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› DORHEA ESP32 ESP-32S WiFi Development Board User Manual

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DORHEA ESP32 ESP-32S WiFi Development Board User Manual

Model: ESP32 ESP-32S

1. INTRODUCTION

This manual provides comprehensive instructions for the DORHEA ESP32 ESP-32S WiFi Development Board. This board is a versatile 2.4GHz dual-mode WiFi and Bluetooth microcontroller, featuring a dual-core processor and an integrated CP2102 chip for stable USB serial communication. It is designed for a wide range of applications, from home automation to wireless industrial control, and supports various development environments.

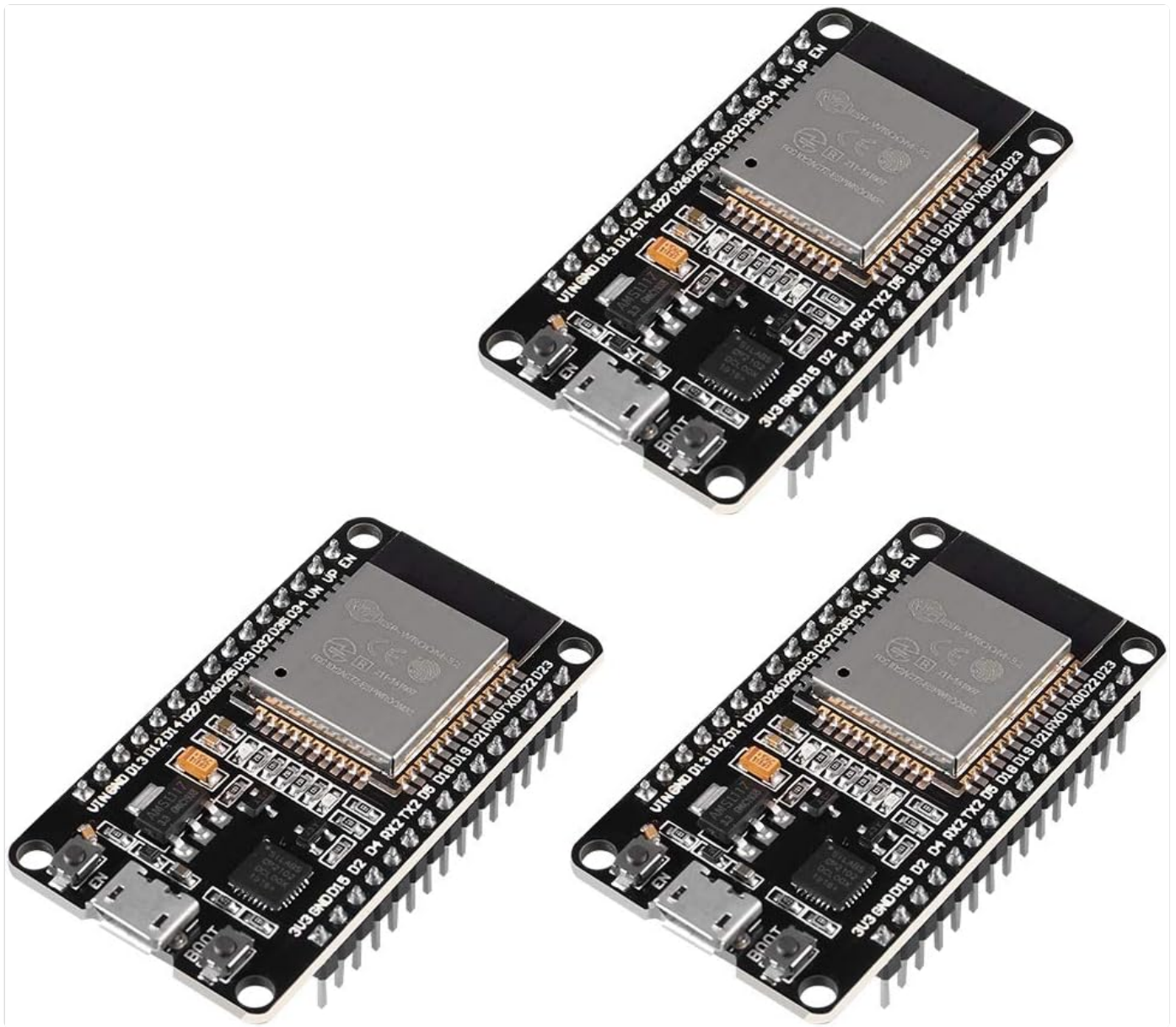
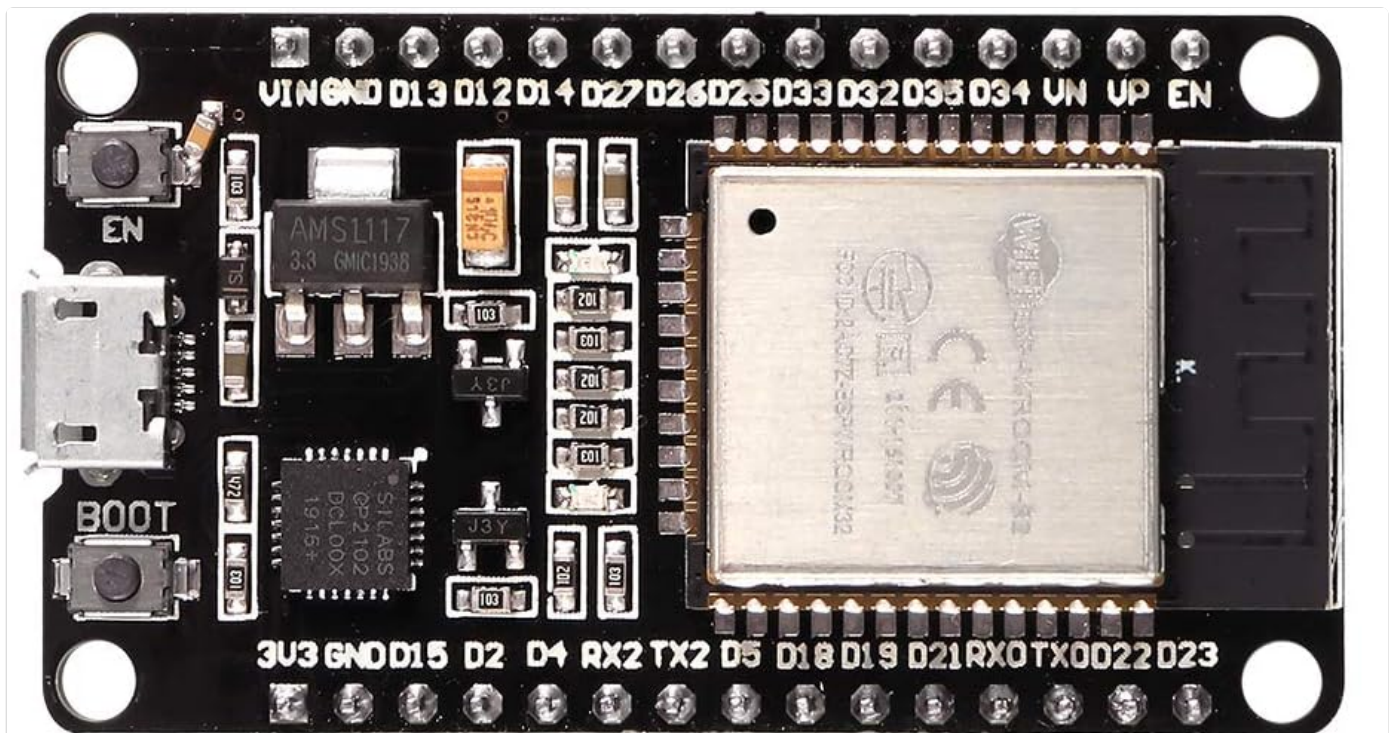


