developing graphical user interfaces using the LVGL library.

Human-Machine Interface (HMI)

Leverage the round display and capacitive touch capabilities to create intuitive and interactive HMI for smart home devices, industrial control panels, or custom gadgets. The ESP32-S3's processing power and connectivity enable complex interactions and data visualization.

LVGL GUI Development

The board is optimized for LittlevGL (LVGL), a free and open-source graphics library. This allows developers to create visually appealing and responsive graphical user interfaces with ease, even on resource-constrained microcontrollers.

9. OPERATING INSTRUCTIONS

To begin using your ESP32-S3-LCD-2.8C development board, follow these general steps:

1. **Software Setup:** Install the necessary development environment (ESP-IDF or Arduino IDE) on your computer. Ensure all required drivers for the USB-to-UART chip (CH340C) are installed.
2. **Connect the Board:** Connect the ESP32-S3-LCD-2.8C to your computer using a USB Type-C cable. The board will be powered via USB.
3. **Select Port:** In your IDE, select the correct serial port corresponding to the connected board.
4. **Load Example Code:** Start with a simple example program (e.g., a basic display test or Wi-Fi scan) to verify the board's functionality.
5. **Compile and Upload:** Compile your code and upload it to the ESP32-S3 board. The onboard automatic download circuit simplifies this process.
6. **Test Functionality:** Observe the display and any connected peripherals to confirm the program is running as expected.
7. **Battery Operation:** If using a 3.7V Li-ion battery, connect it to the MX1.25 battery header. The onboard recharge manager will handle charging.

10. MAINTENANCE

Proper care and maintenance will ensure the longevity and reliable operation of your development board:

- **Handle with Care:** Avoid dropping the board or subjecting it to excessive physical stress.
- **Static Electricity:** Always handle the board in an anti-static environment or take precautions to prevent electrostatic discharge (ESD).
- **Power Supply:** Use a stable and appropriate power supply (5V via USB Type-C or 3.7V Li-ion battery). Do not exceed the recommended voltage.
- **Cleaning:** If necessary, gently clean the board with a soft, dry brush or compressed air. Avoid using liquids or harsh chemicals.
- **Storage:** Store the board in a dry, cool environment, away from direct sunlight and extreme temperatures.
- **Firmware Updates:** Regularly check for and apply firmware updates for the ESP32-S3 chip and any libraries you are using to benefit from improvements and bug fixes.

11. TROUBLESHOOTING

If you encounter issues with your ESP32-S3-LCD-2.8C board, consider the following troubleshooting steps:

- **Board Not Powering On:**
 - Ensure the USB Type-C cable is securely connected to both the board and your computer/power adapter.
 - Check if the power indicator LED on the board is lit.
 - Try a different USB cable or power source.
- **Unable to Upload Code:**
 - Verify that the correct serial port is selected in your IDE.
 - Ensure the CH340C USB-to-UART driver is correctly installed.
 - Press and hold the BOOT button, then press and release the RESET button, then release the BOOT button to enter download mode if automatic download fails.
 - Check for any error messages in the IDE's output console.
- **Display Not Working:**
 - Ensure your code initializes the display correctly.
 - Check for proper power supply to the display.
 - Verify that the display ribbon cable is securely connected.
- **Wi-Fi/Bluetooth Connectivity Issues:**
 - Confirm your code correctly configures and initializes the Wi-Fi or Bluetooth module.
 - Check for proper antenna connection if an external antenna is used.
 - Ensure you are within range of the Wi-Fi access point or Bluetooth device.

12. TECHNICAL SPECIFICATIONS

- **Part Number:** ESP32-S3-LCD-2.8C
- **Processor:** ESP32-S3 (32-bit LX7 Dual-core, up to 240MHz)
- **Wireless:** 2.4GHz Wi-Fi (802.11 b/g/n), Bluetooth 5 (LE)
- **Onboard Memory:** 512KB SRAM, 384KB ROM, 16MB Flash, 8MB PSRAM
- **Display:** 2.8-inch IPS LCD, 480x480 resolution, RGB interface, ST7701 Driver IC
- **Touch:** Capacitive touch (I2C interface, GT911 Touch IC) *-for touch version only*
- **Interfaces:** UART, I2C, GPIO, Full-speed USB Type-C
- **Sensors:** QMI8658 6-axis IMU, PCF85063 RTC
- **Storage:** TF card slot
- **Power:** USB Type-C (5V), 3.7V Li-ion battery support with recharge management
- **Dimensions:** Approximately 73.00mm (diameter) x 77.35mm (height including connector) for non-touch version; 95.86mm (diameter) x 95.86mm (height including connector) for touch version.

- **Weight:** 0.06 kg (approximate)
- **UPC:** 795602424032

13. WARRANTY AND SUPPORT

For warranty information and technical support, please refer to the seller's policies on the platform where the product was purchased. Typically, products come with a standard return period. For detailed technical inquiries or assistance with specific projects, please contact XYGStudy directly through the Amazon messaging system or their official support channels.