CH592 Evaluation Board Introduction and Application

Version: 1C
https://wch.cn

1. Overview

This evaluation board is applied to the test development of CH592 chip, with MounRiver compiler and ISP tools, and provides application reference examples and demonstrations related to chip resources.

2. Evaluation Board Hardware

For the evaluation board schematic, please refer to CH592SCH.pdf document.

CH592X evaluation board, the board is equipped with Bluetooth antenna, indicator LED, USB interface holder and chip general interface pins, suitable for customer basic function testing and verification.

Figure 1-1 CH592X evaluation board
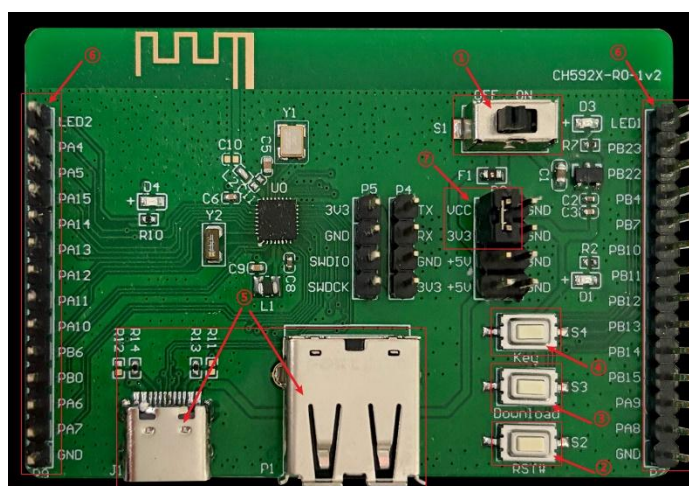

2.1 Functional Specification

CH592 is a RISC-V MCU microcontroller integrated with BLE wireless communication. It integrates a 2Mbps low-power Bluetooth BLE communication module, a full-speed USB host and device controller and transceiver, a segmented LCD driver module, SPI, 4 serial ports, 12-channel ADC, touch button detection module, and other rich peripheral resources. The CH592 evaluation board is equipped with the following resources:

1. Switch (S1): Supply switch, used to disconnect or connect to external 5V power supply or USB supply.
2. Button RESET: Reset button, used for external manual reset (Note that the manual reset function of the chip needs to be enabled).
3. Button DOWNLOAD: Download button, used when downloading with ISP tool.
4. Key: Customizable key functions.
5. Two USB interfaces: USB communication interfaces of the main chip, with Host and Device functions.
6. Extension connector (P2/P3): including chip functional pins, power pins and LED load operation pins.
7. VCC Power Jumper: Short 3V3 to VCC for power supply; can be removed to directly supply VCC for measuring chip power consumption, etc.

2.2 CH592 Antenna Introduction

The following is a 2.4GHz small-size PCB antenna design application matched with CH592. For the specific parameters of the antenna, please refer to the PCB design provided by our company.

