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Wishiot XH-C2X

Wishiot XH-C2X ESP8684H4 WiFi Bluetooth Module Instruction Manual

Model: XH-C2X

1. Introduction

This manual provides detailed instructions for the Wishiot XH-C2X ESP8684H4 WiFi Bluetooth Module. This module is an updated version designed to replace the ESP-01S, offering enhanced Wi-Fi and Bluetooth capabilities for various embedded applications. Please read this manual thoroughly before using the module to ensure proper setup and operation.

2. Product Features

- **Wi-Fi/Bluetooth Dual Function:** Integrates both Wi-Fi and Bluetooth capabilities, expanding functionality beyond the ESP-01S.
- **Built-in ESP8684H4 Chip:** Features a RISC-V 32-bit single-core microprocessor operating up to 120 MHz.
- **Integrated Flash Memory:** Equipped with 4MByte (32Mbit) built-in FLASH memory.
- **Rich Peripherals:** Supports GPIO, SPI, UART, I2C, I2S, IR, LED PWM, Temperature Sensor, SAR ADC, General Timers, and Watchdog Timers.
- **Wide Application Scope:** Suitable for Smart Home, Smart Building, Electric Lighting, Baby Monitors, Webcams, Wearable Electronics, Smart Bus systems, Wireless Location Sensing, Wireless Positioning System Beacons, and Industrial Wireless Control.

3. Technical Specifications

3.1. Wi-Fi Specifications

- **Protocol:** IEEE 802.11 b/g/n
- **Frequency Band:** 2.4 GHz (20 MHz and 40 MHz bandwidth)
- **Data Rates:** Up to 72 Mbps (1T1R mode)
- **Output Power:** Maximum +18dBm in 802.11b mode
- **Modes:** Infrastructure BSS Station, SoftAP, Station + SoftAP, Hybrid mode
- **Channel Frequency Range:** 2412 ~ 2484 MHz
- **Features:** Automatic Beacon Monitoring (Hardware TSF), 3 × virtual Wi-Fi interface

3.2. Bluetooth Specifications

- **Protocol:** Low Energy Bluetooth (Bluetooth LE): Bluetooth 5, Bluetooth mesh
- **RF:** NZIF Receiver with -98 dBm Sensitivity
- **Rate Support:** 125 Kbps, 500 Kbps, 1 Mbps, 2 Mbps
- **Features:** Channel Selection Algorithm #2, Wi-Fi and Bluetooth coexist and share the same antenna.

3.3. Hardware Specifications

- **Module Interface:** GPIO, SPI, UART, I2C, I2S, IR, LED PWM, Temperature Sensor, SAR ADC, General Timers, Watchdog Timers
- **Onboard Clock:** 26 MHz Crystal, 32 kHz Crystal
- **Operating Voltage:** 3.0-3.6V DC
- **Operating Current:** Average: 80 mA
- **Operating Temperature Range:** -40°C to +85°C
- **Package Size:** 16 mm x 24 mm x 3 mm

3.4. Software Specifications

- **Wi-Fi Modes:** Station/softAP/SoftAP+station
- **Security Mechanism:** WPA/WPA2/WPA2-Enterprise/WPS
- **Encryption Types:** AES/RSA/ECC/SHA
- **Firmware Upgrade:** UART Download/OTA (Over the network/Through the host to download and write firmware)
- **Software Development:** Supports cloud server development/SDK for user firmware development
- **Network Protocol:** IPv4, IPv6, SSL, TCP/UDP/HTTP/FTP/MQTT
- **User Configuration:** AT+ Command Set, Cloud Server, Android/iOS APP

4. Physical Overview and Dimensions

The Wishiot XH-C2X module is a compact board with pin headers for easy integration. Below are images illustrating its physical appearance, dimensions, and pinout.

