CH585 Evaluation Board Description and Application Reference

Version: 1B

https://wch.cn

I. Overview

This evaluation board is used for the testing and development of the CH585 chip, and is equipped with the Mount River compiler and host computer ISP tools. It also provides application reference examples and demonstrations related to chip resources.

II. Evaluation Board Hardware

Please refer to the CH585SCH.pdf document for the evaluation board schematic.

The CH585M evaluation board features a Bluetooth antenna, NFC antenna, indicator lights, a USB connector, and general-purpose chip interface pins, making it suitable for testing and verifying basic customer functions.
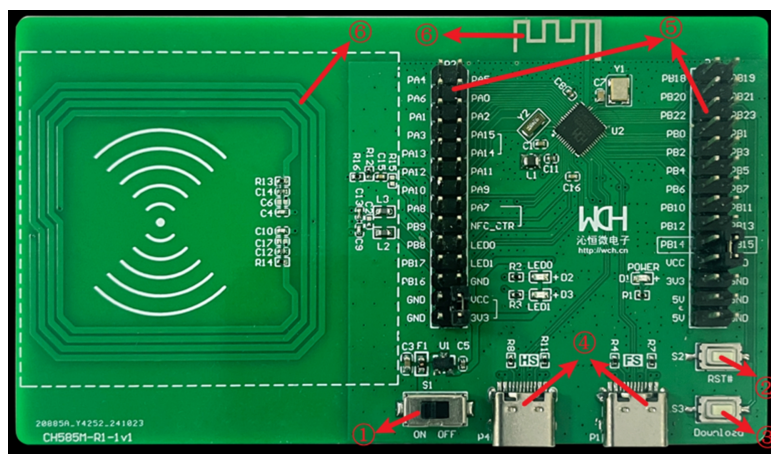

Figure 1-1 CH585M-R1-1v1 Evaluation Plate

2.1 Functional Description of Each Part

The CH585 is a RISC-V MCU microcontroller integrating BLE wireless communication, high-speed USB, and NFC. It integrates a 2Mbps low-power Bluetooth BLE communication module, a USB full-speed controller and transceiver, a USB high-speed controller and transceiver (480Mbps), an NFC near-field communication wireless interface, a segmented LCD driver module, an LED dot matrix screen interface, two SPIs, four serial ports, a 14-channel ADC, a touch button detection module, and other rich peripheral resources. The CH585 evaluation board includes the following resources:

1. Switch S1: Power switch, used to disconnect or connect external 5V power supply or USB power supply.

2. RESET button: Reset button, used for external manual reset (note that the chip's manual reset function needs to be enabled).

3. DOWNLOAD button: Download button, used when downloading via ISP.

4. Two USB ports: USB communication interfaces for the main chip: one high-speed USB; one full-speed USB with Host and Device functions.

5. P2/P3 connectors: include chip function, power supply, and LED load operation pins.

6. NFC and BLE antennas: responsible for transmitting wireless signals.

2.2 CH585 Antenna Description

The following is a design example of a small-size PCB antenna for 2.4GHz paired with the CH585 chip. For specific parameters of the antenna drawing, please refer to the PCB design provided by our company.
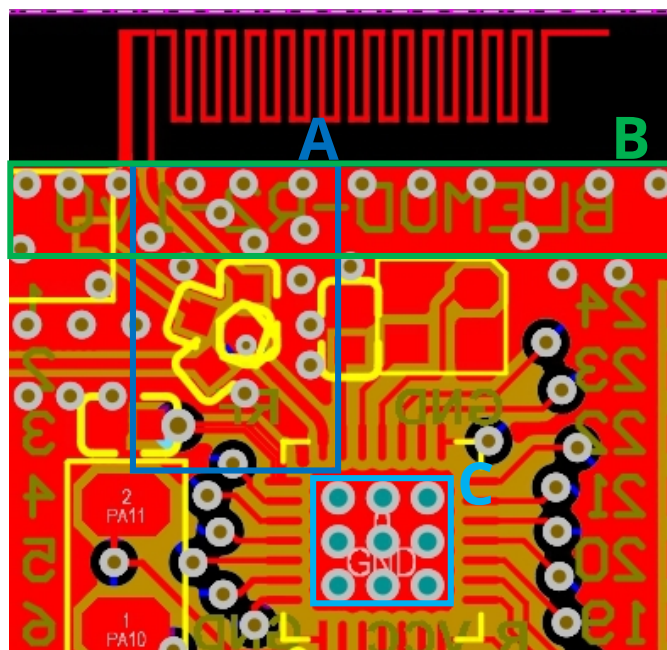
Figure 2-1 Antenna drawing method

1. The trace from the chip pin to the antenna feed point (area A in the diagram above) needs to be impedance matched with 50 ohms. The counting factor will involve parameters such as the trace width in area A, the spacing

between A and B, the board thickness, the dielectric constant of the board material, the copper thickness, and the solder mask thickness.

