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ACEIRMC ESP32 C3 Mini

ACEIRMC ESP32-C3 Mini Development Board User Manual

Model: ESP32 C3 Mini

1. INTRODUCTION

The ACEIRMC ESP32-C3 Mini Development Board is a compact IoT development board featuring the Espressif ESP32-C3 Wi-Fi and Bluetooth dual-mode chip. This board integrates a 32-bit RISC-V CPU with a Floating Point Unit (FPU), offering powerful computing capabilities for various applications. It supports IEEE 802.11 b/g/n Wi-Fi and Bluetooth 5 (LE) protocols, making it ideal for low-power IoT and wireless wearable projects. Its small form factor and rich interface set, including digital I/Os (PWM), analog I/Os (ADC), UART, I2C, and SPI, provide flexibility for developers.

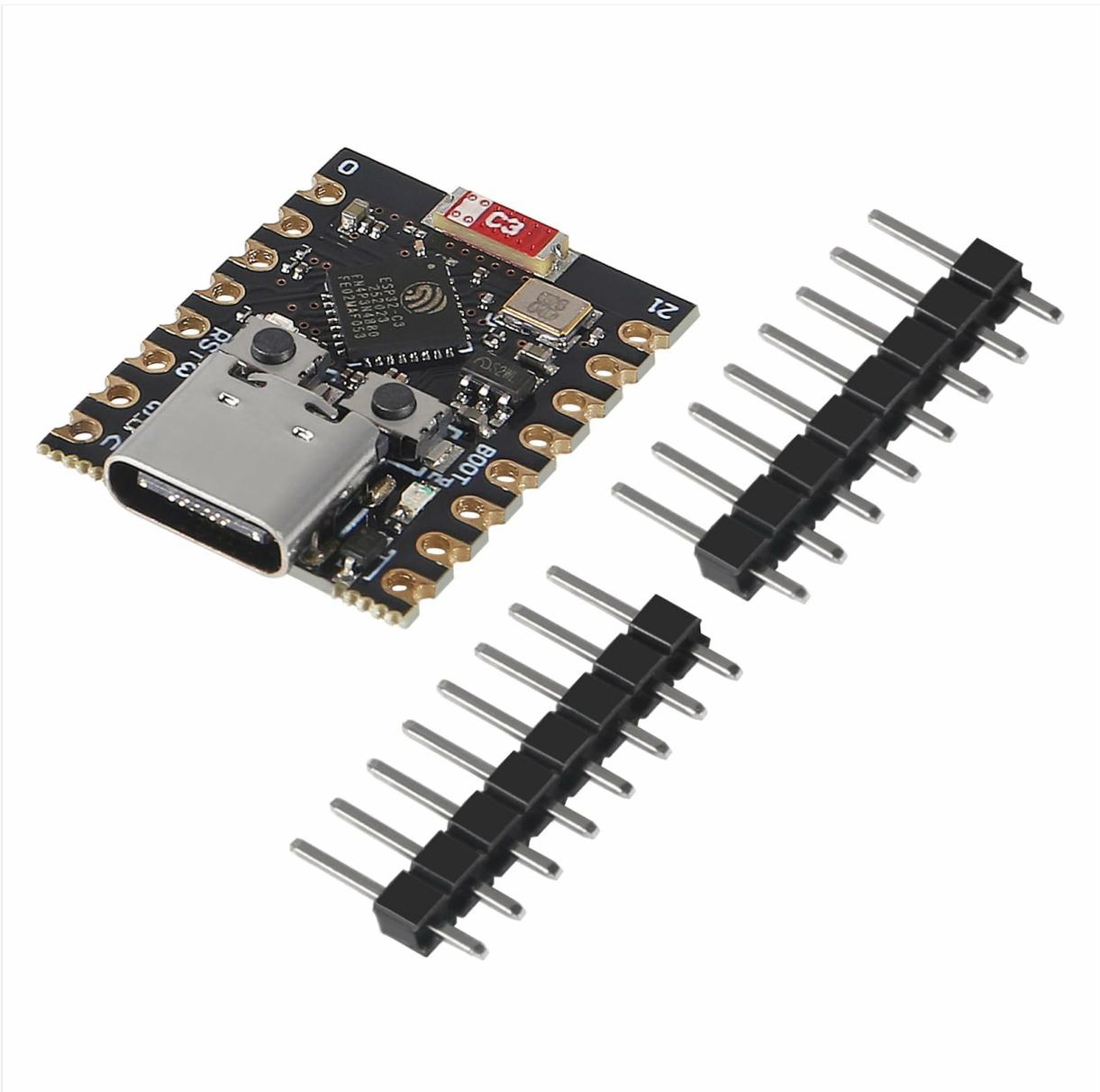


Image 1.1: ACEIRMC ESP32-C3 Mini Development Board

2. KEY FEATURES

- **Processor:** ESP32-C3, single-core 32-bit RISC-V processor, up to 160 MHz.
- **Wireless Connectivity:** Integrated Wi-Fi (802.11 b/g/n, 2.4GHz) and Bluetooth 5.0 (LE).
- **Memory:** 400 KB SRAM, 384 KB ROM, with built-in 4MFlash.
- **Low Power Consumption:** Designed for energy-efficient IoT applications.
- **Interfaces:** 1x I2C, 1x SPI, 2x UART, 11x GPIO (PWM capable), 4x ADC.
- **Compact Design:** Ultra-small size (22.52mm x 18mm) with single-sided surface mount.
- **Security Features:** Encryption hardware accelerator supporting AES-128/256, hashing, RSA, HMAC, digital signatures, and secure boot.

3. TECHNICAL SPECIFICATIONS

Brand	ACEIRMC
Model Name	ESP32 C3 Mini
Chip Model	ESP32C3FN4

CPU Speed	160 MHz
RAM	400KB SRAM
ROM	384KB ROM
Flash Memory	4MB
Connectivity Technology	Wi-Fi, Bluetooth, I2C, SPI, UART, GPIO, ADC
Operating System	FreeRTOS (typical development environment)
Dimensions	22.52mm x 18mm (0.86 x 0.70 inches)
Item Weight	0.16 ounces

