

Waveshare ESP32-S3-Touch-LCD-2.8C

Waveshare ESP32-S3 2.8-inch Capacitive Touch Round Display Development Board User Manual

Brand: Waveshare | Model: ESP32-S3-Touch-LCD-2.8C

1. INTRODUCTION

The Waveshare ESP32-S3 2.8-inch Capacitive Touch Round Display Development Board is a high-performance microcontroller development board designed for a wide range of applications. It integrates a 2.8-inch capacitive touch display with a 480x480 resolution, powered by an Xtensa 32-bit LX7 dual-core processor. This board offers robust connectivity with 2.4GHz Wi-Fi and Bluetooth 5 (LE), making it suitable for IoT projects, human-machine interfaces (HMI), and various DIY developments.

Key features include:

- High-performance Xtensa 32-bit LX7 dual-core processor, up to 240MHz.
- Integrated 2.8-inch capacitive touch display with 480x480 resolution.
- Supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) with onboard antenna.
- Built-in 512KB SRAM, 384KB ROM, 16MB Flash, and 8MB PSRAM.
- Multiple peripheral interfaces: UART, I2C, and various IO.
- Onboard QMI8658 6-axis sensor, RTC sensor, TF card slot, and battery recharge management module.

2. PACKAGE CONTENT

The following items are included in your Waveshare ESP32-S3-Touch-LCD-2.8C package:

- 1x ESP32-S3-Touch-LCD-2.8C Development Board
- 1x SH1.0 12PIN cable ~100mm
- 2x SH1.0 4PIN cable ~100mm

ESP32-S3 2.8" LCD Development Board

480×480 Resolution, Multiple Peripheral Interfaces



Image: Contents of the Waveshare ESP32-S3-Touch-LCD-2.8C package, showing the main board and included cables.

3. SETUP

To begin using your Waveshare ESP32-S3 development board, follow these general setup guidelines:

1. **Power Connection:** Connect the board to a power source using the USB-C port. The board can be powered directly via USB-C for development and basic operation.
2. **Battery (Optional):** If you plan to use the board in a portable application, connect a compatible 3.7V Lithium battery to the dedicated MX1.25 2PIN connector. The onboard battery recharge management module will handle charging.
3. **MicroSD Card:** Insert a TF card into the TF card slot if your application requires external storage for data or program files.
4. **Initial Boot:** Upon first power-up, the board may run a pre-loaded demo program.

Video: A demonstration of connecting a USB-C cable to a round display development board and showing basic touch interaction. This video is from DIYmalls and features a 1.28-inch ESP32-C3 board, but illustrates the general setup process.

Video: Another demonstration from DIYmalls showing the power-on sequence and touch functionality of a 1.28-inch round IPS display ESP32-C3 board, similar to the setup for the ESP32-S3 board.

4. OPERATING INSTRUCTIONS

The ESP32-S3-Touch-LCD-2.8C features a capacitive touch display, allowing for intuitive interaction with graphical user interfaces (GUIs). The board supports GUI programs such as LVGL for smooth and responsive operation.

- **Touch Control:** Interact with the display by touching the screen. The capacitive touch interface is responsive and supports interrupt functionality.
- **Sensors:** Utilize the onboard QMI8658 6-axis sensor for motion detection and the RTC sensor for real-time clock functions.
- **Power Modes:** The board supports flexible clock and multiple power modes to achieve low power consumption in various scenarios.

Video: Waveshare's demonstration of the ESP32-S3 Touch LCD 1.85C, showcasing its high-performance processor, display capabilities, touch interaction, and various features like voice control and music playback. This provides insight into the operational capabilities of the 2.8-inch model.

Video: Waveshare's demonstration of the ESP32-S3 Touch AMOLED 1.75 BG, highlighting its display quality, processor, memory, connectivity, and expansion interfaces. This video illustrates the advanced features and interactive capabilities of a similar round display board.

Video: Waveshare's demonstration of the ESP32-S3 LCD 1.85-inch board, showcasing its display, processor, memory, connectivity, TF card slot, sensors, RTC, microphone, and speaker interfaces. This video provides a detailed look at the hardware and potential applications.

5. CONNECTIVITY & DEVELOPMENT

The ESP32-S3-Touch-LCD-2.8C offers versatile connectivity and development options:

- **Wireless Connectivity:** Supports 2.4GHz Wi-Fi (802.81 b/g/n) and Bluetooth 5 (LE) for seamless wireless communication.
- **Peripheral Interfaces:** Adapting UART, I2C, and various IO interfaces, the board integrates a full-speed USB port for easy expansion and connection to external devices.
- **Development Environments:** Compatible with popular development tools such as ESP-IDF and Arduino IDE, providing a flexible platform for programming and project development.
- **Wiki Resources:** Waveshare provides extensive Wiki resources, including detailed access tutorials and demo codes, to assist users in getting started quickly and efficiently.

