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› Waveshare ESP32-S3 Mini Development Board User Manual

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Waveshare ESP32-S3 Mini Development Board User Manual

Model: ESP32-S3 Mini Development Board

1. INTRODUCTION

The Waveshare ESP32-S3 Mini Development Board is a compact and powerful microcontroller board based on the ESP32-S3FH4R2 dual-core processor. Designed for embedded applications, it integrates 2.4GHz Wi-Fi and Bluetooth 5 (LE) connectivity, along with onboard memory and a rich set of GPIO pins. This manual provides essential information for setting up, operating, and troubleshooting your development board.

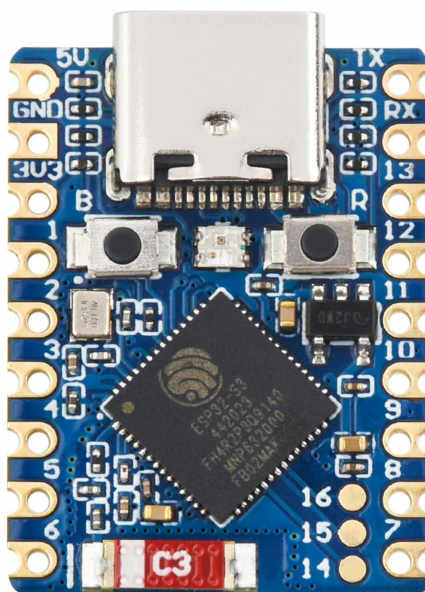


Image 1.1: Top view of the Waveshare ESP32-S3 Mini Development Board, highlighting its compact size and USB-C port.

2. KEY FEATURES

- Equipped with Xtensa 32-bit LX7 dual-core processor, operating at up to 240MHz main frequency.
- Supports 2.4GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 (LE) for versatile wireless communication.
- Built-in 512KB SRAM and 384KB ROM, with onboard 4MB Flash memory and 2MB PSRAM for ample storage and processing.
- Castellated module design with an onboard ceramic antenna, suitable for direct soldering onto carrier boards.
- Features flexible clock and independent module power supply settings to optimize for low power consumption scenarios.
- Integrated USB serial port full-speed controller and 24 configurable GPIO pins.
- Multiple peripheral interfaces: 4x SPI, 2x I2C, 3x UART, 2x I2S, 2x ADC.

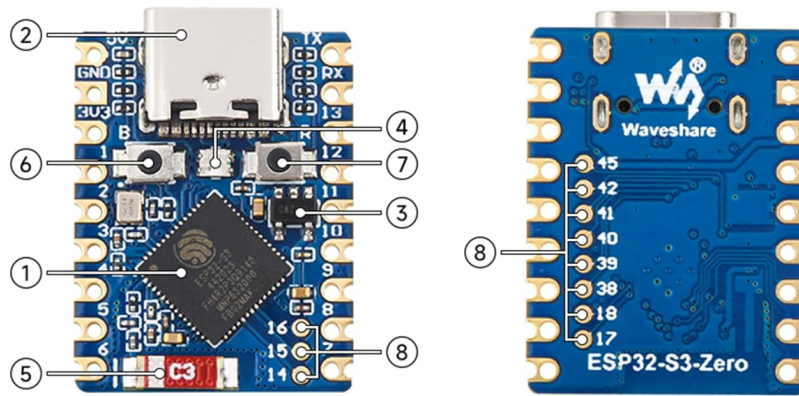
3. TECHNICAL SPECIFICATIONS

Feature	Detail
Processor	Xtensa 32-bit LX7 dual-core (ESP32-S3FH4R2)
Main Frequency	Up to 240MHz
Wireless Connectivity	2.4GHz Wi-Fi (802.11 b/g/n), Bluetooth 5 (LE)
SRAM	512KB
ROM	384KB
Flash Memory	4MB
PSRAM	2MB
GPIO Pins	24 (configurable)
Interfaces	4x SPI, 2x I2C, 3x UART, 2x I2S, 2x ADC, USB Type-C
Antenna	Onboard ceramic antenna
Power Supply	Flexible, independent settings for low power consumption

4. BOARD OVERVIEW

This section details the main components and their locations on the ESP32-S3 Mini Development Board.