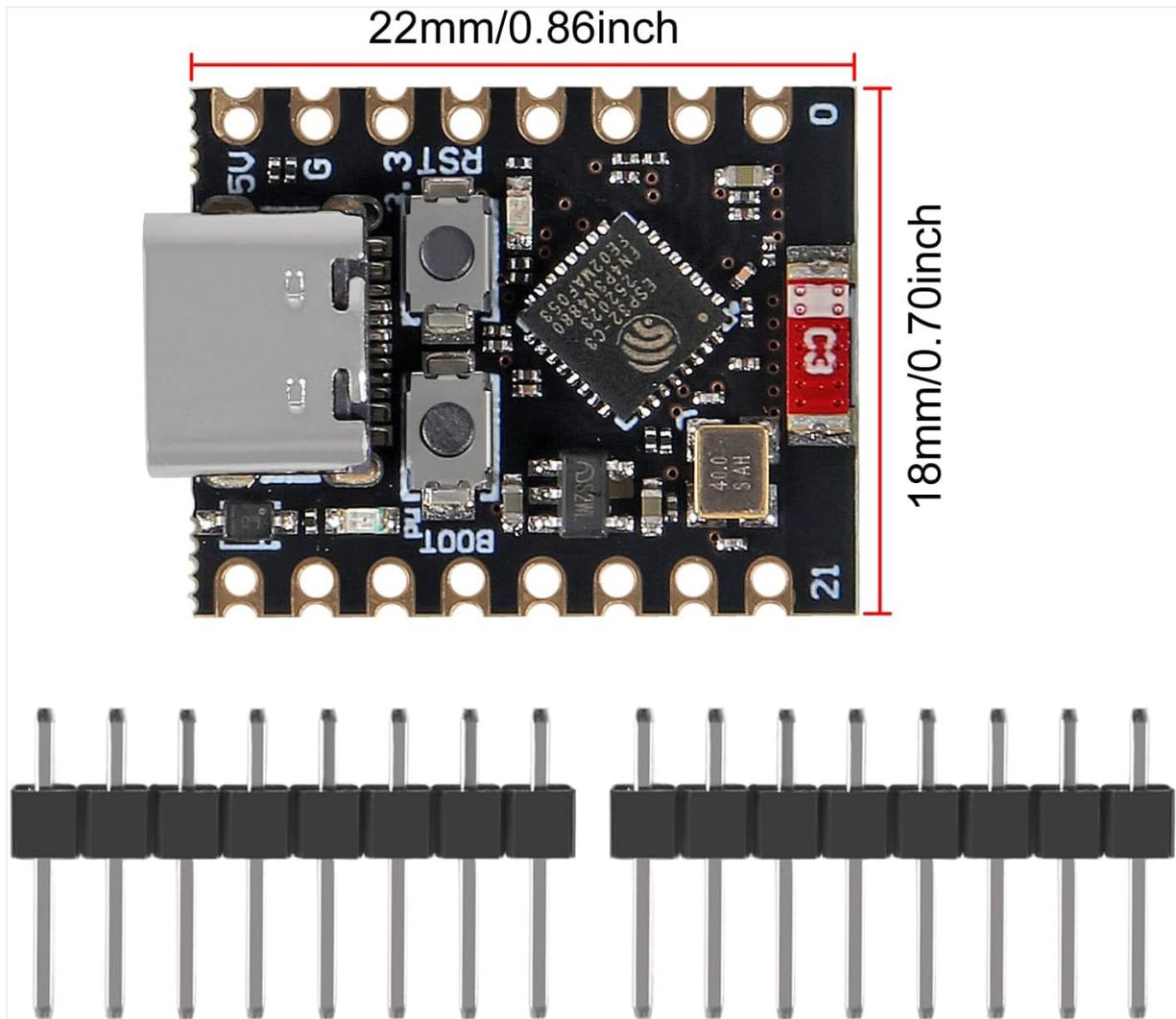


Image 3.1: Board Dimensions

4. PACKAGE CONTENTS

The package includes:

- 1 x ESP32-C3 Mini Development Board
- 2 x Pin Headers (unassembled)

