# WT32C3-S6 Datasheet



V1.0.2

July 11, 2021

Wireless-Tag Technology Co., Ltd.

  

# About this document

This document provides users with the technical specifications for WT32C3-S6.

# Document updates

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# Revision history

Please go to the document revision history page to view the revisions of the document.



**Statement**

Due to product version upgrade or other reasons, the contents of this manual may be changed. Wireless-Tag Technology Co., Ltd reserves the right to modify the contents of this manual without any notice or prompt. This manual is only used as a guide. Wireless-Tag Technology Co., Ltd makes every effort to provide accurate information in this manual, but it does not guarantee that the contents of the manual are completely free of errors. All statements, information and suggestions in this manual do not constitute any express or implied guarantee.

# Revision History

| No. | Version | Changes | Change (+/-) Descriptions | Author | Date |
|---|---|---|---|---|---|
| 1 | V1.0.0 | C | Created the document | Fiona | January 15, 2021 |
| 2 | V1.0.1 | A | Added electrical characteristics and application note | Fiona | June 11, 2021 |
| 3 | V1.0.2 | A | Added current consumption | Fiona | July 11, 2021 |
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*Changes：C——create，A——add，M——modify，D——delete



# Contents





# 1 Overview

WT32C3-S6 WiFi module is a low-power, cost-effective embedded wireless network control module, which is an ideal choice for smart grid, building automation, security system, smart home, telemedicine and other IoT applications.

The module's core processor ESP32-C3 integrates an industry-leading 32-bit RISC-V single-core microprocessor with a maximum clock speed of 160 MHz in a small-sized package. It comes with an on-board PCB antenna.

The module supports for the standard IEEE802.11 b/g/n protocol and Bluetooth Low Energy 5.0 (Bluetooth LE): Bluetooth 5, Bluetooth mesh. The module can be used to help Bluetooth pairing and network connection to existing devices, or build an independent network controller.

# 2 Features

- SMD-16 package
- On-board PCB antenna
- Operating voltage: 3.3V
- Operating ambient temperature: -20-85°C
- ESP32-C3 chip embedded, 32-bit RISC-V single-core microprocessor, up to 160MHz
  - SRAM 400KB
  - RTC SRAM 8KB
  - ROM 384KB
- Embedded Flash 4MB
- System

**WIFI**

- IEEE 802.11 b/g/n protocol
- 1T1R mode with data rate up to 150 Mbps
- WIFI @2.4 GHz, support for WEP/WPA-PSK/WPA2-PSK security mode
- Frame aggregation (TX/RX A-MPDU, RX A-MSDU)

**BLE**

- Bluetooth Low Energy 5.0(Bluetooth LE): Bluetooth 5, Bluetooth mesh
- Speed: 125 Kbps, 500 Kbps, 1 Mbps, 2 Mbps
- Advertising Extensions
- Multiple Advertisement Sets
- Channel Selection Algorithm #2

