



User Manual

ESP32 Arduino Development Board

Open Source · Wi-Fi / Bluetooth · Ready for Secondary Development

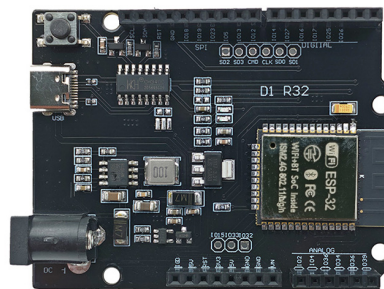
OLIGHKER · Document Version V1.0 · July 2026

1 Overview

The ESP32 Arduino development board (ESP32 UNO D1 R32) is an **open-source development board** based on the Espressif ESP-WROOM-32 module.

Its Arduino UNO-compatible form factor gives direct access to the rich Arduino shield ecosystem, and it fully supports secondary development.

The board breaks out every pin of the ESP32 module and integrates Wi-Fi, Bluetooth 4.2 (BR/EDR/BLE) and an Ethernet MAC, with 4MB Flash and a dual-core processor. Together with the onboard CH340C USB-to-serial chip, a single USB cable handles both power and firmware download — an ideal platform for IoT, smart hardware and embedded development.



1.1 Product Features

- **Open source:** open hardware and software; supports Arduino / ESP-IDF / MicroPython and other frameworks, making secondary development easy.



- **All-in-one wireless:** integrated Wi-Fi (802.11 b/g/n) and Bluetooth 4.2 (BR/EDR/BLE dual mode).
- **UNO-compatible form factor:** D1 R32 layout, compatible with Arduino UNO shields, with all ESP32 pins broken out.
- **Dual power options:** powered via USB Type-C or a DC jack (5V–12V).
- **Driver-free USB serial:** onboard CH340C USB-to-serial chip, driver-free on Windows 10 and later.

2 Key Specifications

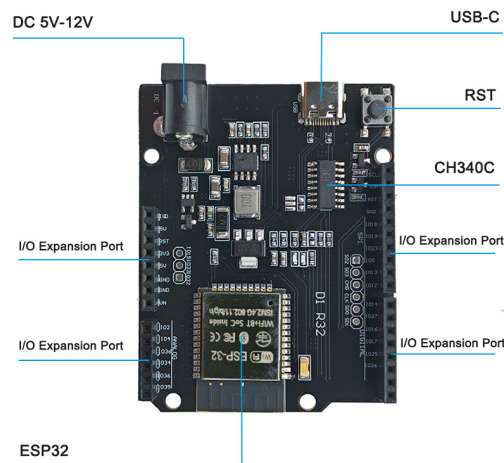
Category	Parameter	Description
Wireless	Certification	FCC / CE / TELEC
	Wireless standard	802.11 b/g/n/e/i, Bluetooth 4.2 (BR/EDR/BLE)
	Frequency range	2.4GHz–2.5GHz (2400M–2483.5M)
Hardware	Data interface	UART / SPI / I2C / I2S / IR / CAN, GPIO / PWM
	Operating voltage	3.0V–3.6V
	Operating current	90mA average
	Operating temperature	-40°C to 125°C
	Storage temp. / Flash	Ambient / 4MB Flash



Software	Wi-Fi modes	station / softAP / SoftAP+station
	Security	WPA, WPA/WPA2, WAPI
	Encryption	WEP / TKIP / AES
	Firmware upgrade	Local UART flashing / cloud OTA / host download
	Software development	Custom servers supported; SDK available for secondary development
	Protocols / User config	IPv4, TCP/UDP/HTTP/FTP; AT+ command set, cloud server, Android/iOS APP

3 Interfaces and Onboard Resources

The board layout is shown below. From top to bottom: the power input area (DC jack), the USB and serial area (USB-C, RST, CH340C), the core module area (ESP32), and the I/O expansion headers around the edges.



No.	Onboard resource	Description
1	ESP32 module	ESP-WROOM-32 core module, dual-core CPU + 4MB Flash, handling computing and Wi-Fi/Bluetooth communication
2	USB-C port	All-in-one port for power, firmware download and serial communication
3	DC power jack	DC 5V–12V external supply input, for higher-current or USB-free applications
4	RST reset button	Resets the chip and restarts the program; with BOOT (IO0), enters the firmware flash mode
5	CH340C USB-serial chip	USB-to-UART chip for



		firmware download and serial debugging; built-in clock, no external crystal required
6	I/O header (digital side)	ESP32 digital GPIOs (IO2, IO4, IO5, IO12–IO23, IO25–IO27, etc.), supporting PWM and peripheral multiplexing
7	I/O header (analog/power side)	ADC analog input pins (IO36/VP, IO39/VN, IO34, IO35, etc.) plus 3V3, 5V, GND, VIN power pins
8	SPI pads	Reserved SD2, SD3, CMD, CLK, SD0, SD1 pads for SPI storage expansion and other advanced uses

3.1 Power Supply

USB-C power supply: 5V, $\geq 500\text{mA}$ recommended; the default choice for daily development.

DC jack power: 5V–12V input, regulated to 3.3V onboard; use a separate supply for high-power peripherals (motors, LED strips, etc.).

Logic level: ESP32 I/O is 3.3V; use a level shifter when connecting 5V peripherals to avoid damaging the chip.



3.2 Common Pin Quick Reference

Pin	Function	Description
IO2 / IO4 / IO5 / IO12– IO19 / IO21–IO23 / IO25–IO27	Digital I/O	PWM output and peripheral multiplexing supported
IO36 (VP) / IO39 (VN) / IO34 / IO35	Analog input	Input only, ADC1 channels, suitable for sensor signals
IO21 / IO22	I2C	Default SDA / SCL
IO3 / IO1	UART0	Default serial RX/TX (connected to CH340C, shared for download and debug)
IO16 / IO17	UART2	Second hardware serial port
3V3 / 5V / GND / VIN	Power pins	Powers peripheral modules; keep the total current within the regulator's capacity

4 Setting Up the Development Environment

1. **Install the Arduino IDE:** download and install Arduino IDE 1.8 or later (or Arduino IDE 2.x) from the official Arduino website.
2. **Add ESP32 board support:** open File → Preferences and enter the official ESP32 board JSON URL in "Additional Boards Manager URLs"; then open



Tools → Board → Boards Manager, search for esp32 and install **esp32 by Espressif Systems**.

3. **Install the USB serial driver:** if the board's serial port is not recognized, install the CH340C driver (Windows 10/11 usually installs it automatically).
4. **Select the board and port:** in the Tools menu, select the board (e.g. ESP32 Dev Module) and the corresponding COM port.

5 Quick Start

Connect the board to your computer with a USB-C cable, open the Arduino IDE, and load the Blink example (or a Wi-Fi example) from File → Examples. Click "Upload" to flash the program to the board. If the upload fails to connect, hold down the RST (BOOT) button while clicking Upload to enter download mode.

After flashing, open Tools → Serial Monitor (baud rate 115200) to view the program output — your first step from a blinking LED to a network connection.

6 Precautions

- ESP32 I/O uses **3.3V logic**; do not connect 5V signals directly.
- The supply voltage must not exceed the DC jack rating (5V–12V); observe correct polarity.
- Wi-Fi transmission at high power draws large peak currents; allow at least 500mA of power headroom.



- The board is ESD-sensitive: take anti-static precautions, and do not hot-plug peripheral modules while powered on.
- For long-term storage, keep the board in a dry place at room temperature to prevent pin oxidation.

7 Technical Support

If you have any questions during use, or need more examples, schematics and firmware, feel free to contact the technical support team via the official brand channel www.olighker.com for assistance.