2. Area B in the above figure is a coplanar reference area. This area should be guaranteed to have sufficient area and number of boreholes as much as possible.

3. The grounding pad on the bottom of the chip (area C in the above figure) should be well grounded and have good heat dissipation, provided that the manufacturing process allows (multiple grounding vias).

4. The radio frequency section needs to be kept away from interference sources, such as crystals, power devices, and switching power supplies.

Figure 2-1 shows the antenna design of our evaluation board. The PCB board thickness is 0.8mm. For antenna size details, please contact our technical support.

III. Software Development

Please search and download the CH585EVT.ZIP development package from the company's homepage.
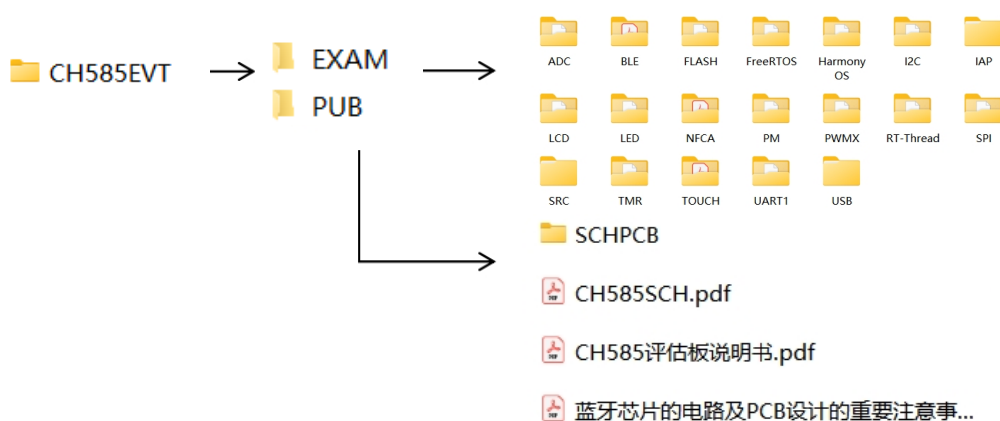
3.1 EVT Package Directory Structure

Figure 3-1 EVT Package Directory Structure

illustrate:

The PUB folder contains the evaluation board instruction manual and the evaluation board schematic.

The EXAM folder provides software development drivers and corresponding examples for the CH585 controller, categorized by peripheral. Each peripheral folder contains one or

more folders with functional application examples.

3.2 Open the project

Users can open the project of any peripheral device, such as the Bluetooth slave routine "Peripheral".
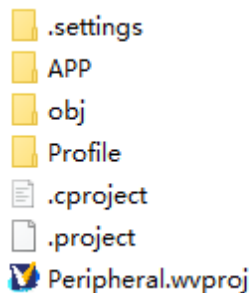

Figure 3-2 File layout under the Peripheral folder

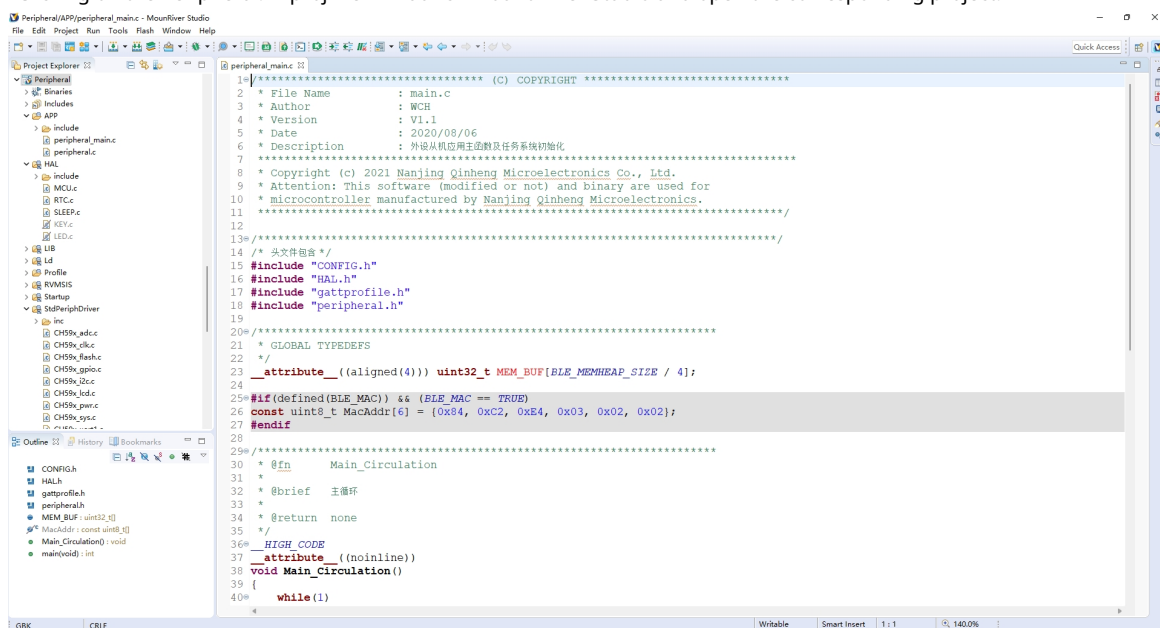Clicking on the Peripheral.wvproj file will launch Mount River Studio and open the corresponding project.