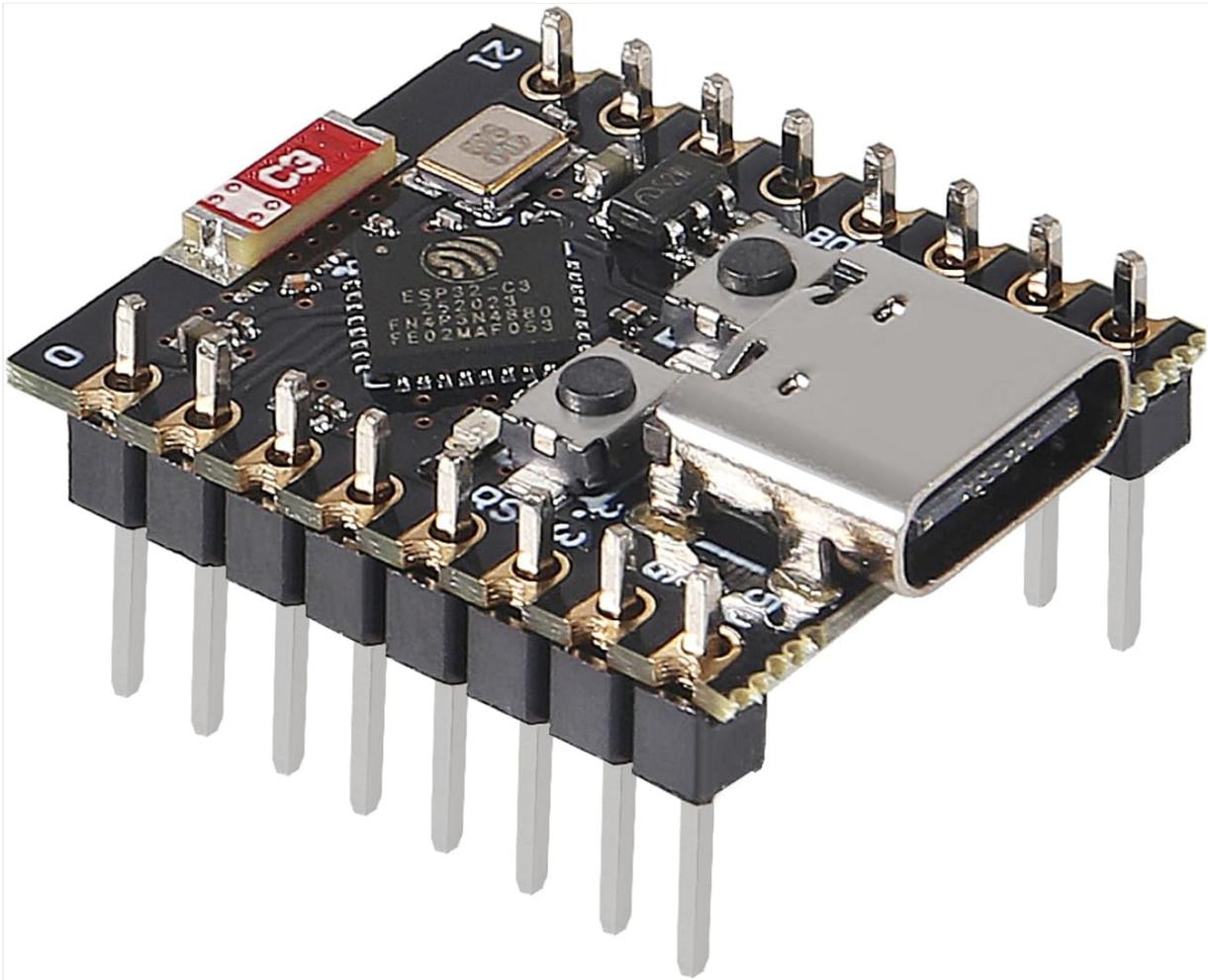


Image 4.1: Included Components

5. INITIAL SETUP

5.1. Pin Header Assembly

The included pin headers are typically not pre-soldered. You will need to solder them to the board if you intend to use it on a breadboard or with jumper wires. Ensure proper alignment before soldering.

5.2. Driver Installation

Connect the ESP32-C3 Mini board to your computer using a USB-C cable. Most modern operating systems will automatically install the necessary USB-to-Serial drivers. If the board is not recognized, you may need to manually install drivers for the USB-to-Serial chip (often CH340 or CP210x, though the ESP32-C3 typically uses its internal USB-JTAG).

5.3. Development Environment Setup

To program the ESP32-C3 Mini, you will need a suitable development environment. Popular choices include:

- **Arduino IDE:** Install the ESP32 board package through the Boards Manager. Select "ESP32C3 Dev Module" as your board.
- **Espressif IDF:** For more advanced development, use Espressif's official IoT Development Framework.
- **MicroPython:** Flash MicroPython firmware to program the board using Python.

Refer to the official documentation for your chosen development environment for detailed installation and configuration instructions.

