ESP32-C3-MINI-1
ESP32-C3-MINI-1U

Datasheet Version 2.1

Small-sized 2.4 GHz Wi-Fi (802.11b/g/n) and Bluetooth® 5 module
Built around ESP32-C3 series of SoCs, RISC-V single-core microprocessor
4 MB flash in chip package
15 GPIOs
On-board PCB antenna or external antenna connector

ESP32-C3-MINI-1

ESP32-C3-MINI-1U

ESPRESSIF

1 Module Overview

Note:

Check the link or the QR code to make sure that you use the latest version of this document:
https://www.espressif.com/documentation/esp32-c3-mini-1_datasheet_en.pdf

1.1 Features

CPU and On-Chip Memory

- ESP32-C3FH4 embedded, 32-bit RISC-V single-core processor, up to 160 MHz
- 384 KB ROM
- 400 KB SRAM (16 KB for cache)
- 8 KB SRAM in RTC
- 4 MB flash in chip package

Wi-Fi

- IEEE 802.11 b/g/n-compliant
- Center frequency range of operating channel: 2412 ~ 2484 MHz
- Supports 20 MHz, 40 MHz bandwidth in 2.4 GHz band
- 1T1R mode with data rate up to 150 Mbps
- Wi-Fi Multimedia (WMM)
- TX/RX A-MPDU, TX/RX A-MSDU
- Immediate Block ACK
- Fragmentation and defragmentation
- Transmit opportunity (TXOP)
- Automatic Beacon monitoring (hardware TSF)
- 4 × virtual Wi-Fi interfaces
- Simultaneous support for Infrastructure BSS in Station mode, SoftAP mode, Station + SoftAP mode, and promiscuous mode
  Note that when the chip scans in Station mode, the SoftAP channel will change along with the Station channel
- 802.11mc FTM

Bluetooth®

- Bluetooth LE: Bluetooth 5, Bluetooth mesh
- Speed: 125 Kbps, 500 Kbps, 1 Mbps, 2 Mbps
- Advertising extensions
- Multiple advertisement sets
- Channel selection algorithm #2
- Internal co-existence mechanism between Wi-Fi and Bluetooth to share the same antenna

Peripherals

- Up to 15 GPIOs
  - 3 strapping GPIOs
- SPI, UART, I2C, I2S, remote control peripheral, LED PWM controller, general DMA controller, TWAI® controller (compatible with ISO 11898-1, i.e. CAN Specification 2.0), USB Serial/JTAG controller, temperature sensor, SAR ADC, general-purpose timers, watchdog timers

  Note:
  * Please refer to *ESP32-C3 Series Datasheet* for detailed information about the module peripherals.

Integrated Components on Module

- 40 MHz crystal oscillator

Antenna Options

- ESP32-C3-MINI-1: On-board PCB antenna

- ESP32-C3-MINI-1U: External antenna via a connector

Operating Conditions

- Operating voltage/Power supply: 3.0 ~ 3.6 V
- Operating ambient temperature:
  - 85 °C version module: −40 ~ 85 °C
  - 105 °C version module: −40 ~ 105 °C

Certification

- RF certification: See certificates
- Green certification: RoHS/REACH

Test

- HTOL/HTSL/uHAST/TCT/ESD/Latch-up

1.2 Series Comparison

ESP32-C3-MINI-1 and ESP32-C3-MINI-1U are two general-purpose Wi-Fi and Bluetooth LE modules. The rich set of peripherals and a small size make the two modules an ideal choice for smart homes, industrial automation, health care, consumer electronics, etc.

ESP32-C3-MINI-1 comes with a PCB antenna. ESP32-C3-MINI-1U comes with an external antenna connector. A wide selection of module variants are available as shown in Table 1-1 and 1-2.

The series comparison for the two modules is as follows:

Table 1-1. ESP32-C3-MINI-1 (ANT) Series Comparison[1]

Ordering Code[5]	Flash[4]	Ambient Temp.[2] (°C)	Embedded Chip Revision[6]	Size[3] (mm)
ESP32-C3-MINI-1-N4X (Recommended)	4 MB (Quad SPI)	−40 ~ 85	v1.1	13.2 × 16.6 × 2.4
ESP32-C3-MINI-1-H4X (Recommended)		−40 ~ 105	v1.1	
ESP32-C3-MINI-1-N4 (NRND)		−40 ~ 85	v0.4	
ESP32-C3-MINI-1-H4 (NRND)		−40 ~ 105	v0.4	
ESP32-C3-MINI-1-H4-AZ (NRND)		−40 ~ 105	v0.4	

[1] This table shares the same notes presented in Table 1-2 below.

Table 1-2. ESP32-C3-MINI-1U (CONN) Series Comparison

Ordering Code[5]	Flash[4, 7]	Ambient Temp.[2] (°C)	Embedded Chip Revision [6]	Size[3] (mm)
ESP32-C3-MINI-1U-N4X (Recommended)	4 MB (Quad SPI)	−40 ~ 85	v1.1	13.2 × 12.5 × 2.4
ESP32-C3-MINI-1U-H4X (Recommended)		−40 ~ 105	v1.1	
ESP32-C3-MINI-1U-N4 (NRND)		−40 ~ 85	v0.4	
ESP32-C3-MINI-1U-H4 (NRND)		−40 ~ 105	v0.4	

[2] Ambient temperature specifies the recommended temperature range of the environment immediately outside the Espressif module.

[3] For details, refer to Section 10.1 *Module Dimensions*.

[4] The flash is integrated in the chip's package. For specifications, refer to Section 6.5 *Memory Specifications*.

[5] All modules can be pre-programmed with AWS IoT ExpressLink firmware. Modules with such firmware have suffix "-A" in their ordering codes, e.g. ESP32-C3-MINI-1-N4-A. Since AWS IoT ExpressLink firmware enables flash encryption and secure boot, joint download boot mode will be disabled, and it will no longer be possible to program firmware through the UART or USB port into the modules.

[6] All chip revisions have the same SRAM size, but chip revision v1.1 has around 10 KB more available space for users than chip revision v0.4. Chip revision v1.1 depends on specific ESP-IDF versions, as detailed in Compatibility Advisory for ESP32-C3 Chip Revision v1.1. For how to identify chip revisions, please refer to *ESP32-C3 Series SoC Errata*.

[7] By default, the SPI flash on the module operates at a maximum clock frequency of 80 MHz and does not support the auto suspend feature. If you have a requirement for a higher flash clock frequency of 120 MHz or if you need the flash auto suspend feature, please contact us.

Both ESP32-C3-MINI-1 and ESP32-C3-MINI-1U has two operating ambient temperature options: −40 ~ 85 °C variants and −40 ~ 105 °C variants, all embedded with the ESP32-C3FH4 chip. ESP32-C3-MINI-1 has one more variant: ESP32-C3-MINI-1-H4-AZ embedded with the ESP32-C3FH4AZ chip. For this chip, SPI0/SPI1 pins for flash connection are not bonded. For more information about the differences between chips embedded, please refer to Section *Chip Series Comparison* in *ESP32-C3 Series Datasheet*.

1.3 Applications

- Smart Home
- Industrial Automation
- Health Care
- Consumer Electronics
- Smart Agriculture
- POS Machines
- Service Robot
- Audio Devices
- Generic Low-power IoT Sensor Hubs
- Generic Low-power IoT Data Loggers

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