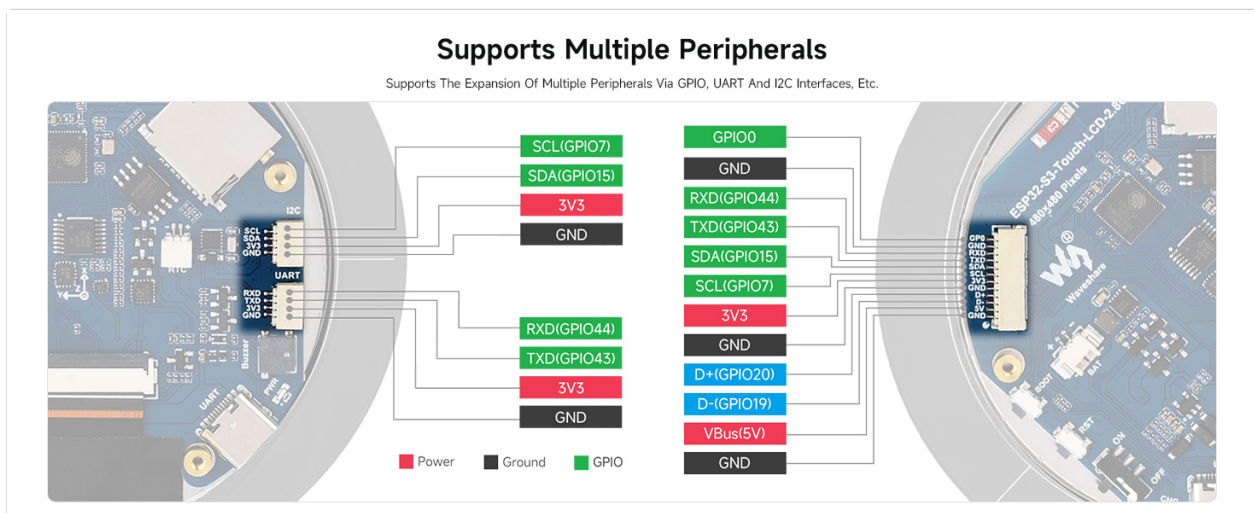


Image: Detailed pinout diagram of the Waveshare ESP32-S3-Touch-LCD-2.8C, illustrating the various GPIO, UART, and I2C interfaces available for connecting peripherals.

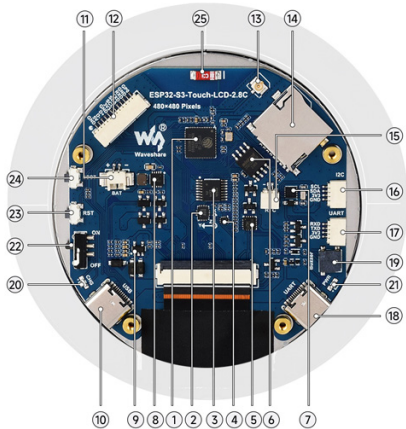
Video: Waveshare's demonstration of the ESP32 C6 LCD 1.47-inch board, highlighting its Wi-Fi and Bluetooth capabilities, TF card slot, GPIO interfaces, and support for GUI programs like LVGL. This video is relevant for understanding the connectivity and development features of ESP32 boards.

6. SPECIFICATIONS

Detailed technical specifications for the Waveshare ESP32-S3-Touch-LCD-2.8C Development Board:

Feature	Specification
Processor	Xtensa 32-bit LX7 dual-core, up to 240MHz
Display Type	2.8-inch Capacitive Touch Round Display, IPS Panel
Resolution	480x480 pixels
RAM	512KB SRAM, 8MB PSRAM
ROM	384KB ROM
Flash Memory	16MB Flash
Wireless Connectivity	2.4GHz Wi-Fi (802.81 b/g/n), Bluetooth 5 (LE)
Interfaces	UART, I2C, IO, USB-C (full-speed)
Onboard Sensors	QMI8658 6-axis sensor, RTC sensor
Storage Expansion	TF card slot
Power Management	Battery recharge management module
Item Weight	3.52 ounces
Package Dimensions	6.69 x 4.41 x 1.22 inches

What's On Board



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

Image: Outline dimensions of the Waveshare ESP32-S3-Touch-LCD-2.8C, providing physical measurements for integration into projects.

7. MAINTENANCE

To ensure the longevity and optimal performance of your Waveshare ESP32-S3-Touch-LCD-2.8C, consider the following maintenance tips:

- **Environmental Conditions:** Avoid exposing the board to extreme temperatures, high humidity, or dusty environments.
- **Power Supply:** Always use a stable and appropriate power supply. When using a battery, ensure it is a compatible Lithium battery and follow proper charging procedures to prevent overcharging or deep

discharge.

- **Cleaning:** Gently clean the display and board with a soft, dry cloth. Avoid using harsh chemicals or abrasive materials.
- **Firmware Updates:** Regularly check the Waveshare Wiki for firmware updates and new development resources to keep your board up-to-date and secure.

8. TROUBLESHOOTING

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

- **No Power/Display:** Ensure the USB-C cable is securely connected to a functional power source. If using a battery, verify it is charged and properly connected.
- **Touchscreen Unresponsive:** Check for any physical obstructions on the screen. If programming a custom application, ensure the touch driver is correctly initialized and configured in your code.
- **Connectivity Issues (Wi-Fi/Bluetooth):** Verify that your network credentials are correct and that the board is within range of the access point or Bluetooth device. Ensure the onboard antenna is not obstructed.
- **Programming/Compilation Errors:** Refer to the official Waveshare Wiki for detailed documentation, installation guides for ESP-IDF and Arduino IDE, and library examples. Ensure all necessary libraries are installed and up-to-date.
- **Unstable Operation:** This could be due to power fluctuations or software issues. Try using a different power source or re-flashing a known stable firmware.

9. WARRANTY AND SUPPORT

Waveshare is committed to providing quality products and support. For detailed information regarding product warranty, please refer to the official Waveshare website or contact their customer service directly.

For technical assistance, extensive documentation, tutorials, and community forums, please visit the official Waveshare Wiki. These resources are designed to help you maximize the potential of your ESP32-S3-Touch-LCD-2.8C development board and resolve any technical challenges you may encounter.

If you require further assistance, please do not hesitate to contact Waveshare customer support through their official channels.