

AYWHP ESP32-S3 DevC-1-N16R8-S3

AYWHP ESP32-S3 DevC-1-N16R8-S3 Development Board User Manual

1. INTRODUCTION

The **AYWHP ESP32-S3 DevC-1-N16R8-S3** development board is a powerful tool designed for *Internet of Things (IoT)* applications. It integrates **Wi-Fi** and **Bluetooth** connectivity, making it versatile for various projects. Featuring two **USB Type-C** interfaces, it offers flexible options for power supply and data communication. The board's rich interface design includes multiple **GPIO** pins, **I2C**, **SPI**, and **UART** interfaces, allowing for easy connection to a wide range of sensors and peripherals. Compatible with various development environments, this board is suitable for both beginners and experienced developers looking to implement diverse projects.

2. KEY FEATURES

- **Low Power Performance:** Utilizes the efficient **ESP WROOM** module, providing excellent **Wi-Fi** and **Bluetooth** connectivity, ideal for *Arduino IoT* projects.
- **Dual Download Mode:** Equipped with two **USB Type-C** interfaces for flexible power and data connections, supporting both direct **USB** and **USB-to-serial** downloads.
- **Easy Programming and Debugging:** The **ESP32-S3** module can be programmed and flashed via the two **USB Type-C** ports, offering options for **USB** or **UART** mode.
- **Secure and Energy Efficient:** Supports low-power applications and incorporates various security features to meet stringent security requirements, ensuring longer battery life.
- **Multiple Connection Options:** Supports **Wi-Fi** and **Bluetooth 5.0 (LE)**, and includes a port for an external antenna, making it suitable for a variety of smart devices and *IoT* applications.

3. HARDWARE OVERVIEW

The **ESP32-S3 DevC-1-N16R8-S3** board is designed for ease of use and integration. Below are detailed views of its components and layout.

