ESP32-C6-WROOM-1 / ESP32-C6-DevKitC-1 Development Board – Wi-Fi 6 & Bluetooth 5 Low Power Module

The **ESP32-C6-WROOM-1 / ESP32-C6-DevKitC-1** is a powerful and versatile development board designed by **Espressif Systems**, featuring the latest **ESP32-C6** chip. This board brings together **Wi-Fi 6**, **Bluetooth 5 (LE)**, and **low-power capabilities**, making it ideal for next-generation **IoT**, **smart home**, and **industrial automation** applications. Built with a focus on performance, energy efficiency, and ease of integration, this module provides developers with everything needed to create connected, intelligent, and energy-efficient devices.

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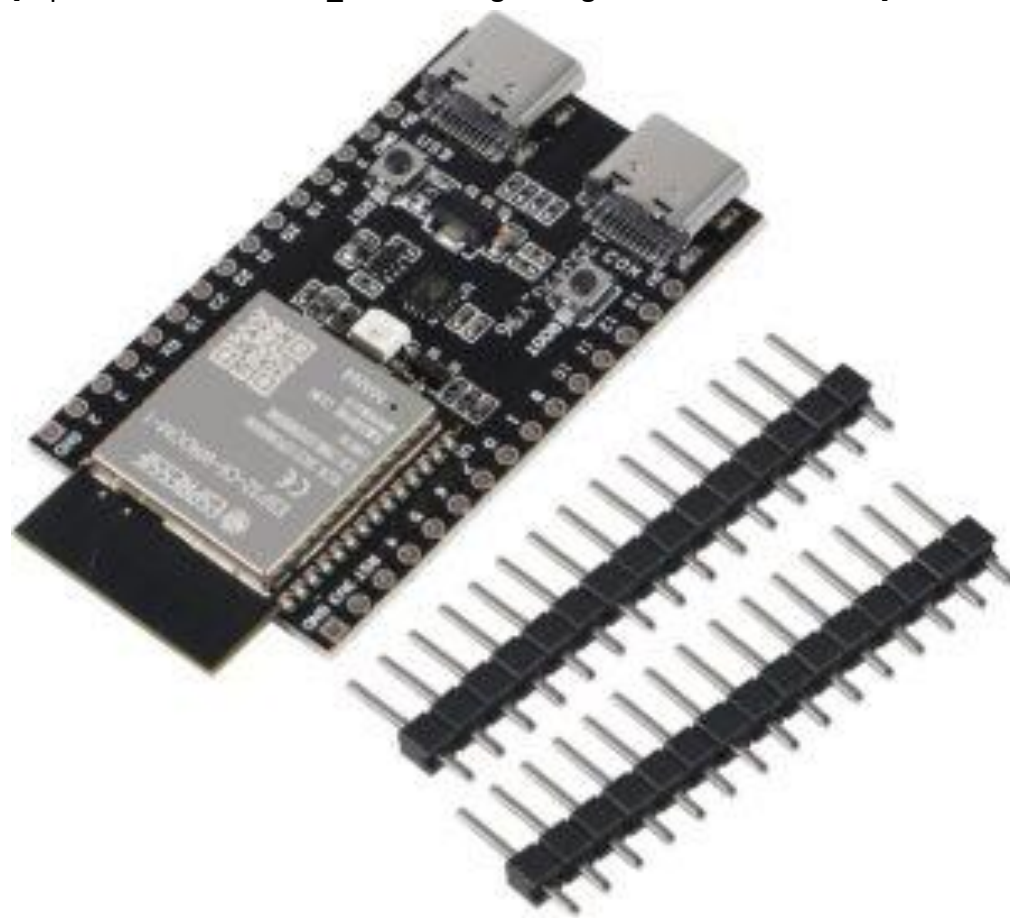
ESP32-C6-WROOM-1 ESP32-C6 ESP32-C6-WROOM-1-N4 Development Board[/caption]

Core Chip: ESP32-C6

At the heart of the board lies the **ESP32-C6 SoC**, a high-performance RISC-V-based microcontroller that offers exceptional wireless connectivity and efficient power management. The chip integrates:

- A **32-bit RISC-V single-core processor** operating up to **160 MHz**

- Support for **2.4 GHz Wi-Fi 6 (802.11ax)**

- **Bluetooth 5.3 Low Energy (LE)** with advanced low-power modes

- **4 MB SPI flash memory** (in the N4 version of ESP32-C6-WROOM-1 module)

This combination ensures seamless connectivity, faster data transmission, and stable performance for a wide variety of wireless applications.