Figure 1.1: Overview of three ESP32 ESP-32S WiFi Development Boards.

2. KEY FEATURES

- **Dual-Core ESP-32 Processor:** Equipped with a 2.4GHz dual-mode development board, offering robust processing capabilities.
- **Integrated CP2102 Chip:** Utilizes the CP2102 USB serial port chip for reliable and fast data transmission, enabling direct debugging via USB.
- **Flexible Development Environments:** Supports Lua programming, LWIP protocol, FreeRTOS, and is compatible with NodeMCU and other development environments.
- **Multiple Operating Modes:** Operates in AP (Access Point), STA (Station), and AP + STA modes for diverse networking applications.
- **Low-Power Co-processor:** Allows the main CPU to enter low-power mode while the co-processor continuously monitors peripherals or analog values, enhancing power efficiency.
- **Reset and Boot Buttons:** Features two tactile buttons for easy reset and entering program mode.



Dual core ESP-32 antenna module

2.4GHz dual mode WiFi + Bluetooth development board

Support Lua program, easy to develop

support LWIP protocol, Freertos

Three modes : AP, STA and AP + STA

Figure 2.1: Key features of the ESP32 ESP-32S Development Board.

3. SETUP GUIDE

3.1. Hardware Connection

1. **Connect to Computer:** Use a Micro USB cable to connect the ESP32 development board to your computer. The integrated CP2102 chip will facilitate the serial communication.
2. **Driver Installation:** Ensure the necessary CP2102 drivers are installed on your operating system. These drivers are typically available from Silicon Labs or can be found through a quick online search.
3. **Power Supply:** The board is powered via the USB connection. For stable operation, especially when connecting to Wi-Fi, ensure your USB port or hub can supply sufficient current (500-600mA instantaneously). Inadequate power can lead to reboots or connection issues.

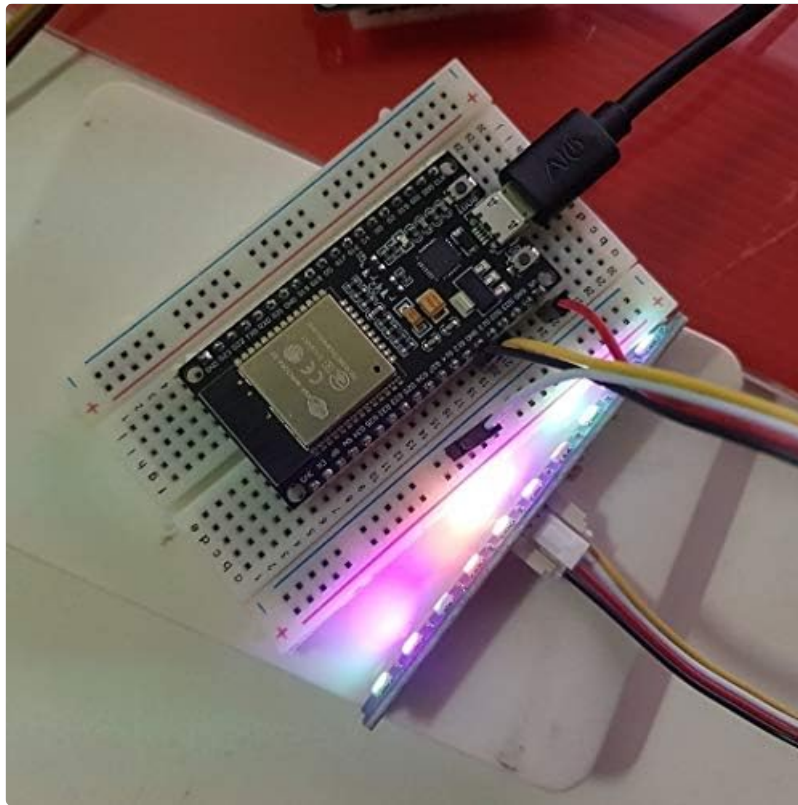


Figure 3.1: ESP32 board connected to a breadboard and powered via USB.

3.2. Pinout Diagram

Understanding the pinout is crucial for connecting external components and sensors. Refer to the diagram below for a detailed layout of the GPIO pins and their functions.

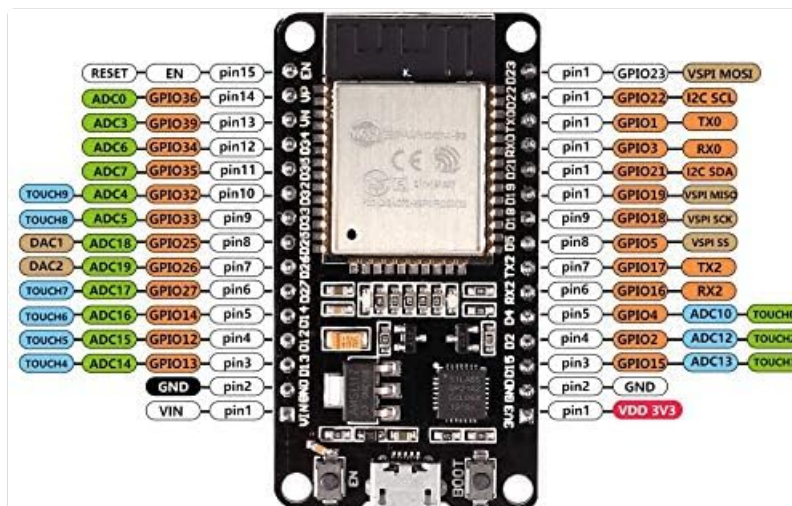


Figure 3.2: ESP32 ESP-32S Pinout Diagram. Note that GPIO0 is connected to the BOOT button and is not broken out to an external pin.