Figure 2-1 Antenna design
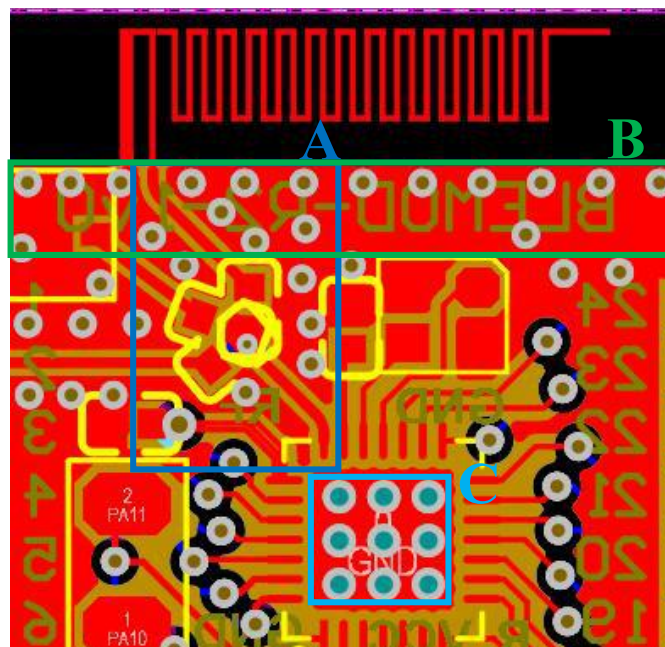
1. Chip pins to the antenna feed point (A area in the above figure) alignment needs to be 50 ohms impedance matching. Counting factor will involve A area alignment width, A and B spacing, board thickness, plate dielectric constant, copper thickness, green oil thickness and other parameters.
2. The area at B above is the common surface reference ground, this area should try to ensure sufficient area and the number of ground holes.
3. The grounding pad at the bottom of the chip (the area at C above), to ensure good grounding and heat dissipation (multiple ground holes) as the manufacturing process allows.
4. The RF part should be kept away from interference sources, such as crystals, power devices, switching power supplies, etc.
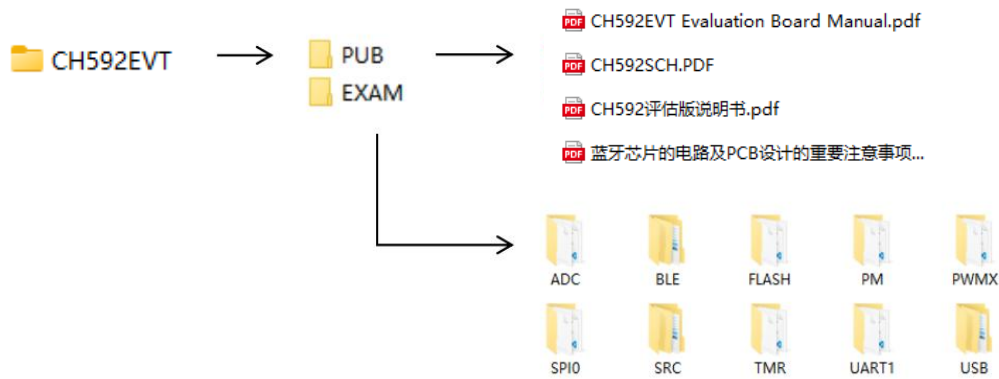
Figure 2-1 is our evaluation board antenna style, PCB board thickness 0.8mm, antenna size details, please contact our technology to provide.

3. Software Development

Please search and download CH592 development packet (CH592EVT.ZIP) on our website.

3.1 EVT Package Directory Structure

Figure 3-1 EVT package directory structure

Note:

"PUB" folder: Evaluation board manual, evaluation board schematic.

"EXAM" folder: Ch592 controller software development driver and corresponding examples, classified by peripherals. Each peripherals folder contains one more functional application routine folders.
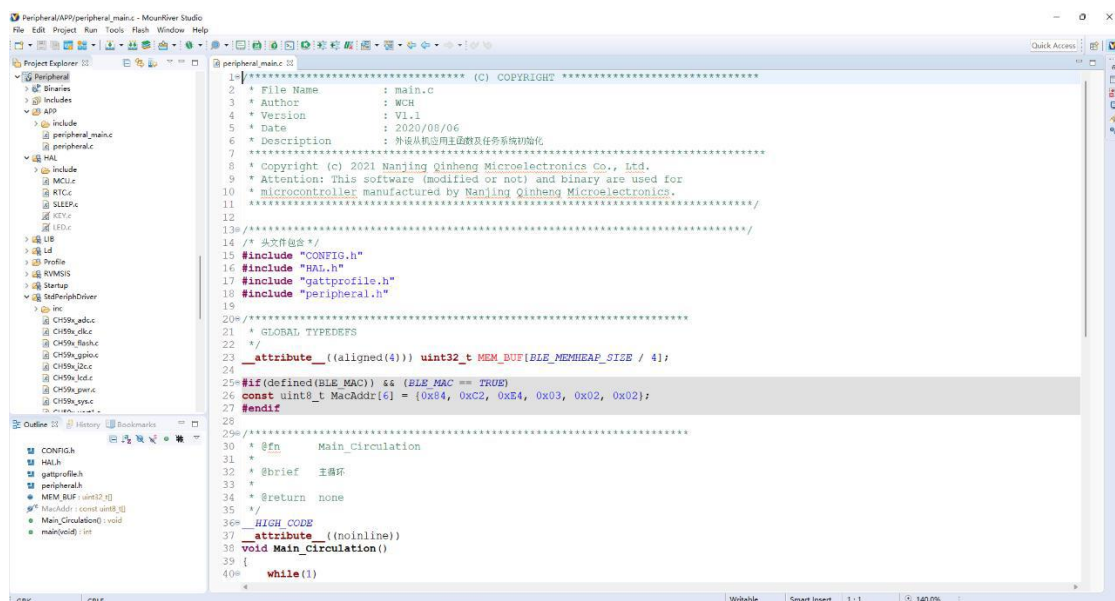
3.2 Open Project