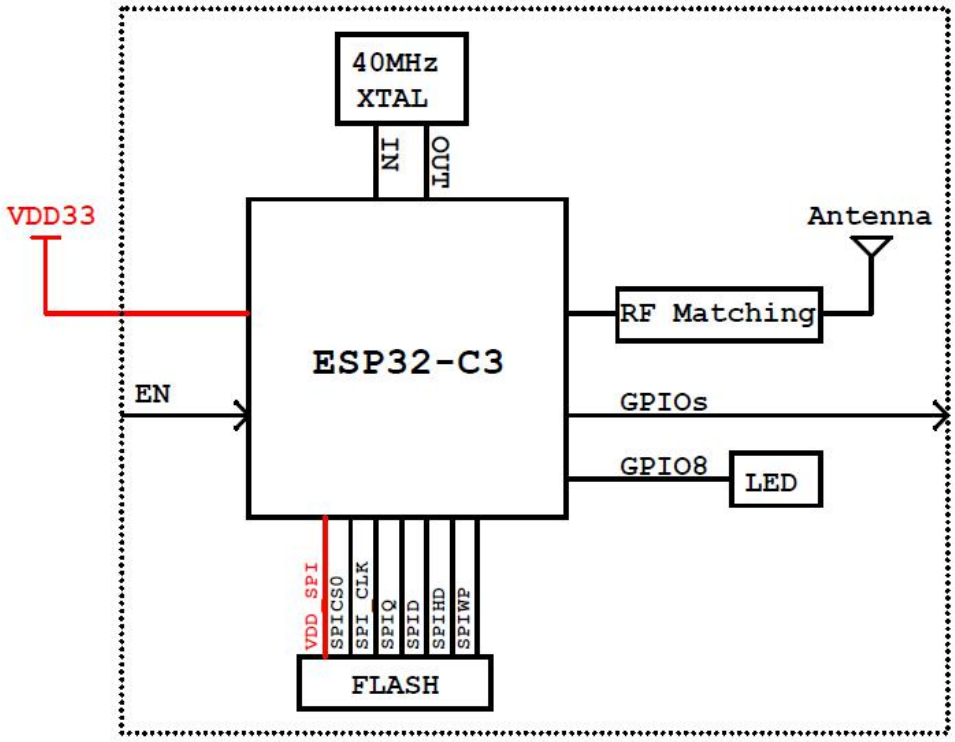
**Hardware**

- Support for GPIO, SPI, UART, I2C, I2S, infrared transceiver, LED PWM controller, USB JTAG interface, general DMA controller, TWAITM controller (compatible with ISO11898-1), temperature sensor, SAR ADC
- Support for STA/AP/STA+AP mode
- Support for remote OTA