Scheda di sviluppo ESP32-S3 DevC-1-N16R8-S3

Introduzione hardware

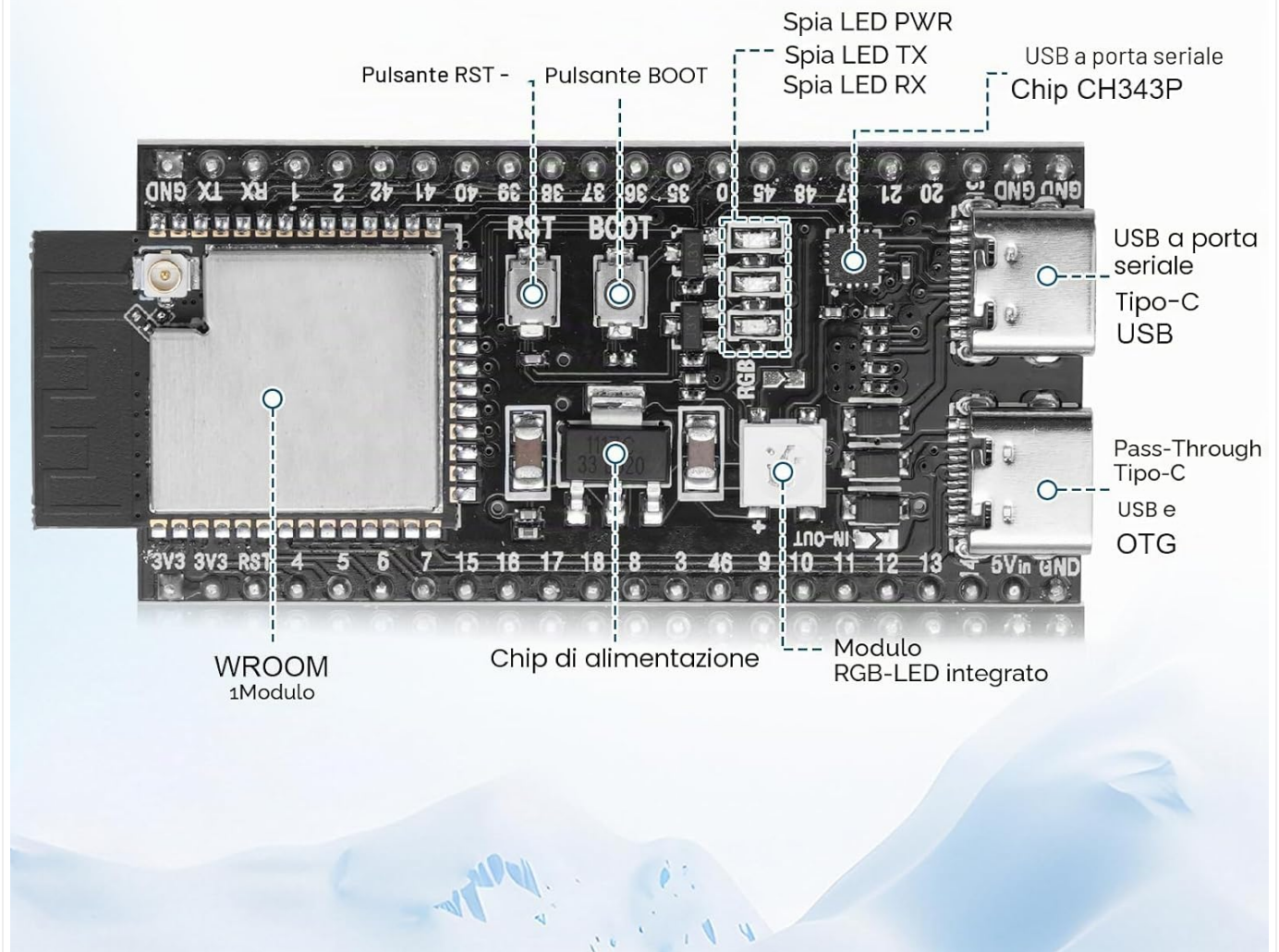
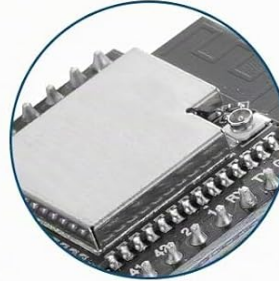
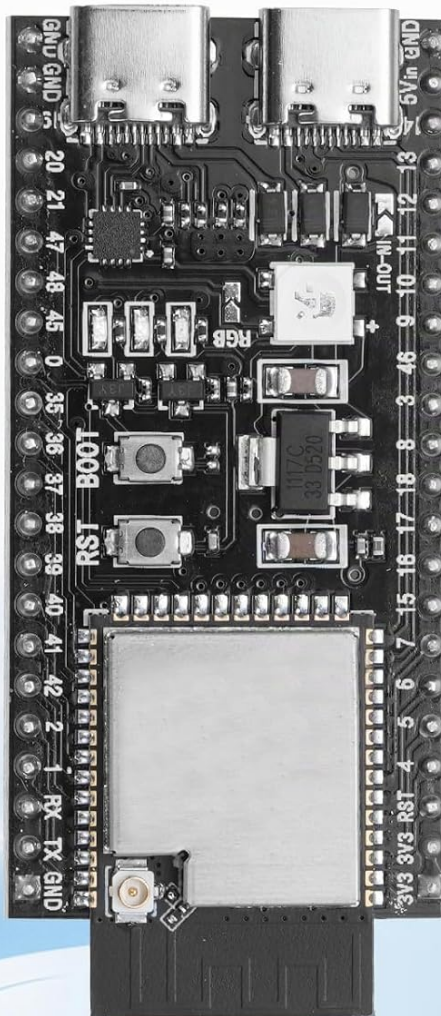


Figure 3.1: Hardware Introduction. This image provides an annotated overview of the development board, highlighting key components such as the **RST** (Reset) button, **BOOT** button, **PWR LED**, **TX/RX LEDs**, **USB-to-serial port (CH343P)**, **USB-C ports** for serial and **OTG**, the **WROOM-1 module**, power chip, and integrated **RGB-LED module**.

ESP32-S3 DevC-1-N16R8-S3

Dettagli della scheda di sviluppo



Chip:WROOM-1



Chip di alimentazione



USB Type-C

Figure 3.2: Development Board Details. A close-up view emphasizing critical components: the **WROOM-1** chip, the dedicated power chip, and the dual **USB Type-C** ports for connectivity.