Select any peripheral project. For example, double-click on Peripheral to open BLE slave routine.

Figure 3-2 Files in "Peripheral" folder
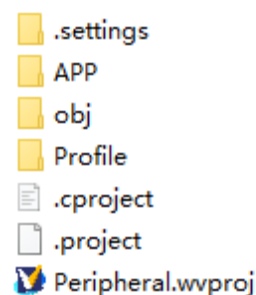
Double-click the file, Peripheral.wvproj, to open the project in MounRiver Studio.

Figure 3-3 Mounriver window after opening Peripheral.wvproj

Besides, you can also open the existing project by importing it. Open the Mounriver, right-click on the left side of the "projectexplorer" interface, and select import in the pop-up menu, as in Figure 3-4.
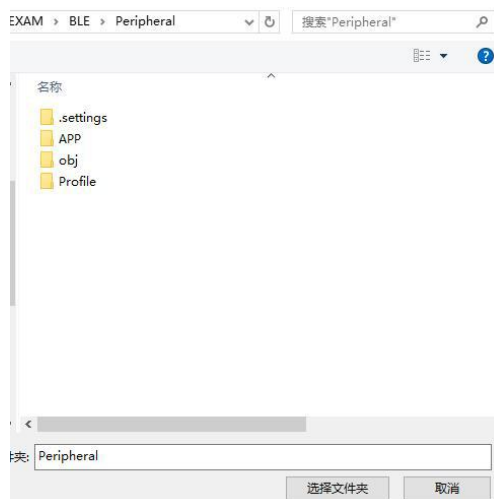
Figure 3-4 Open the menu to import
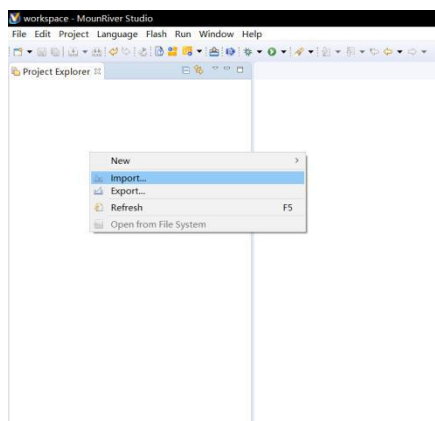
Select an existing project in the pop-up menu.