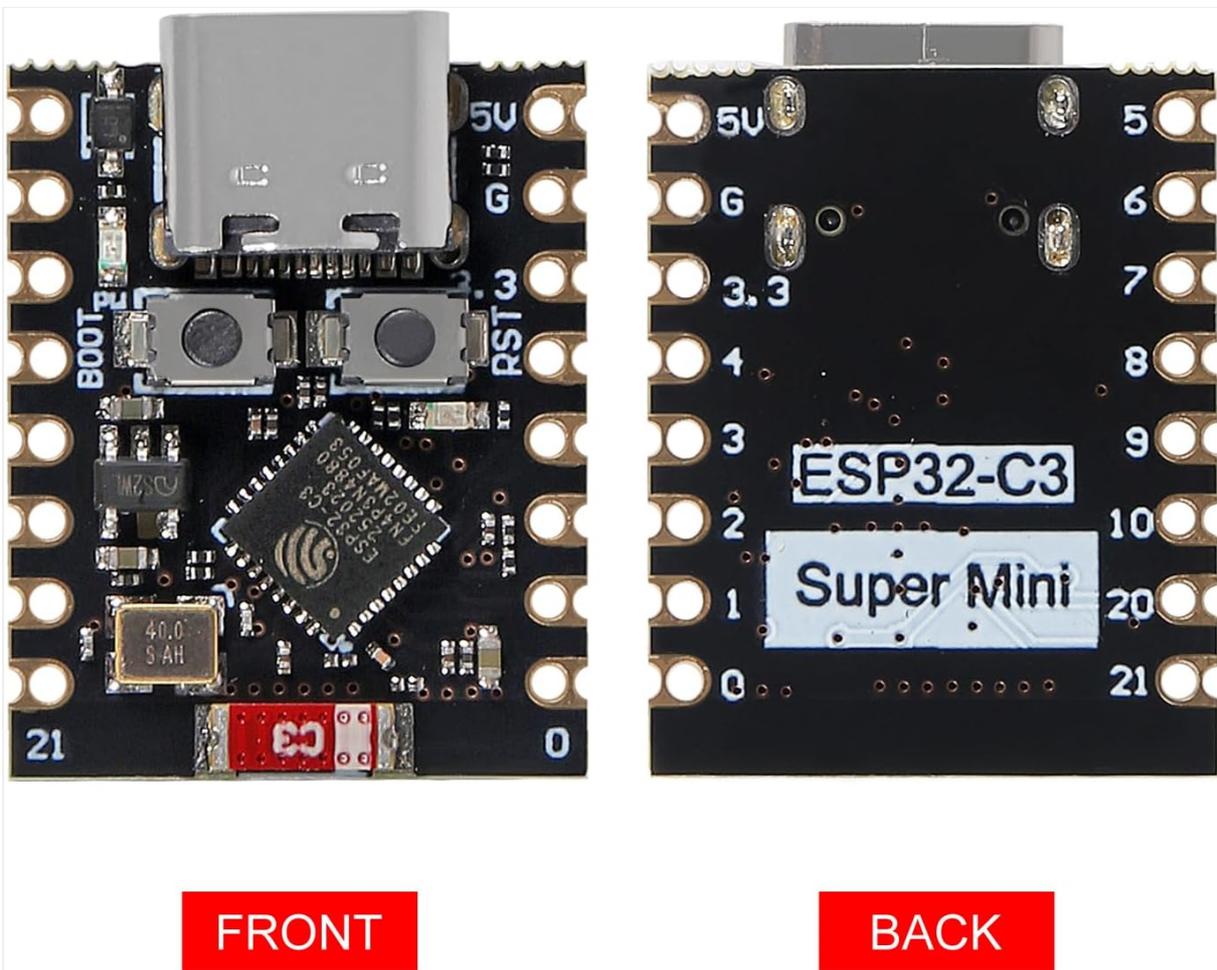


Image 5.1: Front and Back Pinout

6. OPERATION

6.1. Powering the Board

The board can be powered via the USB-C port. Alternatively, an external power supply (3.3V to 6V) can be connected to the 5V and GND pins. **Important:** When using an external power supply, disconnect the USB-C cable to avoid conflicts and potential damage.

6.2. Programming Mode

To upload new firmware, the board typically needs to be in programming mode. This is usually achieved by:

1. Connect the board to your computer via USB-C.
2. Press and hold the **BOOT** button.
3. While holding **BOOT**, briefly press and release the **RST** button.
4. Release the **BOOT** button. The board is now in programming mode.

After uploading, press the **RST** button to exit programming mode and run your new code.