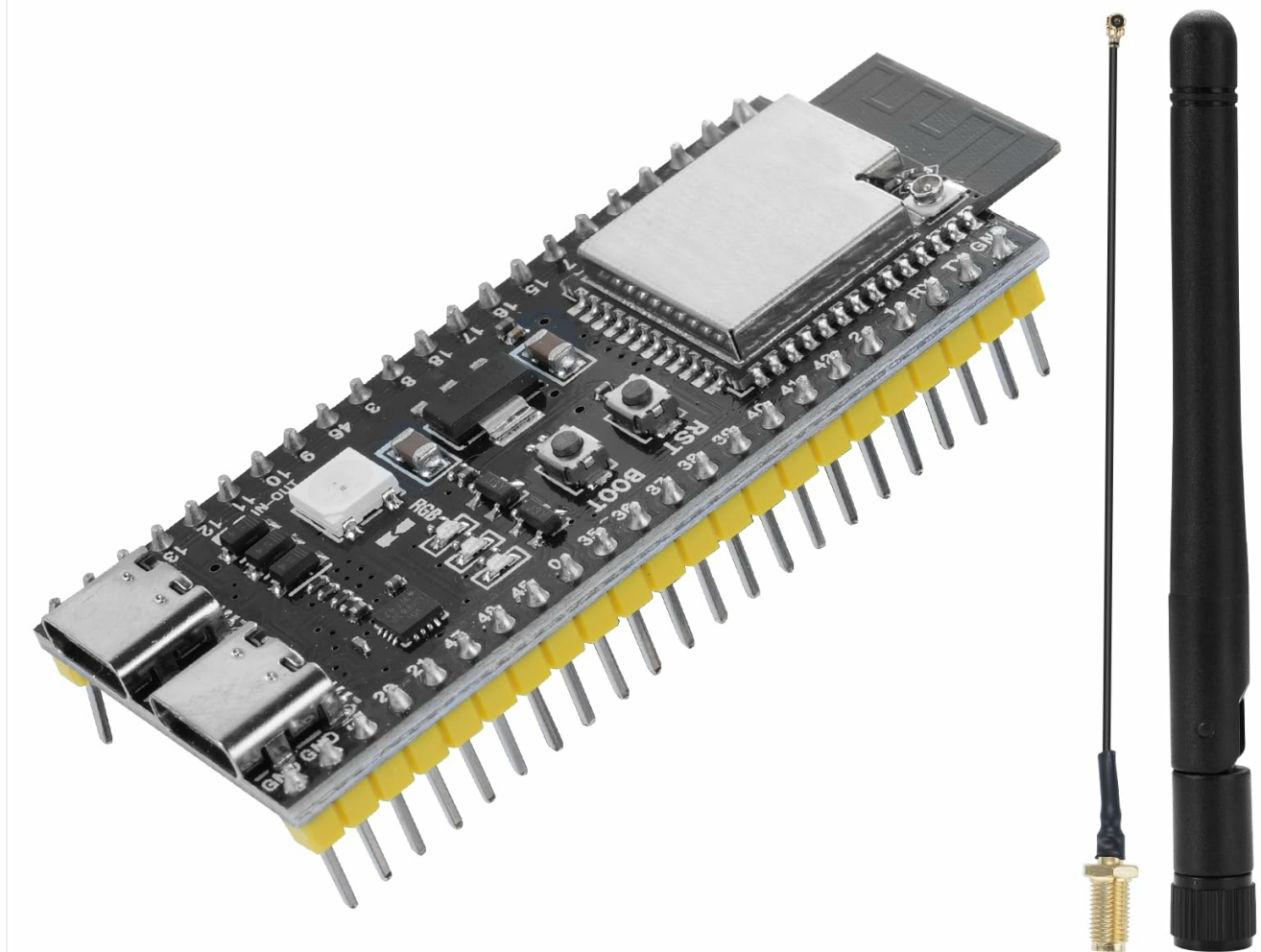


Figure 4.1: Development Board Dimensions. A top-down view of the **ESP32-S3** development board with precise measurements in millimeters and inches, indicating its compact form factor.

5. PINOUT AND SYSTEM ARCHITECTURE

The following diagrams illustrate the pin assignments and the internal block structure of the **ESP32-S3 DevC-1-N16R8-S3** development board.