3.3. Development Environment Setup

The ESP32 board is compatible with various Integrated Development Environments (IDEs).

- **Arduino IDE:** Install the ESP32 board package through the Arduino IDE's Boards Manager. This is a common and user-friendly option.
- **PlatformIO (VS Code):** For more advanced users, PlatformIO integrated with Visual Studio Code offers a powerful and flexible development environment.
- **ESP-IDF:** Espressif IoT Development Framework (ESP-IDF) is the official development framework for ESP32, providing a robust set of tools and libraries for professional development.

4. OPERATING INSTRUCTIONS

4.1. Programming and Uploading Code

Once your development environment is set up, you can write and upload your code to the ESP32 board.

- **Code Development:** Write your application using supported languages like C/C++ (Arduino, ESP-IDF) or Lua (NodeMCU).
- **Uploading:** Select the correct board and COM port in your IDE. For most setups, you do not need to manually press the BOOT button during upload, as the CP2102 chip handles the reset and boot sequence automatically.
- **Boot Mode:** If manual intervention is required, press and hold the "BOOT" button while pressing and releasing the "EN" (Enable/Reset) button, then release "BOOT" to enter flash mode.

4.2. Network Modes

The ESP32 supports three primary Wi-Fi operating modes:

- **Station (STA) Mode:** The ESP32 connects to an existing Wi-Fi network (e.g., your home router) as a client device.
- **Access Point (AP) Mode:** The ESP32 creates its own Wi-Fi network, allowing other devices to connect to it.
- **AP + STA Mode:** The ESP32 simultaneously acts as both an Access Point and a Station, connecting to an existing network while also hosting its own.

5. MAINTENANCE

To ensure the longevity and reliable operation of your ESP32 development board, follow these maintenance guidelines:

- **Handle with Care:** Avoid dropping the board or subjecting it to excessive physical stress.
- **Keep Dry:** Protect the board from moisture and humidity, as water can cause short circuits and damage components.
- **Cleanliness:** Keep the board free from dust and debris. Use a soft, dry brush or compressed air for cleaning.
- **Power Supply:** Always use a stable and appropriate power supply. Over-voltage or under-voltage can damage the board. If using higher input voltages (e.g., 12V), consider using a switching regulator to step down to 5V before connecting to the VIN pin, as the onboard LDO regulator has limited heat dissipation.
- **Storage:** When not in use, store the board in an anti-static bag or container to prevent electrostatic discharge (ESD) damage.

6. TROUBLESHOOTING

- **Board Not Detected / Upload Failed:**
 - Ensure CP2102 drivers are correctly installed.
 - Verify the correct COM port is selected in your IDE.
 - Try a different USB cable or USB port.
 - If using PlatformIO, some users report needing to manually hold the BOOT button during upload.
- **Frequent Reboots / Wi-Fi Connection Issues:**
 - This is often a power supply issue. The ESP32 can draw 500-600mA instantaneously, especially during Wi-Fi operations. Ensure your USB power source can provide this current.
 - If powering via VIN with higher voltages (e.g., 12V), the onboard LDO regulator may overheat. Consider an external switching regulator to step down voltage to 5V.

- **GPIO Pin Restrictions:**

- Some GPIO pins have specific boot-time states (e.g., GPIO0, GPIO2, GPIO12, GPIO15). Incorrectly pulling these pins high or low during boot can prevent the chip from flashing or booting your program. Consult the ESP32 datasheet for detailed information on strapping pins.
- Note that GPIO0 is connected to the BOOT button and is not broken out to an external pin on this board, which can affect programmatic flashing in some advanced setups.

- **Random Memory Loss / Bricked Board:**

- Ensure stable power during flashing and operation.
- Verify the integrity of your uploaded firmware.
- In rare cases, severe power fluctuations or ESD can damage the flash memory.