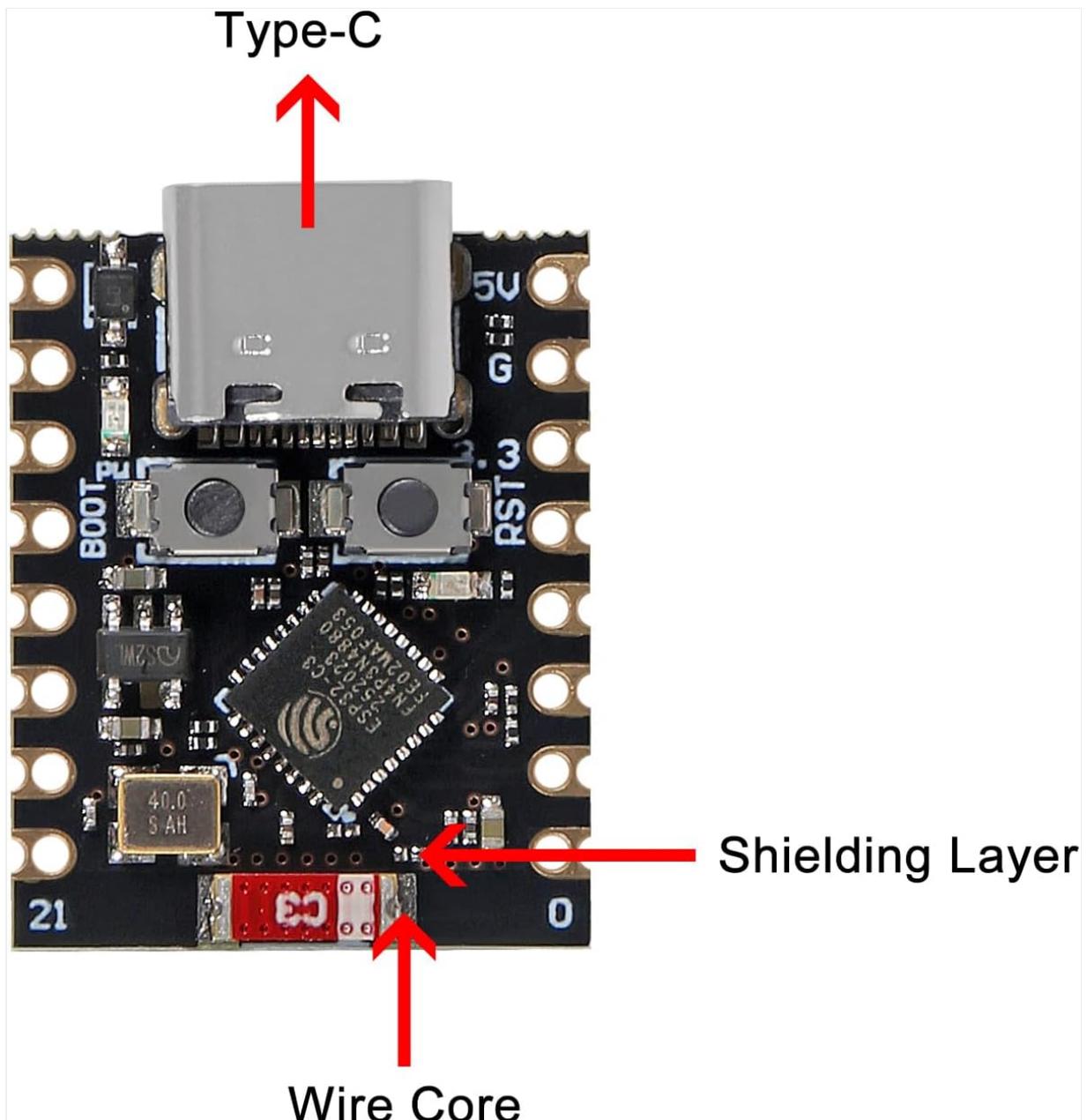


Image 6.1: Key Components (USB-C, Shielding Layer, Wire Core)

6.3. Using Wi-Fi and Bluetooth

The ESP32-C3 supports both 2.4GHz Wi-Fi and Bluetooth 5.0 (LE). You can integrate these functionalities into your projects using the respective libraries in your chosen development environment. For Wi-Fi, the board supports Station, SoftAP, and SoftAP+Station modes.

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Video 6.1: Overview of the ESP32-C3 Development Board Mini WiFi Bluetooth

7. TROUBLESHOOTING

7.1. Board Not Recognized / Boot Loop

If the board is not recognized by your computer or enters a continuous boot loop upon connection, it might be stuck in an incorrect state. Follow these steps to enter programming mode:

1. Ensure the board is connected via USB-C.
2. Press and hold the **BOOT** button.
3. While holding **BOOT**, press and release the **RST** button.

4. Release the **BOOT** button.

Your computer should now recognize the board, and you can proceed with flashing firmware. After flashing, press **RST** to run the new program.

7.2. Upload Errors

If you encounter upload errors, verify the following:

- Correct board selected in your IDE (e.g., "ESP32C3 Dev Module").
- Correct COM port selected.
- Board is in programming mode (refer to section 6.2).
- USB-C cable is data-capable (some cables are charge-only).

7.3. Wi-Fi/Bluetooth Connectivity Issues

Ensure your code correctly initializes and uses the Wi-Fi/Bluetooth modules. Check antenna connections if applicable (this board has an integrated antenna). Test in close proximity to your router or Bluetooth device to rule out range issues.

8. SAFETY INFORMATION

- Handle the board with care to avoid electrostatic discharge.
- Do not expose the board to moisture or extreme temperatures.
- Ensure correct voltage and polarity when connecting external power supplies. Incorrect connections can damage the board.
- Disconnect power before making any physical changes or connections to the board.
- Keep out of reach of children.

9. WARRANTY AND SUPPORT

Specific warranty details for this product are not provided in the available information. For warranty claims or technical support, please contact the manufacturer, ACEIRMC, or your point of purchase. Keep your purchase receipt as proof of purchase.