ESP32-S3 DevC-1-N16R8-S3

Scheda di sviluppo

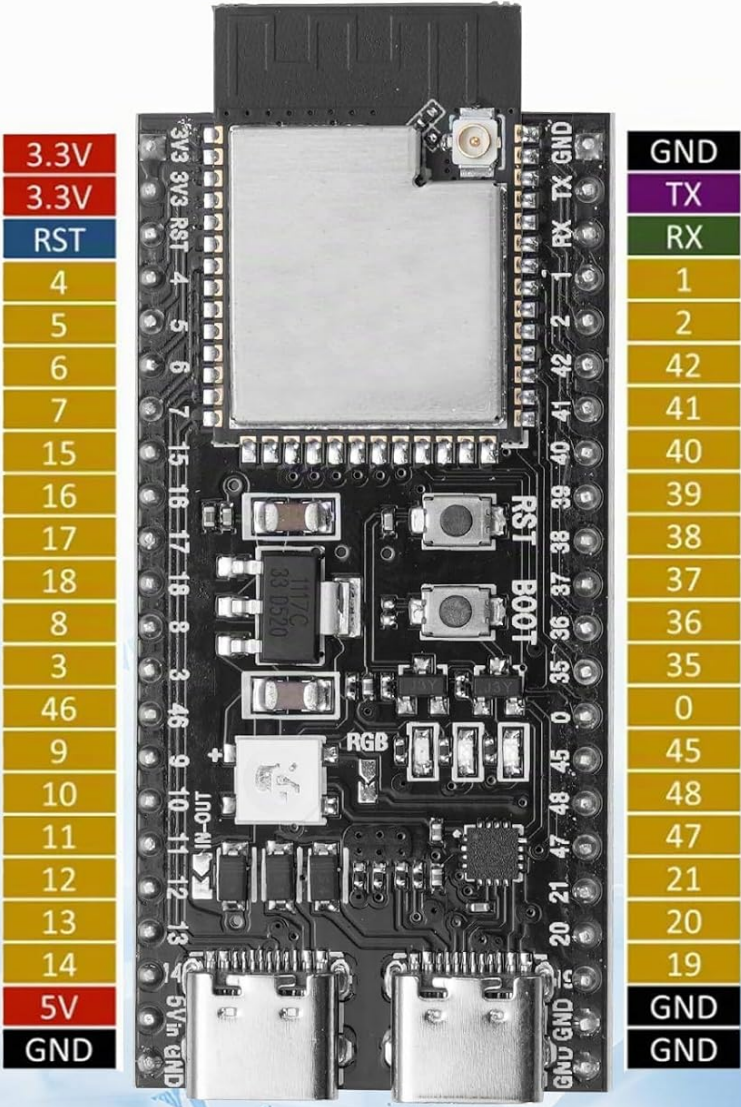
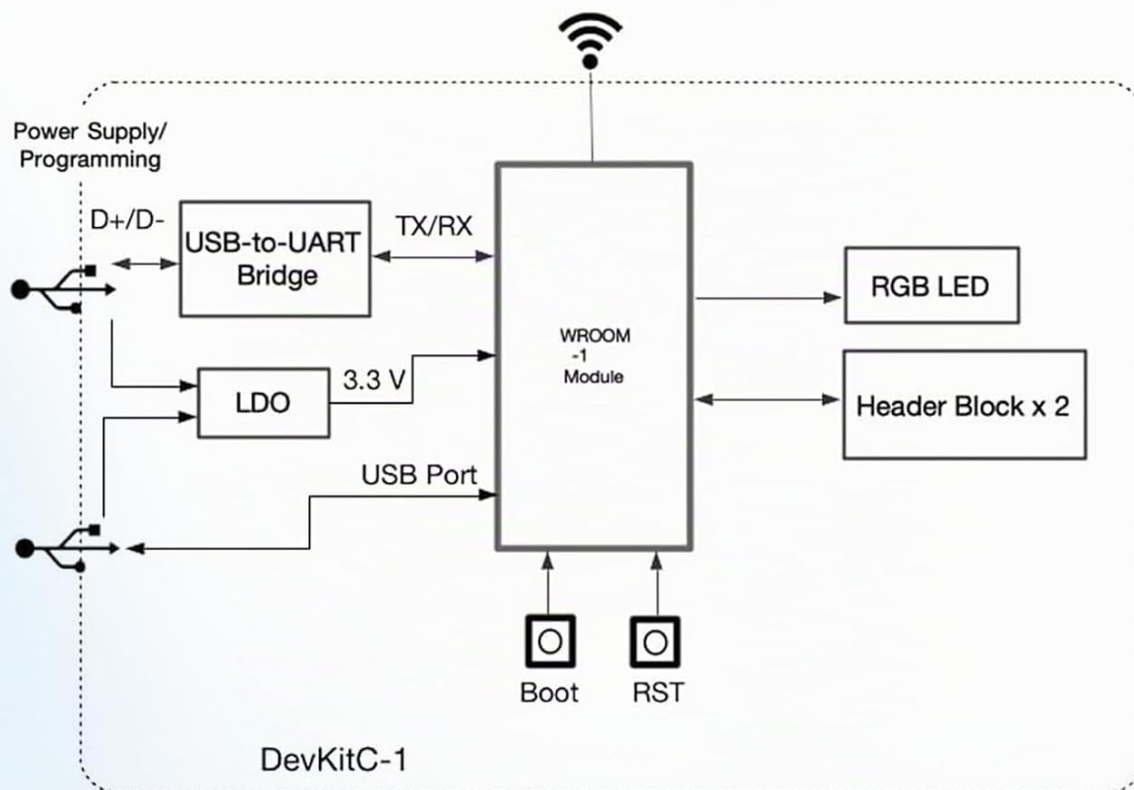