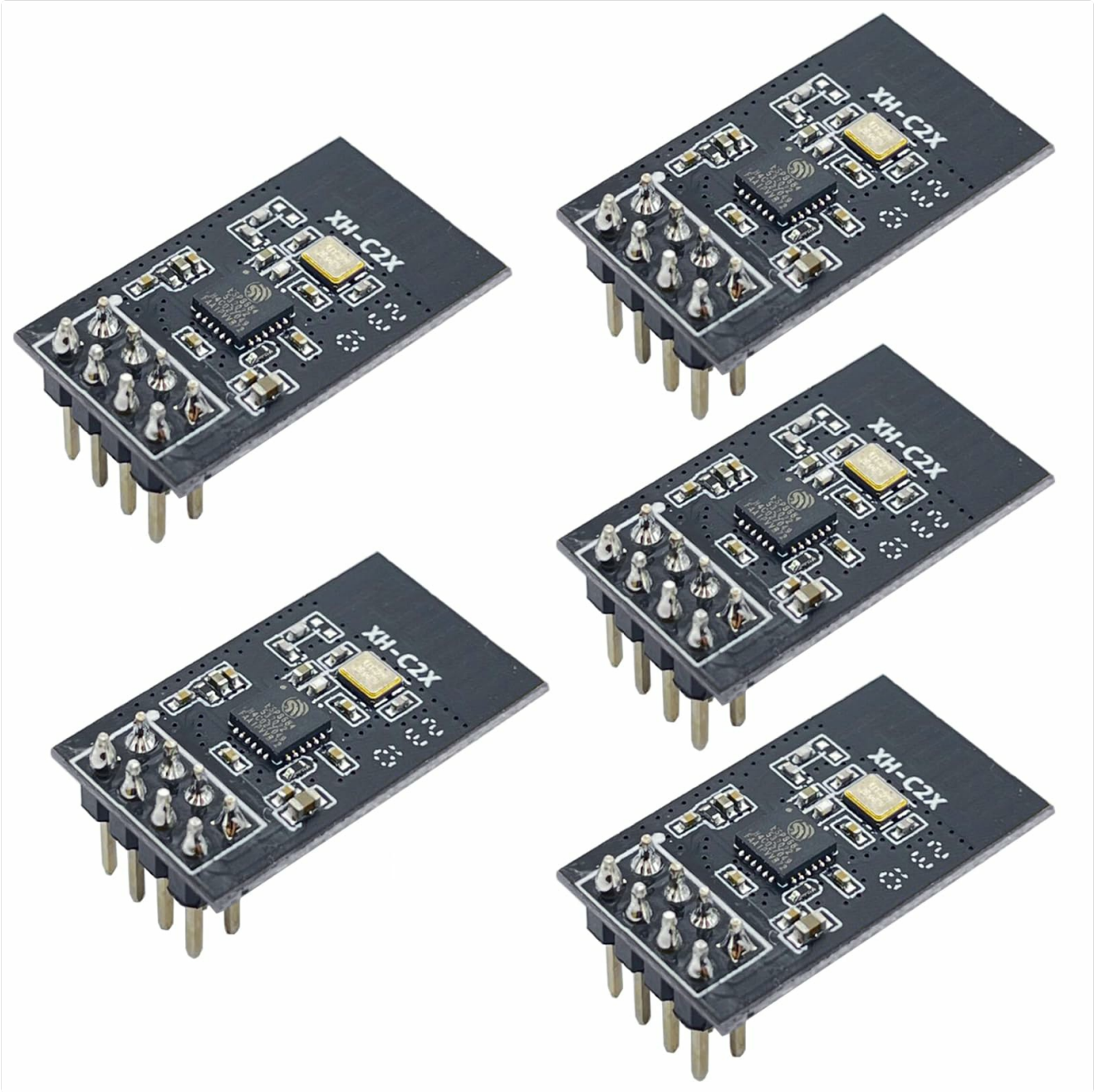


Figure 4.1: Top-down view of the Wishiot XH-C2X module.

