

ESP32-S2

Espressif completes their range of Dual-Core and Single-Core Modules with the ESP32-S2 SoC.

ESP32-S2 is a truly secure, highly integrated, low-power, 2.4 GHz Wi-Fi Microcontroller SoC supporting Wi-Fi HT40 and having 43 GPIOs. Based on an Xtensa® single-core 32-bit LX7 processor, it can be clocked at up to 240 MHz.

With state-of-the-art power management and RF performance, IO capabilities and security features, ESP32-S2 is an ideal choice for a wide variety of IoT or connectivity-based applications, including smart home and wearables. With an integrated 240 MHz Xtensa® core, ESP32-S2 is sufficient for building the most demanding connected devices without requiring external MCUs.

Ecosystem and Application Highlights

By leveraging Espressif's mature and production-ready software development framework (ESP-IDF), ESP32-S2 achieves a balance of performance and cost, thus bringing faster and more secure IoT connectivity solutions to the market.

Smart-Home Connectivity

Ranges from simple solutions like light bulbs, smart door-locks, smart sockets to white goods and kitchen appliances, over-the-top (OTT) devices and video streaming devices like security cameras

- ◆ Supports **Mesh Network**, which can be applied to large-scale commercial lighting and smart-home network solutions.
- ◆ Allows efficient interfacing with a wide range of sensors, which is suitable for the needs of different smart-home scenarios.

Retail & Catering Applications

POS machines and service robots

- ◆ Advanced security features enable the protection of sensitive data on the chip and the flash device
- ◆ Small form factor
- ◆ With 14 highly sensitive touch sensors and an LCD interface, ESP32-S2 targets low-cost securely connected HMI devices, such as POS machines

CPU and Memory

- ◆ Xtensa® single-core 32-bit LX7 microcontroller
- ◆ 7-stage pipeline
- ◆ Clock frequency of up to 240 MHz
- ◆ Ultra-low-power co-processor
- ◆ 320 kB SRAM, 128 kB ROM, 16 KB RTC memory
- ◆ Up to 1GB of external flash and SRAM support
- ◆ Separate instruction and data cache

Connectivity

- ◆ Wi-Fi 802.11 b/g/n
- ◆ 1x1 transmit and receive
- ◆ Single-band 1T1R mode with data rate up to 150 Mbps
- ◆ Support for TCP/IP networking, ESP-MESH networking, TLS 1.0, 1.1 and 1.2 and other networking protocols over Wi-Fi
- ◆ Support Time-of-Flight (TOF) measurements with normal Wi-Fi packets



IO Peripherals

- ◆ 43 programmable GPIOs
- ◆ 14 capacitive touch sensing IOs
- ◆ Standard peripherals including SPI, I2C, I2S, UART, ADC/DAC and PWM
- ◆ LCD (8-bit parallel RGB/8080/6800) interface and support for 16/24-bit parallel
- ◆ Camera interface supports 8 or 16-bit DVP image sensor, with clock frequency of up to 40 MHz
- ◆ Full speed USB OTG support

Security

- ◆ RSA-3072-based trusted application boot
- ◆ AES256-XTS-based flash encryption to protect sensitive data at rest
- ◆ 4096-bit eFUSE memory with 2048 bits available for application
- ◆ Digital signature peripheral for secure storage of private keys and generation of RSA signatures