Connectivity & Communication

The **ESP32-C6-DevKitC-1** supports multiple communication interfaces that allow easy integration with sensors, displays, and actuators.
Key interfaces include:

- **Wi-Fi 6 (802.11ax)** – Delivering improved throughput, reduced latency, and better network coexistence

- **Bluetooth 5.3 LE** – Offering higher range, improved stability, and energy-efficient wireless communication

- **USB 2.0 Full-Speed Interface** – Used for programming, debugging, and as a power supply input via **Type-C** connector

- **UART, SPI, I2C, I2S, PWM, and GPIO pins** – Allowing flexible connection with external components

The USB Type-C port simplifies firmware flashing, serial communication, and debugging, while also acting as the main power input.
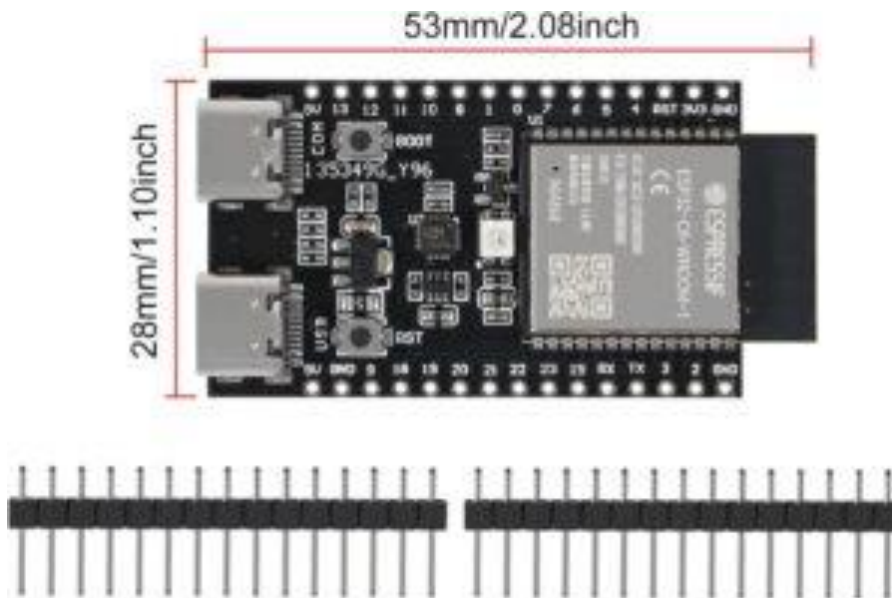
Board Design & Build

The **ESP32-C6-DevKitC-1** is designed for maximum usability. It adopts a **compact layout** with the ESP32-C6-WROOM-1 module soldered on top.

- **Onboard PCB Antenna** ensures stable wireless performance and good signal coverage.

- **Pin Headers** are provided on both sides, exposing most of the module's pins for easy access.

- The board can be conveniently **inserted into a breadboard**, allowing fast prototyping and testing.

This design makes it highly suitable for beginners, students, and professionals looking to develop and test IoT solutions quickly.

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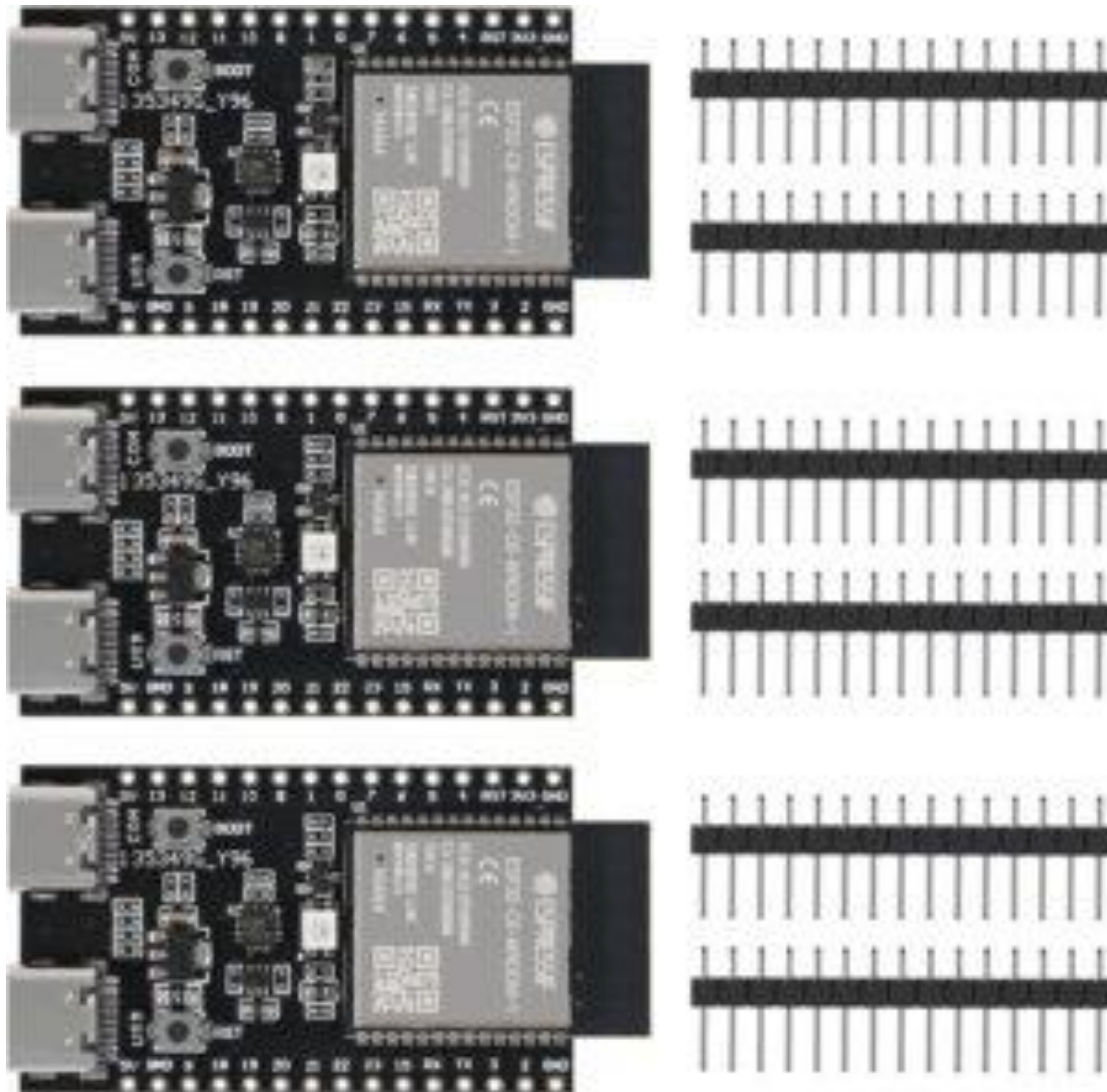
ESP32-C6-WROOM-1 ESP32-C6 ESP32-C6-WROOM-1-N4 Development Board[/caption]