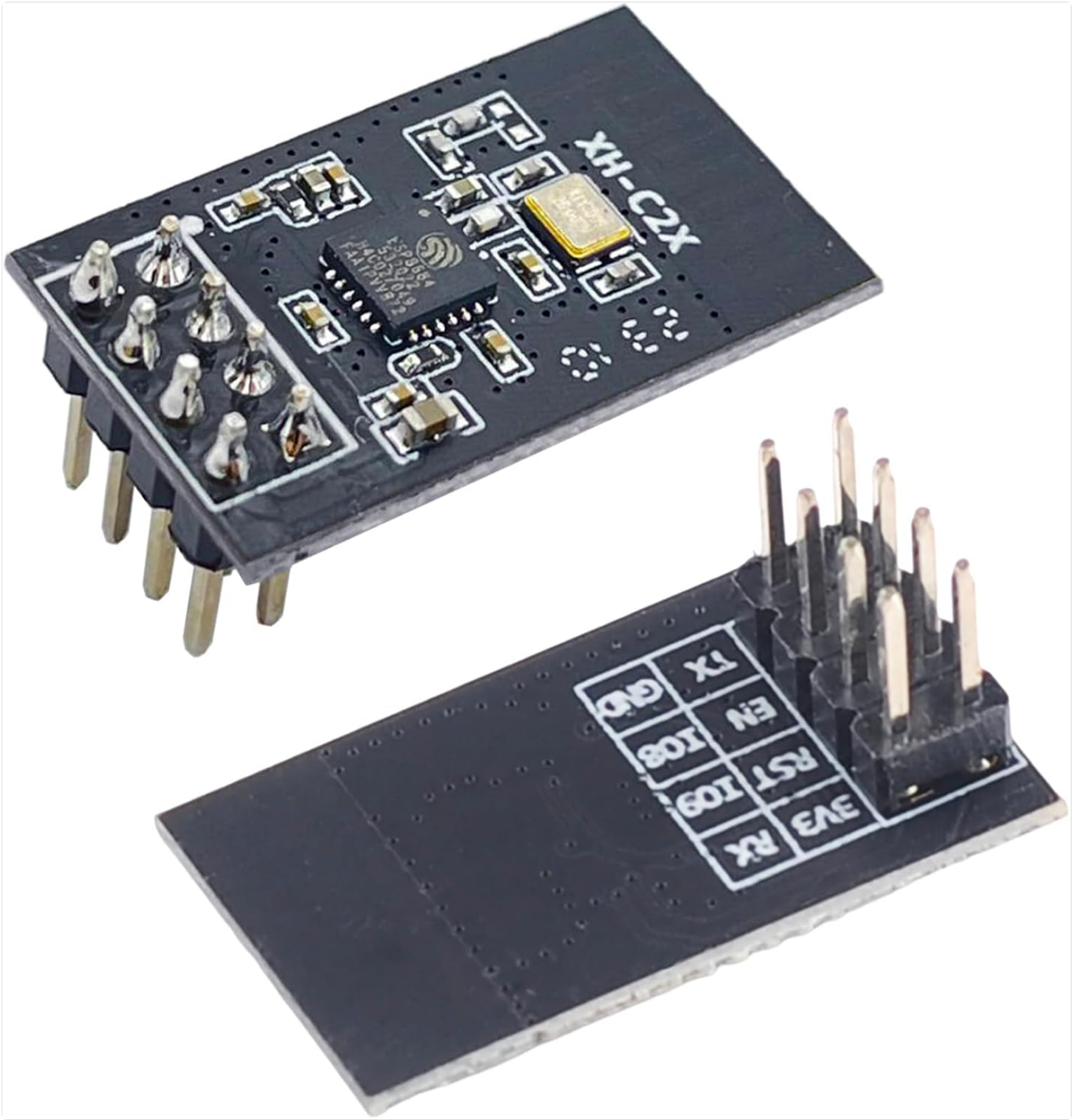


Figure 4.2: Front and back view of the XH-C2X module, showing components and pin labels.