Figure 3-5 Select to open the existing projects
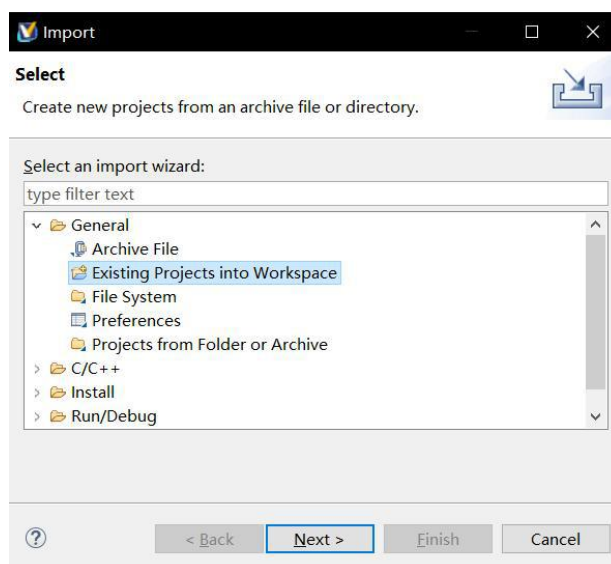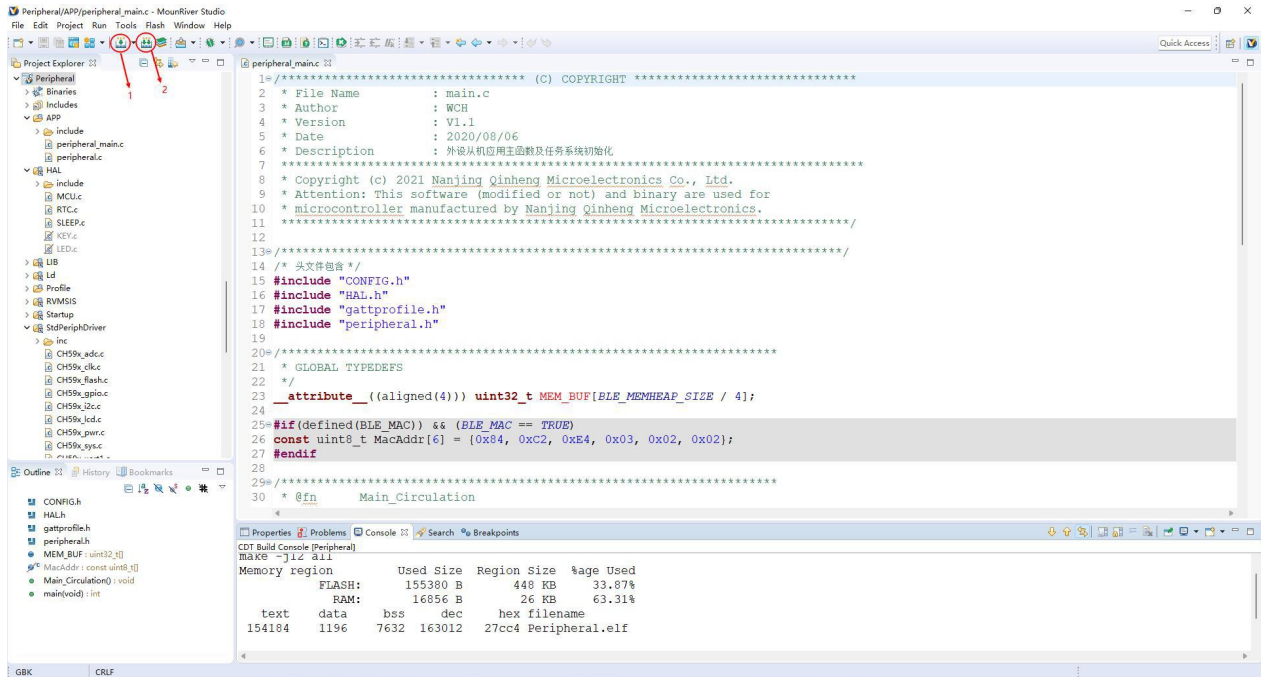
Select the directory that contains the project files.

Figure 3-6 Select the project directory

In this way, the project can also be opened.

3.3 Compile

Figure 3-7 Mounriver window

In the figure, 1 is incremental compilation, which only compiles the modified part and compiles fast, and 2 is rebuild, which is global compilation of the selected project and slower. Here choose rebuild, the compilation result is shown in the figure.

The default compilation will generate an executable .hex file, and we need to download the hex file to the evaluation version to run it. Note that the Mounriver compilation settings and project file directory, linker, optimization level and so on are explained in the *MounRiver Studio Help Manual*.

3.3 Routines Demonstration

3.3.1 BLE Peripheral Routine

1. Open the routine: "CH592EVT\EXAM\BLE\Peripheral\Peripheral.wvproj", click compile and use ISP tool to open the generated "Peripheral.hex " file. Press and hold the download button to power on the board, and connect the serial port to facilitate viewing the serial output of the routine, the hardware connects to serial port 1 (the default program), open the serial port tool, set the serial port parameters baud rate 115200, data bit 8, stop bit 1, no parity, and download the program.

