

ESP32 Specification

Main processor: Tensilica Xtensa 32-bit LX6 microprocessor

Cores: 2

Clock frequency: up to 240 MHz

Performance: up to 600 DMIPS

Ultra low power co-processor: allows you to do ADC conversions, computation, and level thresholds while in deep sleep.

Wireless connectivity:

Wi-Fi: 802.11 b/g/n/e/i (802.11n @ 2.4 GHz up to 150 Mbit/s)

Bluetooth: v4.2 BR/EDR and Bluetooth Low Energy (BLE)

Memory:

Internal memory:

ROM: 448 Kb

For booting and core functions.

SRAM: 520 Kb

For data and instruction.

RTC slow SRAM: 8 Kb

For co-processor accessing during deep-sleep mode.

RTC fast SRAM: 8 Kb

For data storage and main CPU during RTC Boot from the deep-sleep mode.

eFuse: 1 Kb

Of which 256 bits are used for the system (MAC address and chip configuration) and the remaining 768 bits are reserved for customer applications, including Flash-Encryption and Chip-ID.

Embedded flash:

Flash connected internally via IO16, IO17, SD_CMD, SD_CLK, SD_DATA_0 and SD_DATA_1 on ESP32-D2WD and ESP32-PICO-D4.

0 MiB (ESP32-D0WDQ6, ESP32-D0WD, and ESP32-S0WD chips)

2 MiB (ESP32-D2WD chip)

4 MiB (ESP32-PICO-D4 SiP module)

External flash & SRAM: ESP32 supports up to four 16 MB external QSPI flashes and SRAMs with hardware encryption based on AES to protect developers' programs and data. ESP32

can access the external QSPI flash and SRAM through high-speed caches.

Up to 16 MB of external flash are memory-mapped onto the CPU code space, supporting 8-bit, 16-bit and 32-bit access. Code execution is supported.

Up to 8 MB of external flash/SRAM memory are mapped onto the CPU data space, supporting 8-bit, 16-bit and 32-bit access. Data-read is supported on the flash and SRAM. Data-write is supported on the SRAM.

ESP32 chips with embedded flash do not support the address mapping between external flash and peripherals.

Peripheral input/output: Rich peripheral interface with DMA that includes capacitive touch, ADCs (analog-to-digital converter), DACs (digital-to-analog converter), I²C (Inter-Integrated Circuit), UART (universal asynchronous receiver/transmitter), CAN 2.0 (Controller Area Network), SPI (Serial Peripheral Interface), I²S (Integrated Inter-IC Sound), RMII (Reduced Media-Independent Interface), PWM (pulse width modulation), and more.

Security:

IEEE 802.11 standard security features all supported, including WPA, WPA/WPA2 and WAPI

Secure boot

Flash encryption

1024-bit OTP, up to 768-bit for customers

Cryptographic hardware acceleration: AES, SHA-2, RSA, elliptic curve cryptography (ECC), random number generator (RNG)