Figure 5.1: Development Board Pinout. A detailed image of the development board with color-coded pin labels for 3.3V, RST, GND, TX, RX, and various GPIO pins, indicating their positions on the board headers. Users should refer to this diagram for connecting external components.

ESP32-S3 DevC-1-N16R8-S3

Scheda di sviluppo



Modulo

- 8 MB Flash e 8 MB PSRAM
- Integra funzioni complete Wi-Fi e Bluetooth LE
- Facile da usare e flessibile da espandere

Figure 5.2: Development Board Block Diagram. A simplified block diagram illustrating the internal connections and components of the DevKitC-1, including the WROOM-1 module, USB-to-UART bridge, LDO (Low-Dropout Regulator), USB port, RGB LED, and header blocks.

6. TECHNICAL SPECIFICATIONS

Feature	Specification
Microcontroller Chip	ESP32-S3-WROOM-1-N16R8
CPU	Dual-Core Xtensa LX7 32-bit
Clock Frequency	Up to 240 MHz
Flash Memory	16 MB (built-in)
RAM	512 KB
Wireless Connectivity	Wi-Fi 802.11 b/g/n (2.4 GHz), Bluetooth 5.0 (BLE)

Feature	Specification
I/O Pins	34 GPIO
Analog-to-Digital Converter (ADC)	12-bit resolution, 18 channels
Digital-to-Analog Converter (DAC)	8-bit resolution (Note: See Section 8 for clarification)
UART Interfaces	3
SPI Interfaces	2
I2C Interfaces	2
PWM Channels	16
Operating Voltage	3.3 V
Power Supply	USB-C or external 5 V
USB Interface	For programming and debugging (2 ports)

7. SETUP AND INITIAL PROGRAMMING

This section guides you through the basic steps to set up and program your **ESP32-S3 DevC-1-N16R8-S3** development board.

- 1. Connect Power and Data:** Use a **USB Type-C** cable to connect the board to your computer. The board features two **USB Type-C** ports; one typically functions as a **USB-to-serial** converter for programming and debugging, while the other can be used for *USB OTG* or direct **USB** functionality of the **ESP32-S3**.
- 2. Driver Installation:** Your operating system may require drivers for the **USB-to-serial** chip (e.g., **CH343P**). These drivers are usually available from the chip manufacturer's website or can be automatically installed by some development environments.
- 3. Development Environment Setup:** The board is compatible with various development environments, including the *Arduino IDE*, *ESP-IDF*, and *MicroPython*. Install the necessary board support packages or toolchains for your chosen environment. For *Arduino IDE*, add the **ESP32** board manager URL and install the **ESP32-S3** boards.
- 4. Upload Your Code:** Select the correct board model (e.g., **ESP32-S3 Dev Module**) and the appropriate **COM port** in your development environment. You can then upload your firmware or sketches to the board. The board supports dual download modes, allowing flexible programming.
- 5. External Antenna:** If using the external antenna, ensure it is securely connected to the **IPEX connector** on the board for optimal wireless performance.