- **Silkscreen Error (GPIO33):**

- On some boards, the GPIO pin between G25 and G32 may be incorrectly labeled as G23 instead of G33. This is a silkscreen error and does not affect the physical pin's functionality. Refer to the pinout diagram (Figure 3.2) for accurate pin assignments.

7. SPECIFICATIONS

Feature	Description
Brand	DORHEA
Model Name	ESP32 ESP-32S
Processor	Dual-core ESP-32
Wireless Connectivity	2.4GHz WiFi (802.11 b/g/n), Bluetooth (v4.2 BR/EDR and BLE)
USB-to-Serial Chip	CP2102
Operating System Support	Embedded operating system (LWIP and FreeRTOS)
Memory Speed	2.4 GHz
Memory Storage Capacity	4 MB
Connectivity Technology	USB, Wi-Fi
Item Weight	0.81 ounces
Package Dimensions	5.59 x 3.11 x 0.55 inches

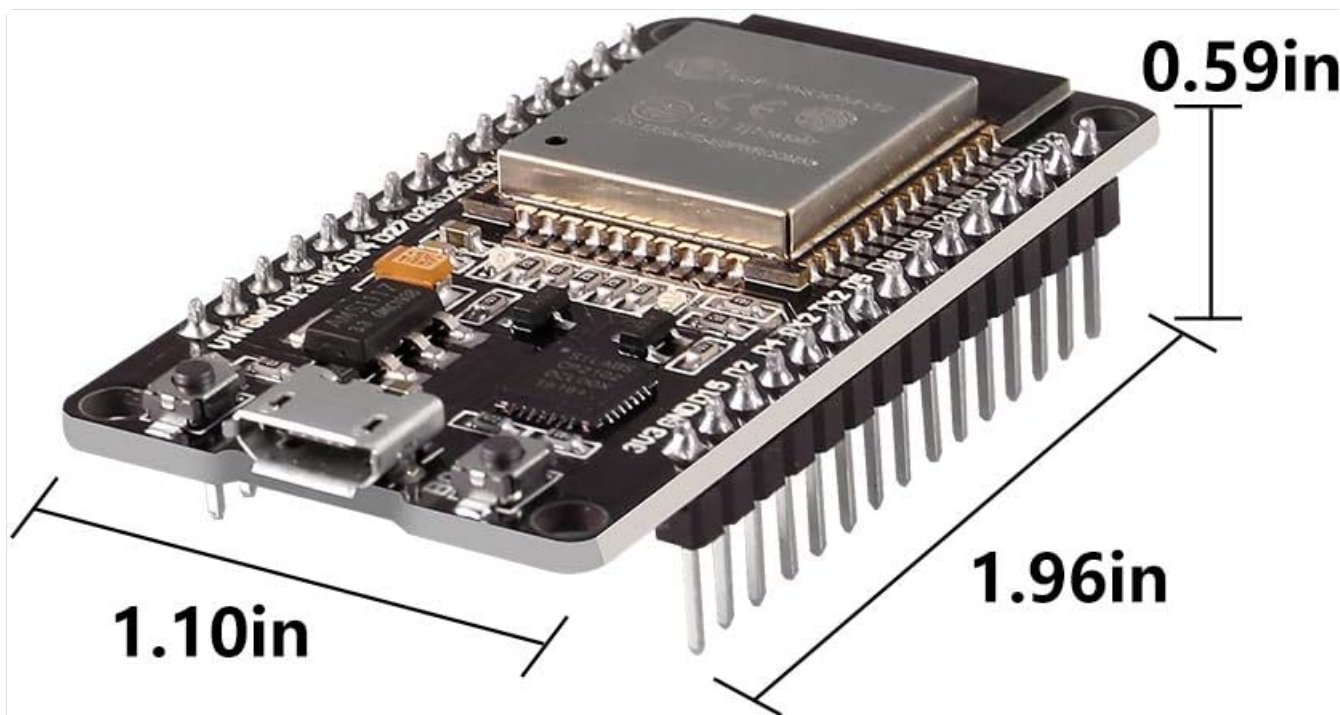


Figure 7.1: Physical dimensions of the ESP32 ESP-32S Development Board.

8. WARRANTY AND SUPPORT

For warranty information and technical support, please refer to the official DORHEA website or contact their customer service directly. Specific warranty terms may vary based on region and purchase date.

Manufacturer: DORHEA

ASIN: B086MJGFVV