

Espressif ESP32-C3-MINI-1U-N4

Espressif ESP32-C3-MINI-1U-N4 Module User Manual

Model: ESP32-C3-MINI-1U-N4

1. INTRODUCTION

This manual provides essential information for the proper use and understanding of the Espressif ESP32-C3-MINI-1U-N4 module. The ESP32-C3-MINI-1U-N4 is a small-sized, low-power Wi-Fi and Bluetooth 5 module designed for a wide range of IoT applications. It integrates a RISC-V single-core microprocessor and 4 MB of flash memory.

Please read this manual thoroughly before operating the module to ensure correct installation and functionality.

2. KEY FEATURES

- Small-sized 2.4 GHz Wi-Fi (802.11 b/g/n) and Bluetooth 5 module.
- Built around the ESP32-C3 series of SoCs, featuring a RISC-V single-core microprocessor.
- Integrated 4 MB flash memory.
- 15 General Purpose Input/Output (GPIO) pins.
- On-board external IPEX antenna connector.
- Operating temperature range: -40°C to +85°C.
- Supports FreeRTOS operating system.

3. PACKAGE CONTENTS

Verify that all items are present and in good condition upon opening the package.

- 1 x ESP32-C3-MINI-1U-N4 Module
- 1 x External Antenna



Image: The ESP32-C3-MINI-1U-N4 module, typically a small surface-mount device, shown alongside its external antenna. This image illustrates the physical appearance of the module and its included antenna.

4. SETUP INSTRUCTIONS

This section outlines the basic steps for integrating and powering the ESP32-C3-MINI-1U-N4 module.

4.1. Antenna Connection

1. Locate the IPEX antenna connector on the ESP32-C3-MINI-1U-N4 module.
2. Carefully align the provided external antenna connector with the module's IPEX connector.
3. Gently press down until the antenna connector snaps securely into place. Ensure a firm connection to optimize wireless performance.

4.2. Power Supply

The module requires a stable power supply. Refer to the module's datasheet for specific voltage requirements. Incorrect voltage can damage the module.

4.3. Integration with Host Board

The ESP32-C3-MINI-1U-N4 is an SMD (Surface Mount Device) module. Integration typically involves soldering the module onto a custom PCB or a development board. Consult the module's official datasheet for detailed pinout diagrams and recommended PCB layout guidelines.

5. OPERATING THE MODULE

Operating the ESP32-C3-MINI-1U-N4 involves programming and interacting with its firmware. This module is designed for embedded applications and typically runs custom firmware.

5.1. Firmware Development

- **Development Environment:** Espressif provides the ESP-IDF (Espressif IoT Development Framework) for developing applications on ESP32-C3 series SoCs. This framework includes

toolchains, APIs, and examples.

- **Programming Interface:** The module can be programmed via its UART interface. A USB-to-UART converter is typically required to connect the module to a computer for flashing firmware.
- **Operating System:** The module supports FreeRTOS, a real-time operating system for embedded systems.

5.2. Wireless Connectivity

- **Wi-Fi:** The module supports 2.4 GHz Wi-Fi (802.11 b/g/n). Firmware can be developed to connect to Wi-Fi networks, host access points, or perform Wi-Fi Direct operations.
- **Bluetooth:** Bluetooth 5 (LE) is supported. Applications can utilize Bluetooth for short-range communication, sensor data transfer, and device pairing.

6. MAINTENANCE

The ESP32-C3-MINI-1U-N4 module is a robust electronic component designed for long-term operation. Minimal maintenance is typically required.

- **Environmental Conditions:** Ensure the module operates within its specified temperature range (-40°C to +85°C) and humidity levels to prevent damage.
- **Cleaning:** If necessary, gently clean the module with a dry, soft brush or compressed air to remove dust. Avoid using liquids or abrasive materials.
- **Firmware Updates:** Periodically check the Espressif website for firmware updates or security patches for the ESP-IDF, which may improve performance or address issues.

7. TROUBLESHOOTING

This section provides guidance for common issues encountered with the ESP32-C3-MINI-1U-N4 module.

| Problem | Possible Cause | Solution |
|----------------------------|---|--|
| Module not powering on. | Incorrect power supply voltage or polarity; faulty connection. | Verify power supply voltage against datasheet specifications. Check all power connections for proper contact and polarity. |
| Wi-Fi connection issues. | Antenna not connected properly; incorrect Wi-Fi credentials in firmware; weak signal. | Ensure the external antenna is securely connected. Double-check Wi-Fi SSID and password in your firmware. Move the module closer to the Wi-Fi access point. |
| Firmware flashing failure. | Incorrect UART connection; driver issues; module not in boot mode. | Verify UART TX/RX connections. Install correct USB-to-UART bridge drivers. Ensure the module is correctly put into bootloader mode (refer to Espressif documentation for specific pin states during boot). |

8. TECHNICAL SPECIFICATIONS

| Feature | Detail |
|---------|---------------------|
| Model | ESP32-C3-MINI-1U-N4 |

| Feature | Detail |
|--------------------------|---|
| SoC | ESP32-C3 series, RISC-V single-core microprocessor |
| Flash Memory | 4 MB |
| RAM | LPDDR4 <i>(Note: This specification may refer to external memory compatibility or be a data entry discrepancy, as ESP32-C3 typically features internal SRAM.)</i> |
| Wireless Connectivity | 2.4 GHz Wi-Fi (802.11 b/g/n), Bluetooth 5 (LE) |
| Antenna Connector | IPEX |
| GPIOs | 15 |
| Operating Temperature | -40°C to +85°C |
| Operating System Support | FreeRTOS |

9. WARRANTY INFORMATION

Espressif products are typically covered by a limited warranty against defects in materials and workmanship. For detailed warranty terms and conditions, please refer to the official Espressif website or contact your distributor. Keep your purchase receipt as proof of purchase.

10. TECHNICAL SUPPORT

For technical assistance, documentation, and community forums, please visit the official Espressif Systems website:

Espressif Systems Official Website: www.espressif.com

You can find datasheets, programming guides, and development tools (ESP-IDF) on their support pages. Community forums are also available for peer-to-peer support and project discussions.

11. VIDEO RESOURCES

No official product videos from the seller were provided in the product data for this manual. Please refer to the Espressif Systems official website or their YouTube channel for relevant tutorials and demonstrations related to the ESP32-C3 series.