8. IMPORTANT NOTES AND KNOWN DISCREPANCIES

Users should be aware of the following points and potential discrepancies in documentation:

- Pinout Documentation:** There have been reports of discrepancies between the silkscreen labels on the PCB and some published pinout diagrams. Always cross-reference with official **Espressif ESP32-S3** documentation and, if uncertain, verify pin functionality with a multimeter or simple test code before connecting sensitive components.
- Wi-Fi Band:** The **ESP32-S3** chip supports **Wi-Fi 802.11 b/g/n**, which operates exclusively in the **2.4 GHz** band. Despite some descriptions mentioning "dual-band Wi-Fi," the **ESP32-S3** does not support **5 GHz Wi-Fi**.

- **Digital-to-Analog Converter (DAC):** While some specifications might list an 8-bit **DAC**, the **ESP32-S3** typically does not feature an integrated hardware **DAC**. It has **ADC** inputs but usually relies on *PWM* for analog output simulation. Please verify specific chip capabilities if **DAC** functionality is critical for your application.
- **WROOM Module Variant:** The product is described as using an **ESP32-S3-WROOM-1-N16R8** module with an external antenna connector. Standard **WROOM-1** modules usually feature a PCB antenna, while **WROOM-1U** variants include an external antenna connector. Ensure the module on your board matches the expected functionality for the external antenna.

9. TROUBLESHOOTING

If you encounter issues with your **ESP32-S3 DevC-1-N16R8-S3** development board, consider the following troubleshooting steps:

- **Power Issues:** Ensure the board is receiving adequate power. Check the **USB Type-C** cable and port. Try a different cable or port. The **PWR LED** should illuminate when power is supplied.
- **Connectivity Problems:** If your computer doesn't recognize the board, verify that the **USB-to-serial** drivers are correctly installed. Check your device manager for any unrecognized devices or driver errors.
- **Programming Errors:** If code upload fails, ensure you have selected the correct board and **COM port** in your *IDE*. Try holding the **BOOT** button while pressing and releasing the **RST** button, then release **BOOT** to enter download mode.
- **Pinout Discrepancies:** As noted in Section 8, verify the actual pin functionality if you suspect a mismatch between documentation and the physical board. Incorrect pin connections can lead to unexpected behavior or damage.
- **Wi-Fi/Bluetooth Issues:** Ensure your external antenna is properly connected. Check your code for correct initialization of **Wi-Fi** or **Bluetooth** modules. Remember that **Wi-Fi** operates only on **2.4 GHz**.
- **Component Damage:** Visually inspect the board for any signs of physical damage, such as bent pins, burnt components, or solder bridges.

10. SAFETY INFORMATION

Please observe the following safety guidelines when working with the development board:

- **Static Electricity:** Handle the board with care to prevent damage from electrostatic discharge (ESD). Use an anti-static wrist strap or work on an anti-static mat.
- **Power Supply:** Only use power supplies that meet the specified voltage (3.3V operating, 5V input via USB-C or external). Exceeding the maximum voltage can damage the board.
- **Short Circuits:** Avoid short circuits between pins or components. Double-check your wiring before applying power.
- **Heat:** Some components may generate heat during operation. Ensure adequate ventilation and avoid touching hot components.
- **Environment:** Do not expose the board to moisture, extreme temperatures, or corrosive environments.

11. WARRANTY AND SUPPORT

For warranty information or technical support, please refer to the retailer or manufacturer's official website. Keep your proof of purchase for any warranty claims. For community support, online forums and resources for **ESP32** development are widely available.

ASK A QUESTION ABOUT THIS MANUAL

Ask about setup, troubleshooting, compatibility, parts, safety, or missing instructions. Manuals+ will review the question and use this page's manual context to help answer it.

Name

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Email

you@example.com

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