2. The serial port tool will display:
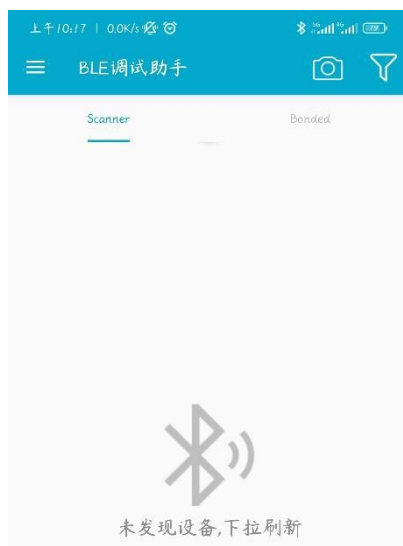
" CH59x_BLE_LIB_V1.11

Initialized..

Advertising.."

At this point the board Bluetooth has started broadcasting, as follows:

接收区
CH57x_BLE_LIB_V1.11
Initialized..
Advertising..

3 Open the cell phone APP. (If not installed, please download and install from our website) After opening the software, you will see the following interface:


4. Pull down the Bluetooth device scan, in the interface will display a "Simple Peripheral" device, the device is the Bluetooth device simulated by the routine, as follows:
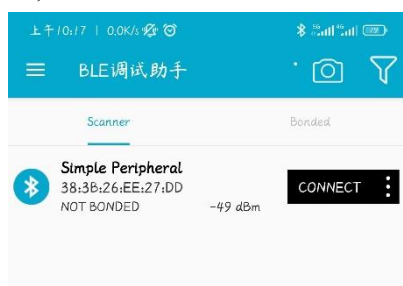

5. Click "Simple Peripheral" device entry to connect, after successful connection, the serial port will output: "Connected..." The software will switch to the connection completion screen, displaying all the services contained in the device, including "Generic Access", "Generic Attribute", "Device Information " and "Unknown Service", as follows:
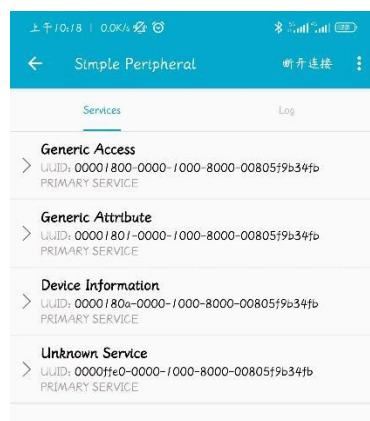
6. Unknown Service is a custom communication service in the program, with UUID 0xFFE0. Clicking on this entry, the interface shows all the characteristic under 0xFFE0 service, including "0xFFE1", "0xFFE2", "0xFFE3", "0xFFE4" and "0xFFE5", "0xFFE2", "0xFFE3", "0xFFE4" and "0xFFE5 ", and shows the Properties of the service as follows:
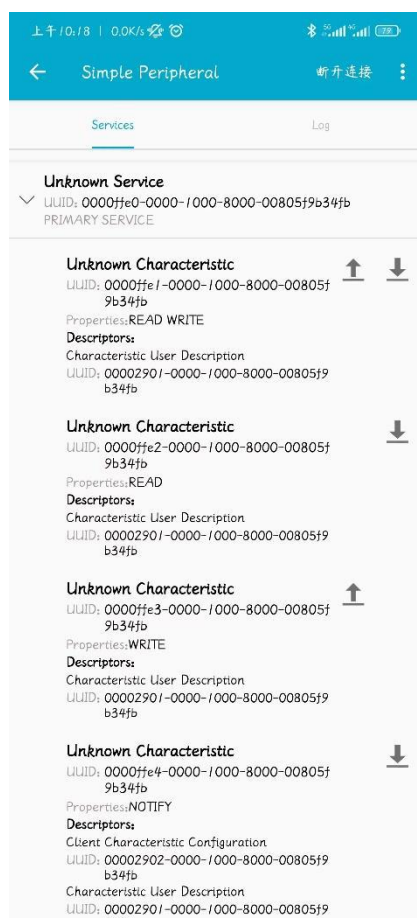
7. Click on the Send and Read button to the right of the first characteristic (i.e. "0xFFE1" service), which has read and write properties. CHAR1..." Click the "Read" button to get a byte just sent, as follows:
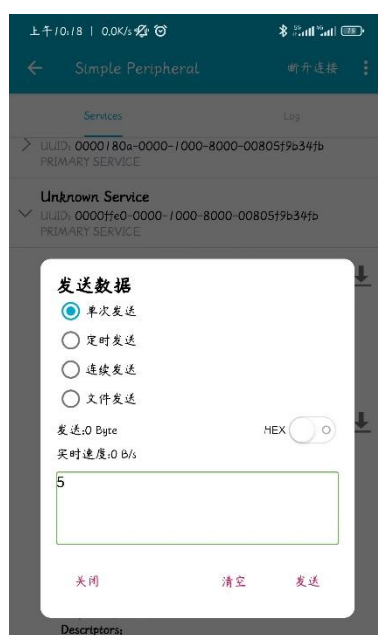
8. Click the Close button to return to the previous level, where "0xFFE2" and "0xFFE3" have read and write attributes respectively, and can perform read and write operations respectively.