Power Management

The board can be powered through:

- **USB Type-C connector** (5V input)

- **External 5V and 3.3V pins**

The onboard **voltage regulator** ensures a stable supply for the ESP32-C6 chip and all connected peripherals. The low-power design enables long-term operation in battery-powered systems and IoT devices that require energy efficiency.

Software Support

The **ESP32-C6 development board** is fully supported by **Espressif's open-source software ecosystem**, including:

- **ESP-IDF (IoT Development Framework)** – The official development environment offering comprehensive APIs, libraries, and examples.

- **Arduino IDE Support** – Simplifying development for users familiar with Arduino syntax and libraries.

- **PlatformIO and MicroPython** – Providing flexible development options for professionals and hobbyists alike.

The board supports over-the-air (OTA) updates, secure boot, and encryption features, ensuring your applications are reliable and secure.

Applications

The **ESP32-C6-WROOM-1 / DevKitC-1** can be used across a wide range of applications, including:

- **Smart Home Devices:** Wi-Fi-connected sensors, lighting systems, door locks, and automation controllers.

- **Industrial IoT:** Wireless data collection, predictive maintenance, and machine monitoring.

- **Wearables and Portable Devices:** Thanks to its Bluetooth 5 LE support and low-power operation.

- **DIY and Educational Projects:** Ideal for students, makers, and developers learning about IoT development.

- **Wireless Networking Gateways:** Acting as bridges between different communication protocols.

Its versatility and compatibility make it a future-ready solution for connected devices.

Technical Specifications

Feature	Description
Chipset	ESP32-C6
Core	32-bit RISC-V, Single-Core @ up to 160 MHz

Feature	Description
Flash Memory	4 MB SPI Flash (ESP32-C6-WROOM-1-N4)
Wi-Fi	2.4 GHz Wi-Fi 6 (802.11ax)
Bluetooth	Bluetooth 5.3 Low Energy (LE)
USB Interface	USB 2.0 Full-Speed via Type-C
GPIO Pins	Up to 23
Communication Interfaces	UART, SPI, I2C, I2S, PWM
Antenna	Onboard PCB antenna
Power Supply	5V via USB Type-C or 3.3V pin
Operating Voltage	3.3V logic level
Development Frameworks	ESP-IDF, Arduino IDE, PlatformIO, MicroPython
Dimensions	Compact, breadboard-compatible design

Why Choose ESP32-C6-DevKitC-1

✅ Latest Wi-Fi 6 + Bluetooth 5 LE connectivity
✅ Low-power design for battery-based systems
✅ USB Type-C interface for easy programming and debugging
✅ Fully open-source software support
✅ Breadboard-friendly layout for rapid prototyping

The **ESP32-C6-WROOM-1 / ESP32-C6-DevKitC-1 Development Board** is the perfect starting point for modern IoT innovation. Whether you're building a smart sensor network, wireless controller, or connected automation system, this board delivers the reliability, performance, and flexibility you need to bring your projects to life.