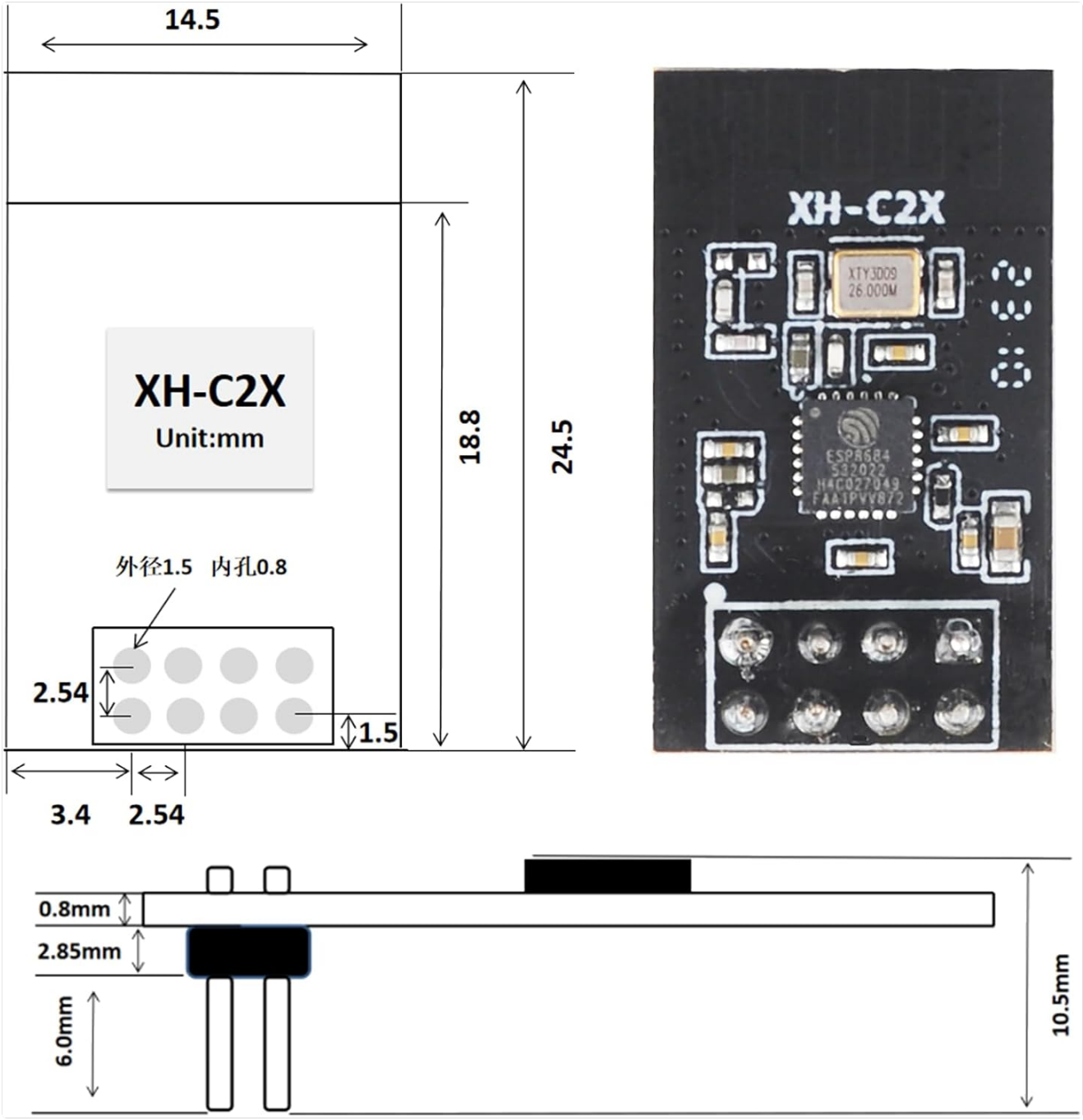
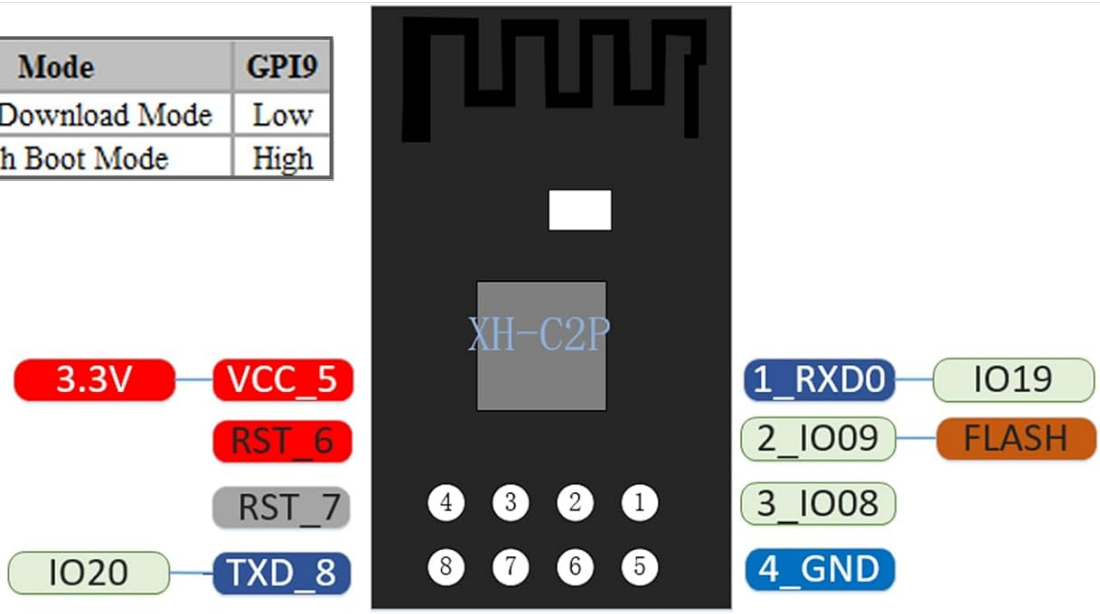