# 3 Hardware Specifications

## 3.1 Block Diagram

**Figure 1 Block Diagram**




## 3.2 Pin Descriptions

**Figure 2 Pin Layout**

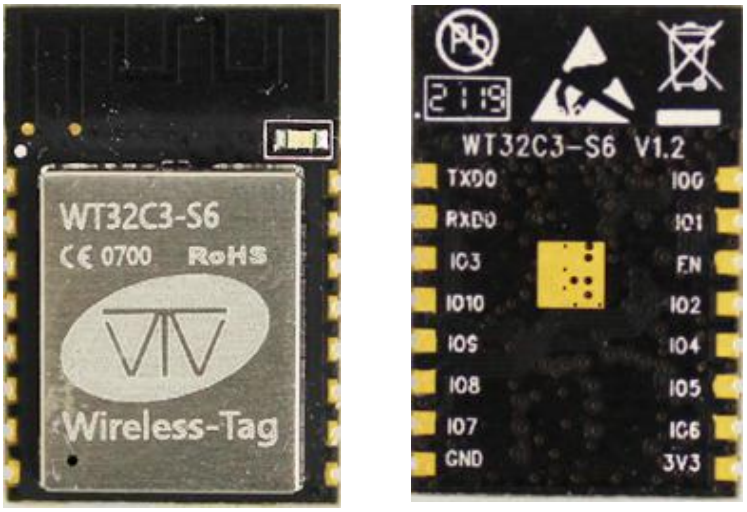


**Table 1 Pin Definitions and Descriptions**

| Pin | Name | Description |
|---|---|---|
| 1 | IO0 | GPIO0，ADC1_CH0，XTAL_32K_P (32.768 kHz crystal input) |
| 2 | IO1 | GPIO1，ADC1_CH1，XTAL_32K_N (32.768 kHz crystal output) |
| 3 | EN | Chip Enable pin:<br>High level: on, enables the chip.<br>Low level: off, low current.<br>Note: Do not leave the EN pin floating. |
| 4 | IO2 | GPIO2，ADC1_CH2，FSPIQ |
| 5 | IO4 | GPIO4，MTMS，ADC1_CH4，FSPIHD |
| 6 | IO5 | GPIO5，MTDI，ADC2_CH0，FSPIWP |
| 7 | IO6 | GPIO6，MTCK，FSPICLK |
| 8 | VCC | 3.3V power supply; The output current delivered by the external power supply is recommended to be above 500mA |
| 9 | GND | GND |
| 10 | IO7 | GPIO7，MTDO，FSPID |
| 11 | IO8 | GPIO8 |
| 12 | IO9 | GPIO9 |
| 13 | IO10 | GPIO10，FSPICS0 |
| 14 | IO3 | GPIO3, ADC1_CH3 |
| 15 | RXD0 | U0RXD，GPIO20 |
| 16 | TXD0 | U0TXD，GPIO21 |



## 3.3 Strapping Pins

ESP32-C3 series has three strapping pins.

- GPIO2
- GPIO8
- GPIO9

Software can read the strapping values of these pins in “GPIO_STRAPPING” register.

During the chip’s system reset(power-on-reset, RTC watchdog reset, brownout reset, analog super watchdog reset, crystal clock glitch detection reset), the latches of the strapping pins sample the voltage level as strapping bits of “0” or “1”, and hold these bits until the chip is powered down or shut down.

By default, GPIO9 is connected to the internal pull-up resistor. If GPIO9 is not connected or connected to an external high-impedance circuit, the latched bit value will be “1”.

To change the strapping bit values, you can apply the external pull-down/pull-up resistances, or use the

host MCU's GPIOs to control the voltage level of these pins when powering on ESP32-C3 family. After reset, the strapping pins work as normal-function pins.

Refer to Table 2 for a detailed boot-mode configuration of the strapping pins.

Note:

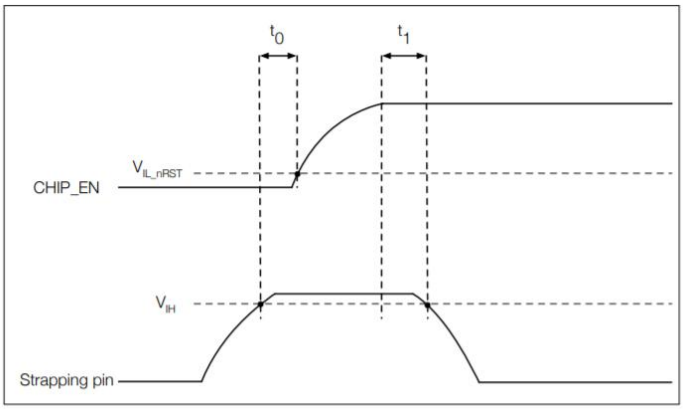
Some pins have been internally pulled up, please refer to the schematic diagram.

**Table 2 Strapping Pins**

| Booting Mode [1] | | | |
|---|---|---|---|
| **Pin** | **Default** | **SPI Boot** | **Download Boot** |
| GPIO2 | N/A | 1 | 1 |
| GPIO8 | N/A | Don't care | 1 |
| GPIO9 | Internal pull-up | 1 | 0 |
| **Enabling/Disabling ROM Code Print During Booting** | | | |
| **Pin** | **Default** | **Functionality** | |
| GPIO8 | N/A | When the value of eFuse field UART_PRINT_CONTROL is<br>0, print is enabled and not controlled by GPIO8.<br>1, if GPIO8 is 0, print is enabled; if GPIO8 is 1, it is disabled.<br>2, if GPIO8 is 0, print is disabled; if GPIO8 is 1, it is enabled.<br>3, print is disabled and not controlled by GPIO8. | |
| **Parameter Descriptions of Setup and Hold Times for the Strapping Pin** | | | |
| **Parameter** | **Description** | | **Min** |
| t0 | Setup time before CHIP_EN goes from low to high | | 0ms |
| t1 | Hold time after CHIP_EN goes high | | 3ms |

Figure 3 shows the setup and hold times for the strapping pin before and after the CHIP_EN signal goes high.