What's On Board



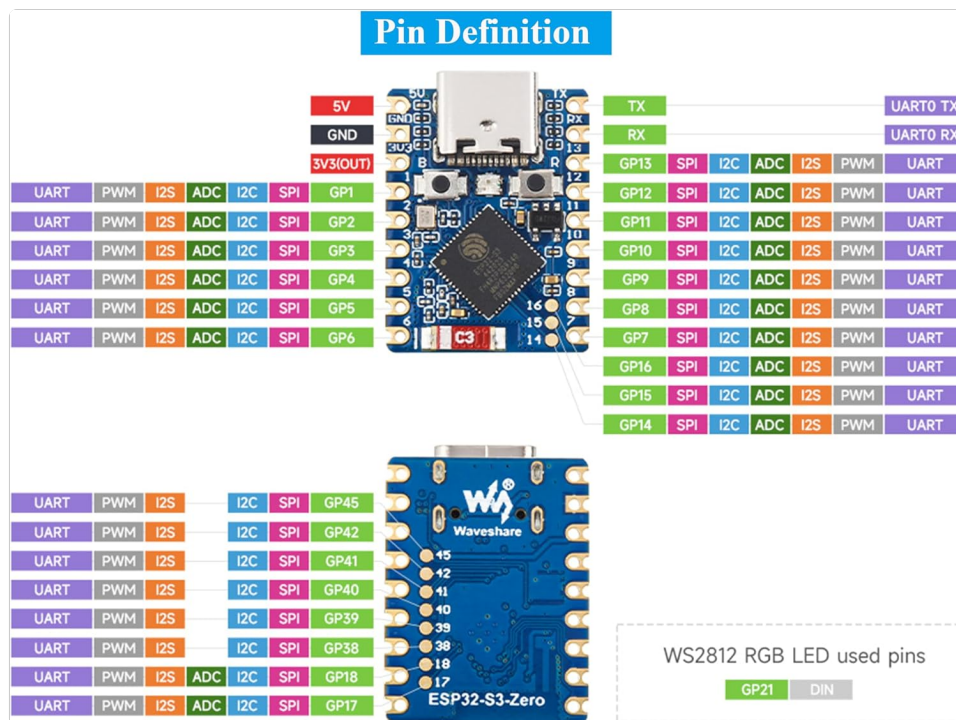
- | | |
|--|--|
| 1. ESP32-S3FH4R2 dual-core processor
up to 240MHz operating frequency | 5. 2.4G ceramic antenna |
| 2. USB Type-C Port | 6. BOOT button
Press it and then press the RESET button to enter
download mode |
| 3. ME6217C33M5G
low dropout LDO, 800mA (Max) | 7. RESET button |
| 4. WS2812 RGB LED | 8.ESP32-S3FH4R2 pins |

Image 4.1: Labeled components on the ESP32-S3 Mini Development Board.

1. **ESP32-S3FH4R2 Dual-Core Processor:** The main processing unit, operating up to 240MHz.
2. **USB Type-C Port:** Used for power supply, data communication, and programming.
3. **ME6217C33M5G Low Dropout (LDO) Regulator:** Provides stable 3.3V power, up to 800mA (Max).
4. **WS2812 RGB LED:** An addressable RGB LED for visual feedback.
5. **2.4G Ceramic Antenna:** Integrated antenna for Wi-Fi and Bluetooth connectivity.
6. **BOOT Button:** Used to enter download mode for flashing firmware.
7. **RESET Button:** Resets the board.
8. **ESP32-S3FH4R2 Pins:** General Purpose Input/Output pins for connecting peripherals.

5. PIN DEFINITION

The ESP32-S3 Mini Development Board offers a variety of pins for different functions. Refer to the diagram below for a detailed pinout, including UART, PWM, I2S, ADC, I2C, and SPI interfaces.



9. TROUBLESHOOTING

- **Board Not Detected / Upload Errors:** Ensure the USB Type-C cable is a data cable and not just a charging cable. Verify that the correct board and port are selected in your IDE. Remember to hold the BOOT button during the upload process as described in Section 7.1.
- **Serial Monitor Issues:** If the serial monitor shows garbled text or no output, check the baud rate setting in your IDE to ensure it matches the baud rate configured in your code. Pressing the RESET button after upload can also help initiate serial communication.
- **Firmware Not Running After Upload:** After a successful upload, press the RESET button to ensure the new firmware starts executing.
- **Issues Saving Files or Loading Libraries (MicroPython):** Refer to the official MicroPython documentation for ESP32-S3 for specific instructions on file management and library installation. Ensure sufficient memory is available.
- **Board Gets Warm:** Some warmth during operation is normal, especially under heavy load or when using Wi-Fi/Bluetooth. Excessive heat might indicate a short circuit or incorrect wiring. Disconnect power immediately and inspect connections.
- **General Instability:** Ensure your power supply is stable and sufficient. Check all connections for proper contact. Consult the Waveshare Wiki or Espressif documentation for known issues and solutions.

10. PACKAGE CONTENTS

The standard package for the ESP32-S3 Mini Development Board includes:

- ESP32-S3-Zero x1

11. SUPPORT AND RESOURCES

For further assistance, detailed documentation, and community support, please refer to the following resources:

- **Waveshare Wiki:** The official Waveshare website often provides extensive documentation, examples, and tutorials for their products.
- **Espressif Documentation:** For in-depth technical details on the ESP32-S3 chip, including datasheets, programming guides, and SDKs, visit the official Espressif website.
- **Community Forums:** Online forums and communities dedicated to ESP32 development can be valuable resources for troubleshooting and project ideas.

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Name

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After a successful submission, we securely hash the supplied account or form email before sending it to Microsoft Advertising for conversion attribution. [Privacy details](#).

Question

Example: How do I reset this device or fix this error?

Details

Model number, symptoms, what you tried, or the section of the manual you are using.

Submit question