9. Click the read button on the right side of the "0xFFE4" service, which has a notification service (NOTIFY), that is, actively send data to the host, open the "Receive notification data" option button in the operation interface, the receiving box will receive the byte "0x88" every second. The byte "0x88" sent by the device will be received in the receiving box every second, and when you return, you need to close the notification (NOTIFY), cancel the "Receive notification data" button option, and click the close button to return to the previous level, as follows:

10. Click "0xFFE5" service, the service has authentication read attribute, need to enter the pairing key to read, in the send and receive interface click the read button will appear Bluetooth pairing interface (different cell phone pairing time is different, some are in the connection after successful pairing, some are in the operation of the need to pair the service before (different mobile phone pairing timing is different, some are paired after successful connection, some are paired when operating the service that needs to be paired), enter the pairing code default is "000000", select the PIN code, click OK button, the host and the device for pairing, pairing can operate the service after successful, otherwise cannot operate or disconnect the device, as follows:

4. ISP (take CH592 as example)

To program CH59x, both serial port and USB interface are available.

Default pin to download boot: PB22;

Download via USB: USB interface;

Download via serial port: Serial port 1 (PA8/PA9). Button-free downloading is supported.

4.1 ISP Tool

Please open the link http://www.wch.cn/downloads/WCHISPTool_Setup_exe.html to download our MCU burn-in software tool. Follow the installation wizard to complete the software installation.