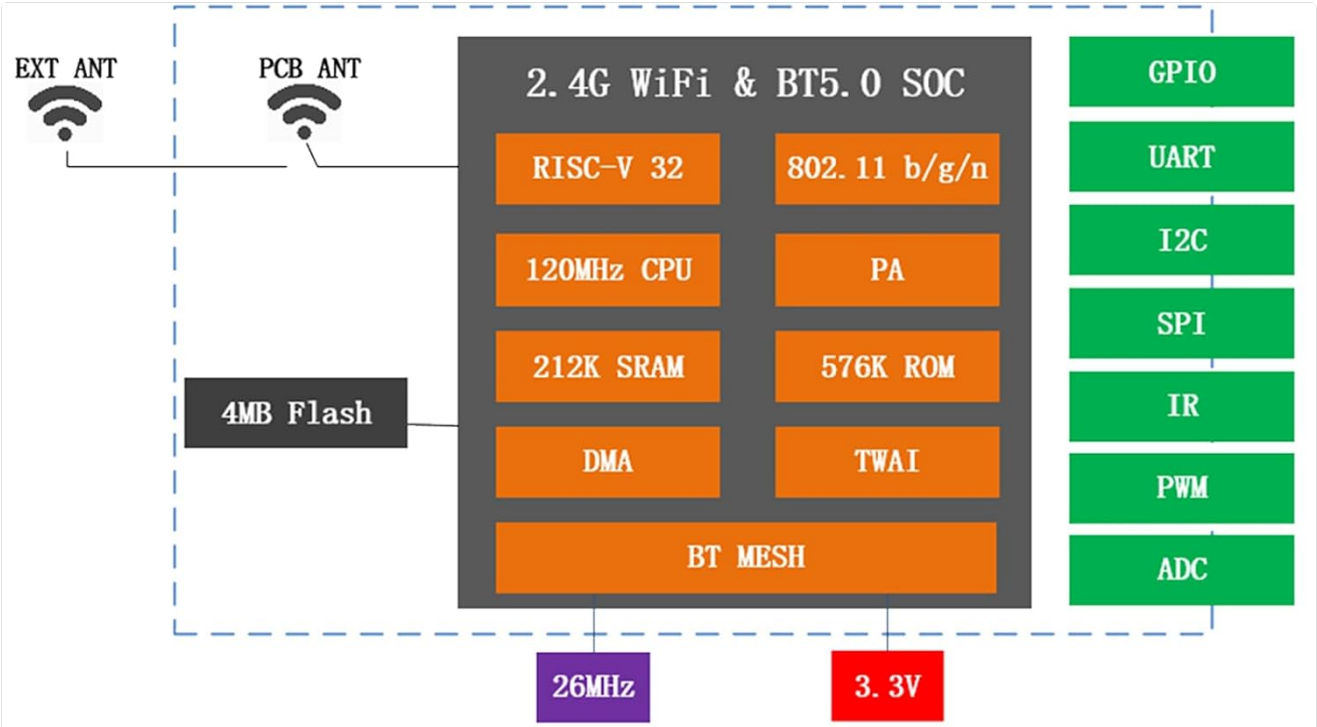
Figure 4.3: Dimensional drawing of the XH-C2X module in millimeters.