**Figure 3 Setup and Hold Times for the Strapping Pin**




Note: 1. The strapping combination of GPIO8 = 0 and GPIO9 = 0 is invalid.

# 4 Electrical Characteristics

## 4.1 Absolute Maximum Ratings

Stresses above those listed in Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

## 4.2 Recommended Operating Conditions

**Table 3 Operating Conditions**

| Symbol | Parameter | | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| VDD | Power supply voltage | | 3.0 | 3.3 | 3.6 | V |
| $I_{VDD}$ | Current delivered by external power supply | | 0.5 | - | - | A |
| $T_A$ | Ambient temperature | 85°C version | -40 | - | 85 | ℃ |
| | | 105°C version | | | 105 | |
| Humidity | Humidity condition | | - | - | 85 | %RH |

**Table 4 Current Consumption Depending on RF Modes**

| Work mode | Description | | Peak（mA） |
|---|---|---|---|
| Active(RF working) | TX | 802.11b, 1 Mbps, @19.5dBm | 384 |
| | | 802.11g, 54 Mbps, @16.4dBm | 287 |
| | | 802.11n, HT20, MCS 7, @16 dBm | 275 |
| | | 802.11n, HT40, MCS 7, @16 dBm | 260 |
| | RX | 802.11b/g/n, HT20 | 83 |
| | | 802.11n, HT40 | 86 |

Note:

Ambient temperature, 3.3V power supply, TX continues mode, DC power accuracy: 100 μA.

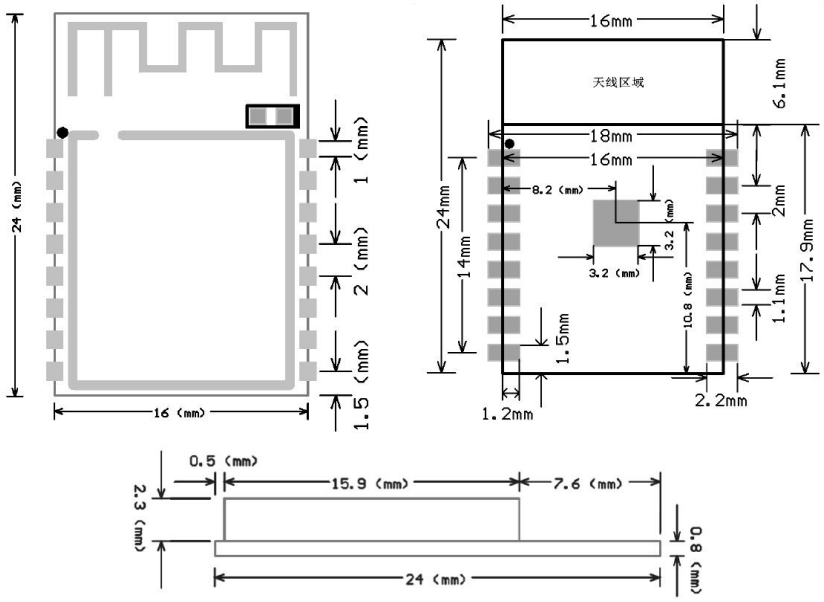
**Table 5 Current Consumption Depending on Work Modes**

| Work mode | Description | | Typical value |
|---|---|---|---|
| Modem-sleep | The CPU is powered on | 160MHz | 25.8mA |
| | | 80MHz | 22.7mA |
| Light-sleep | | | 0.3mA |
| Deep-sleep | | | 14uA |
| Power off | EN is set to low level | | 0 |