Figure 4-1 WCHISPTool Window
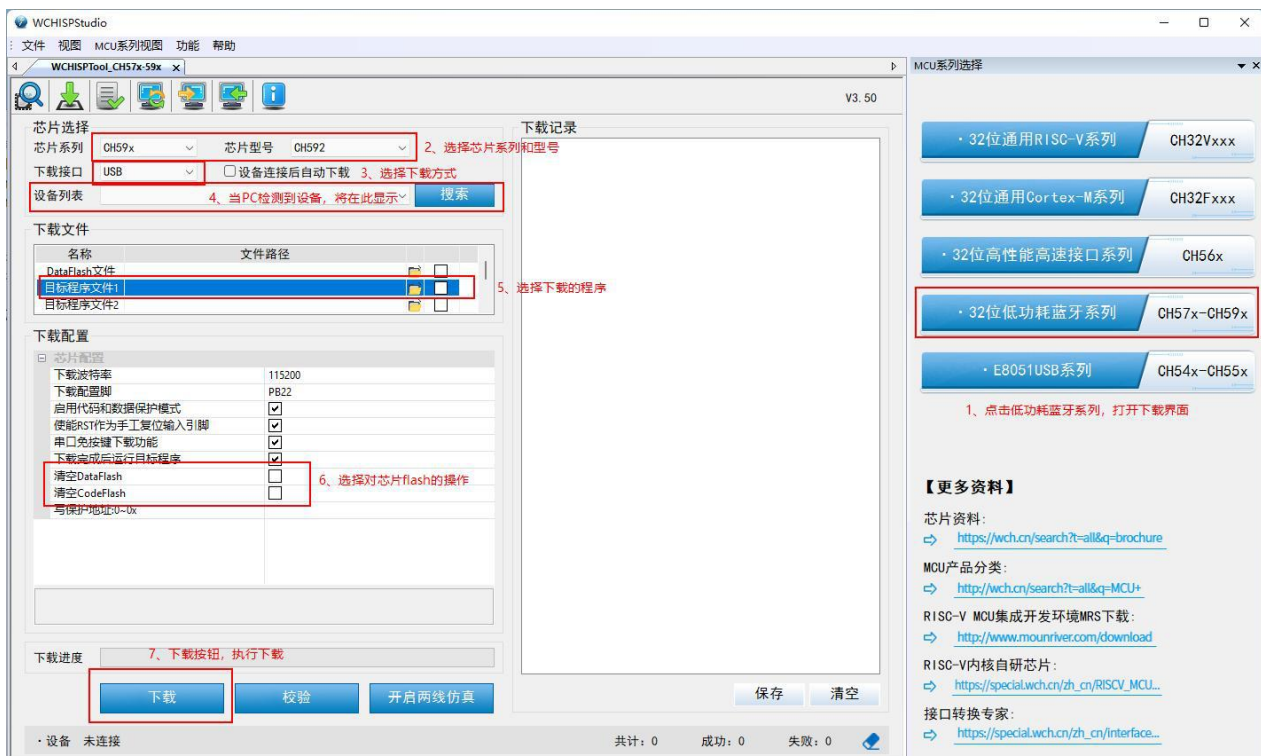
4.2 Download via Serial Port

Step 1: Open the "WCHISPTool.exe" tool software, select the chip model: CH592 (specifically matching the current burn-in chip model), download method: serial download, serial device list: select the COMx used.

Step 2: Connect the MCU's PB22 pin to GND (MCU is not powered on in this process).

Step 3: Supply power to the download board.

Step 4: The burning tool software on the computer side detects the available "serial device list" (if not, please check your own serial device), click "Download" control and execute burning.

Step 5: Check the burning result in "Download Record". When prompted, it will run the user program directly, or you can re-power or reset the hardware to run the user program just burned in the download board. If the prompt fails, please repeat steps 4-5 above.

Button-free download method: Step 1 -> Step 4 -> Step 5.

Note: Serial port download itself is slow, some larger target code will take tens of seconds, it is recommended to use the USB download method.

Figure 4-2 Download via Serial Port
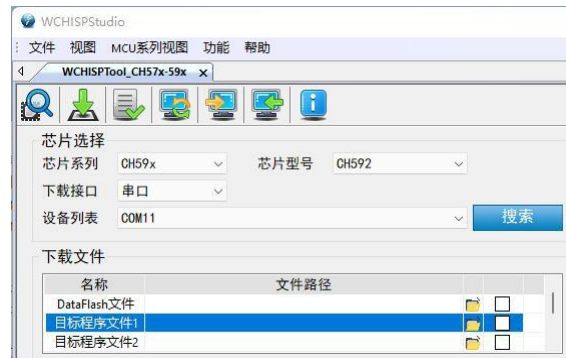
4.2 Download via USB

Step 1: Open the "WCHISPTool.exe" tool software, select the chip model: CH592 (specifically match the current chip model if burned), download method: USB.

Step 2: Connect the MCU's PB22 pin to GND (do not power on the MCU during this process).

Step 3: Connect the download board to the computer via USB cable, and power the download board.

Step 4: The PC-ended tool detects "USB device" (if not, please repeat steps 1-3 above), click the "Download" control, and perform the burning.

Step 5: View the burning result in the "Download Record". When prompted, it will run the user program directly, or you can re-power or reset the hardware to run the user program just burned in the download board. If the prompt fails, repeat steps 4-5 above.

Figure 4-3 Download via USB