Mode	GPI9
UART Download Mode	Low
Flash Boot Mode	High



NO.	Name	Style	Description
1	RXD0	I/O	GPIO19, U0RXD
2	IO9	I/O	High: chip enable; Low: download mode;
3	IO8	I/O	GPIO8, internal pull-up.
4	GND	p	Ground
5	VCC	P	3V3 supply (500mA or more)
6	RST	I/O	High level: chip enable; Low level: chip off; Note that the EN pin cannot be left floating.
7	RST	I/O	High level: chip enable; Low level: chip off; Be careful not to leave the EN pin floating.
8	TXD0	I/O	GPIO20, U0TXD

Figure 4.4: Pinout diagram for the XH-C2X module, detailing each pin's name, style (I/O, Power), and description.



Module Structure Diagram

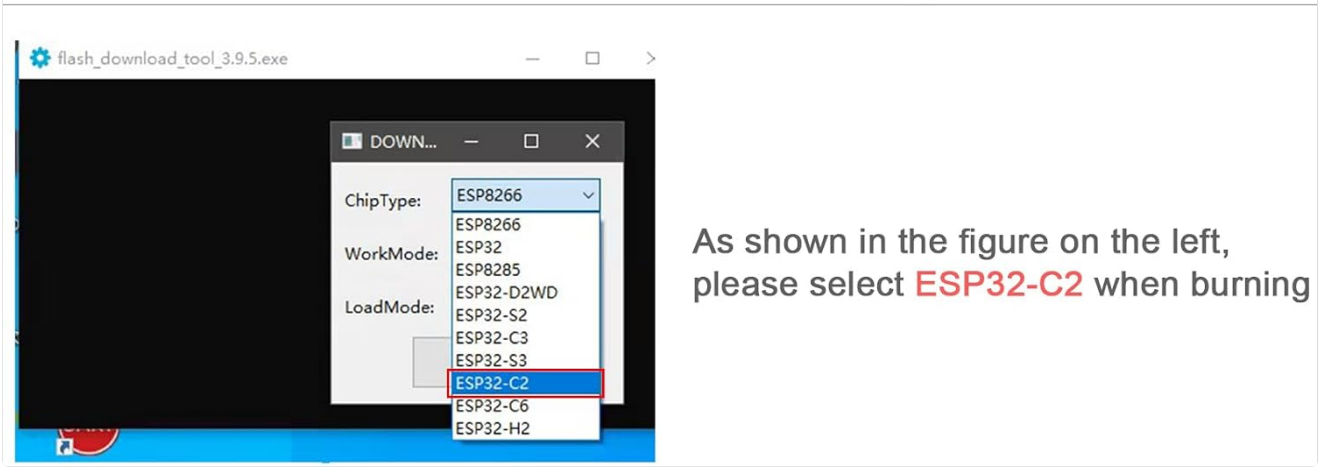


Figure 4.5: Block diagram illustrating the internal structure of the XH-C2X module, including CPU, memory, and peripherals.

