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 to150 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

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