# 5 Application Note

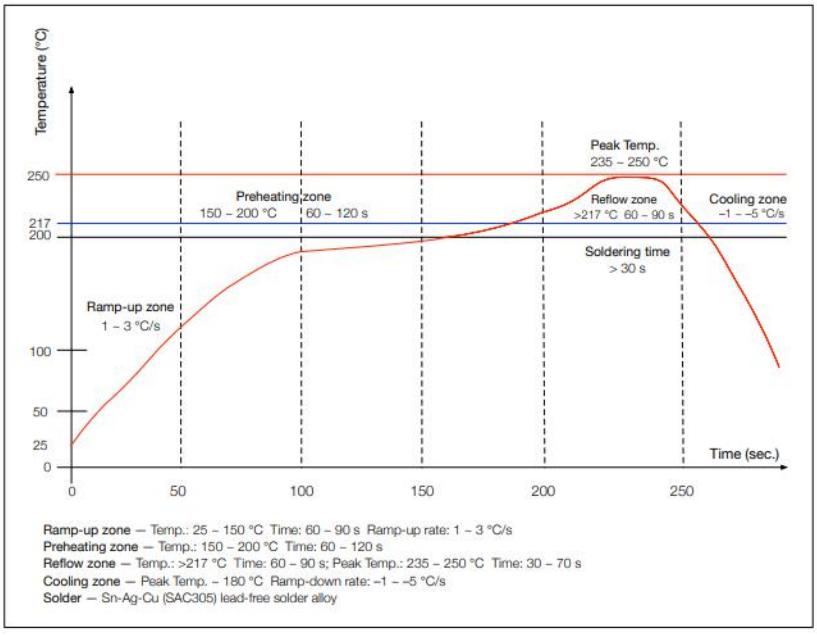
## 5.1 Module Dimensions

**Figure 4 Module Dimensions**



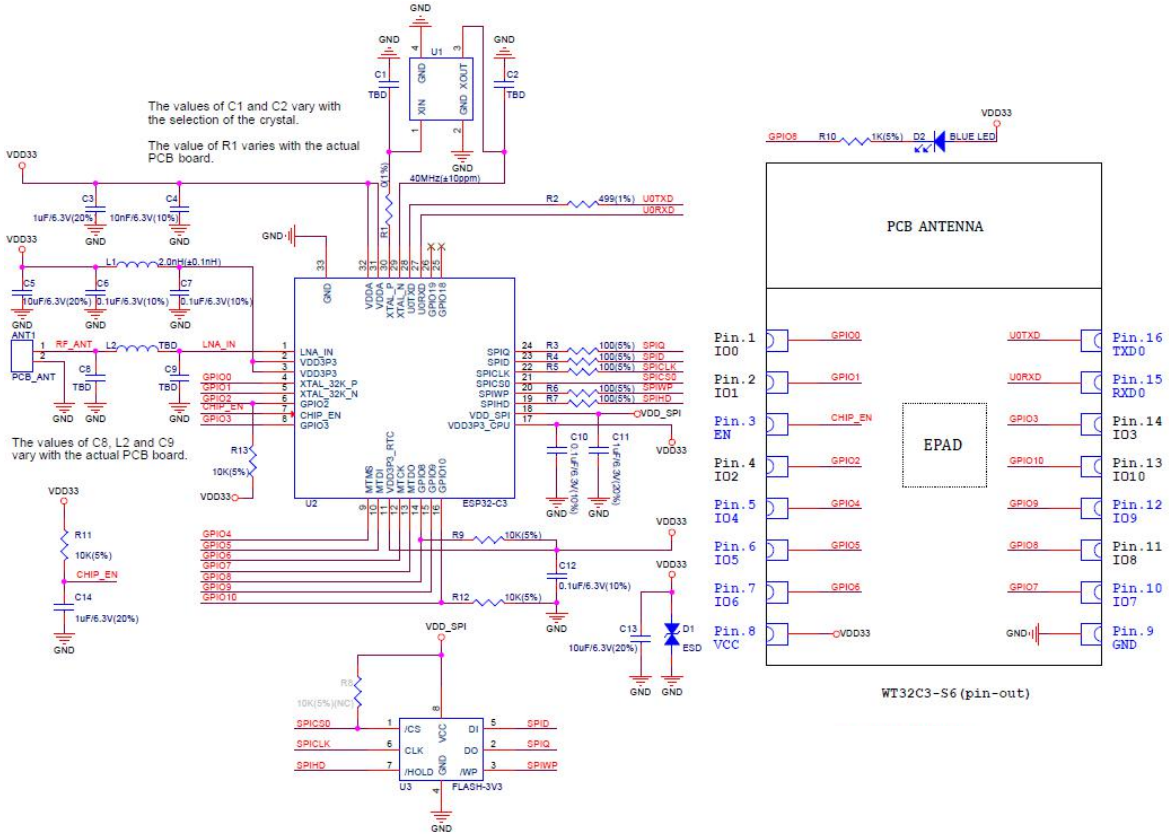

## 5.2 Reflow Profile

**Figure 5 Reflow Profile**



## 5.3 Module Schematics

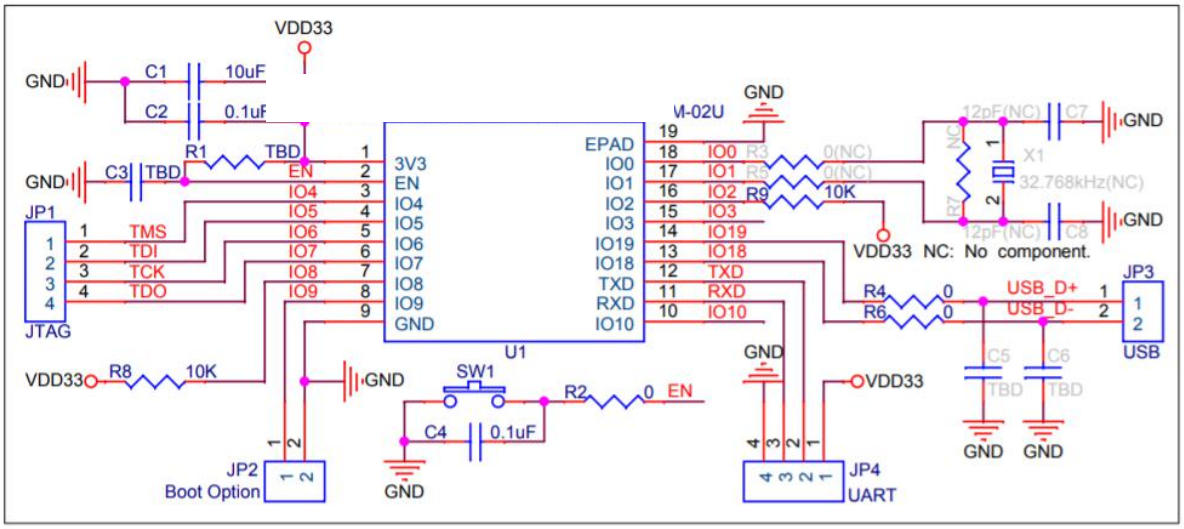
**Figure 6 Module Schematics**



## 5.4 Peripheral Schematic

This is the typical application circuit of the module connected with peripheral components (for example, power supply, antenna, reset button, JTAG interface, and UART interface).

**Figure 7 Application Circuit**




- Soldering the EPAD to the ground of the base board is not a must, though doing so can get optimized thermal performance. If you do want to solder it, please ensure that you apply the correct amount of soldering paste.
- To ensure the power supply to the ESP32-C3 family chip is stable during power-up, it is advised to add an RC delay circuit at the EN pin. The recommended setting for the RC delay circuit is usually R = 10 kΩ and C = 1 µF. However, specific parameters should be adjusted based on the power-up timing of the module and the power-up and reset sequence timing of the chip.

# 6 Product Trial

- Sales email：sales@wireless-tag.com
- Technical support email：technical@wireless-tag.com