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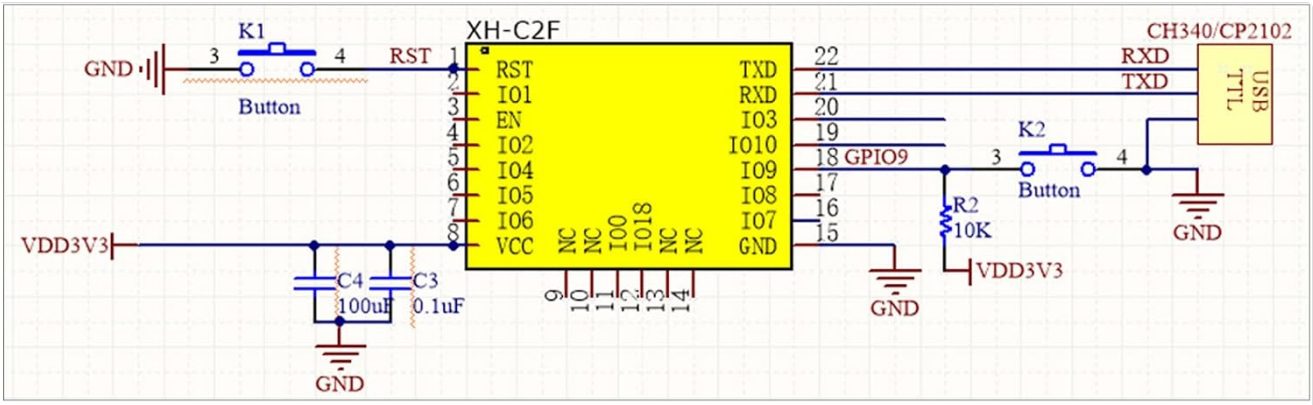
Video 4.1: A short demonstration video showcasing the physical appearance of the Wishiot XH-C2X WiFi Bluetooth Module.

5. Getting Started: Hardware Connection

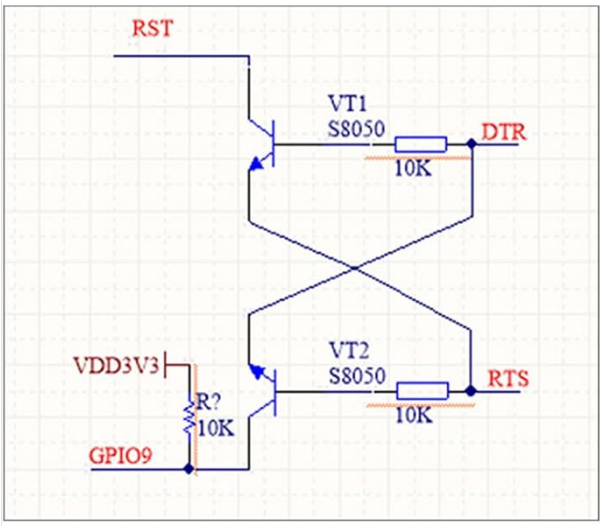
To begin using the XH-C2X module, it typically requires connection to a programmer board for initial setup and firmware flashing. Ensure all connections are secure and correct before applying power.

5.1. Minimum System and Automatic Download Circuit

For stable operation and firmware flashing, understanding the minimum system requirements and the automatic download circuit is essential. The module operates at 3.3V DC. The RST pin is active low. For automatic software download, connect the EN and GPIO9 pins of the module with the DTR and RTS of the serial chip.



Minimum System



Automatic Download Circuit

Notes:

(1) The module supply voltage is 3.3V DC;

(2) The maximum output current of module IO is 12mA;

(3) The module RST pin is active low;

(4) The RXD of the module is connected to the TXD of the external MCU, and the TXD of the Wi-Fi module is connected to the RXD of the external MCU;

(5) Connect the EN and GPIO9 pins of the module with the DTR and RTS of the serial chip to achieve the automatic software download mode.

(6) The module enters FLASH download mode: IO9 is at low level, then the module resets and powers up; Wi-Fi module enters normal working mode: IO9 is at high level, the module resets and powers up.

Figure 5.1: Diagrams for the minimum system configuration and the automatic download circuit for the XH-C2X module.

6. Firmware Update Guide

Updating the firmware on your XH-C2X module is a critical step for many applications. This section outlines the process using the Espressif Flash Download Tool. A programmer board (e.g., ESP8266 programmer, ASIN: B08BXMGVNM) is required for this process.

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Video 6.1: A detailed tutorial on how to flash firmware onto the XH-C2X module using the Espressif Download Tool.

6.1. Prerequisites

- Wishiot XH-C2X Module
- ESP8266 Programmer Board (e.g., ASIN: B08BXMGVNM)
- Computer with Windows OS
- Internet connection for downloading tools and firmware

6.2. Step-by-Step Firmware Flashing

1. **Connect the Module:** Connect the XH-C2X module to your ESP8266 programmer board.
2. **Download Firmware:** Obtain the necessary firmware files from the official Espressif website. For the XH-C2X (ESP8684H4), select the **ESP32-C2 4MB Series** firmware. A recommended link is: Espressif AT Firmware Download.
3. **Download Flash Tool:** Download the Espressif Flash Download Tool. A recommended link is:Espressif Download Tools. Unzip the downloaded file and run the executable (e.g.,flash_download_tool_3.9.5.exe).
4. **Install CP2102 Driver (if needed):** If your computer does not recognize the programmer board (no COM port appears in Device Manager), you may need to install the CP2102 driver. The driver can be found at: Silicon Labs CP2102 Drivers.
5. **Identify COM Port:** Connect the programmer board to your PC via USB. Open Device Manager and note the assigned COM port (e.g., COM5) under 'Ports (COM & LPT)'.
6. **Configure Flash Tool:**
    - In the Flash Download Tool, select **ChipType: ESP32-C2**.
    - Choose **WorkMode: Develop** and **LoadMode: UART**. Click 'OK'.
    - Load the firmware .bin file (e.g., bootloader.bin) into the tool. Ensure the correct address (usually0x0 for bootloader) is specified.
    - Select the identified COM port and set the Baudrate (e.g., 115200). A higher baud rate can speed up flashing.
7. **Start Download:** Click the 'START' button in the Flash Download Tool to begin the flashing process. Wait for the process to complete, indicated by a 'FINISH' message.
8. **Verify Firmware:** After flashing, open a serial port monitoring software (e.g., UART Assistant). Press the RESET button on your programmer board. You should see print information from the module, confirming successful firmware installation.

7. Operating Instructions

Once the firmware is successfully loaded, the XH-C2X module can be operated using AT commands via its UART interface or through custom firmware developed using the Espressif SDK.

7.1. Wi-Fi Operation

The module supports various Wi-Fi modes including Station, SoftAP, and a combination of both. You can configure network parameters (SSID, password, IP settings) using AT commands or through your custom application logic.

7.2. Bluetooth Operation

With Bluetooth 5 and Bluetooth mesh support, the module can be used for low-energy communication. Bluetooth functionality can be controlled via AT commands or integrated into your custom firmware.

7.3. Using AT Commands

Connect the module's UART pins (TXD, RXD) to a serial-to-USB converter and use a serial terminal program on your computer. Send AT commands to configure Wi-Fi, Bluetooth, and other module parameters. Refer to the Espressif AT Command Set documentation for a comprehensive list of commands.

8. Troubleshooting

- **Module Not Detected by PC:** Ensure the CP2102 driver is installed correctly. Check USB cable and programmer board connections.
- **Flashing Fails:** Verify the correct ChipType (ESP32-C2) is selected in the Flash Download Tool. Double-check COM port and baud rate settings. Ensure the module is in download mode (GPIO9 high, RST low during power-up, or use automatic download circuit).
- **No Serial Output After Flashing:** Confirm the serial terminal settings (baud rate, data bits, parity, stop bits) match the module's configuration. Press the RESET button on the programmer board after opening the serial monitor.
- **Wi-Fi/Bluetooth Connectivity Issues:** Check antenna connection (if external). Verify network credentials. Ensure the module is within range of the access point/Bluetooth device.
- **Compatibility with Prusa Mini:** The manufacturer states that the XH-C2X module cannot be used with Prusa Mini and other Prusa printer motherboards. However, some user reports indicate successful integration. Users attempting this should proceed with caution and verify compatibility independently.
- **Slow Data Rate:** While the module supports up to 72 Mbps, actual performance can vary based on network conditions, firmware, and application. Optimize firmware and network environment for better performance.
- **Outdated Firmware:** Modules may ship with older firmware. It is recommended to update to the latest stable firmware version from Espressif for optimal performance and features.

9. Safety Information

- Always ensure correct voltage (3.0-3.6V DC) is applied to the module. Incorrect voltage can cause permanent damage.
- Handle the module with care to avoid electrostatic discharge (ESD) damage.
- Do not expose the module to extreme temperatures, moisture, or corrosive environments.
- Ensure proper ventilation when operating the module, especially in enclosed spaces.
- Keep out of reach of children.

10. Warranty and Support

For warranty information and technical support, please refer to the seller's policies or contact Wishiot directly through their official channels. Keep your purchase receipt for any warranty claims.

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