Figure 3-3 shows the mounriver interface that appears after opening Peripheral.wvproj.

In addition, you can also open existing projects by importing them. Open Mount River, right-click in the blank area of the Project Explorer interface on the left, and select Import from the pop-up menu, as shown in Figure 3-4.
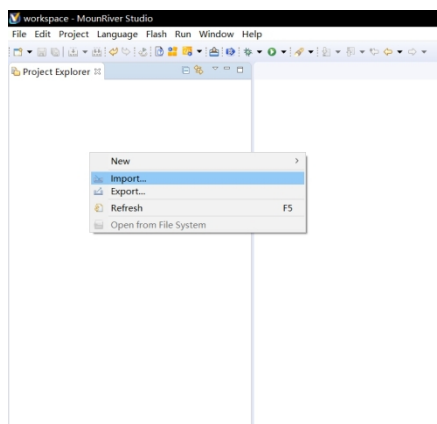

Figure 3-4 Open the Import Menu

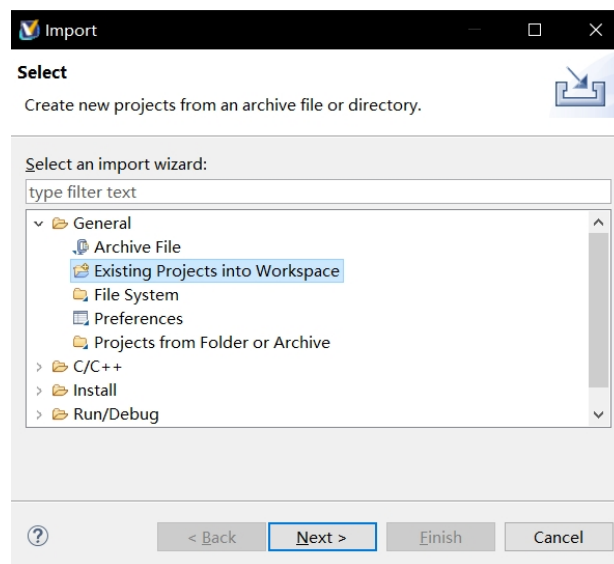Select an existing project from the pop-up menu.

Figure 3-5 Selecting to open an existing project

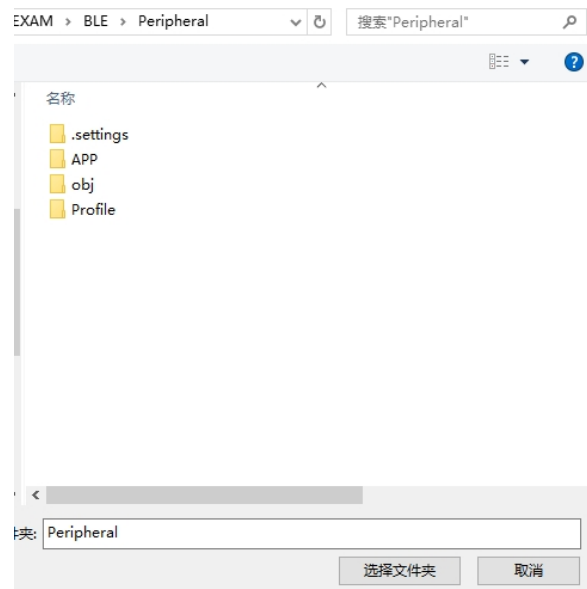Select the directory containing the project files.

Figure 3-6 Selecting the Project Directory

This operation can also open the project.
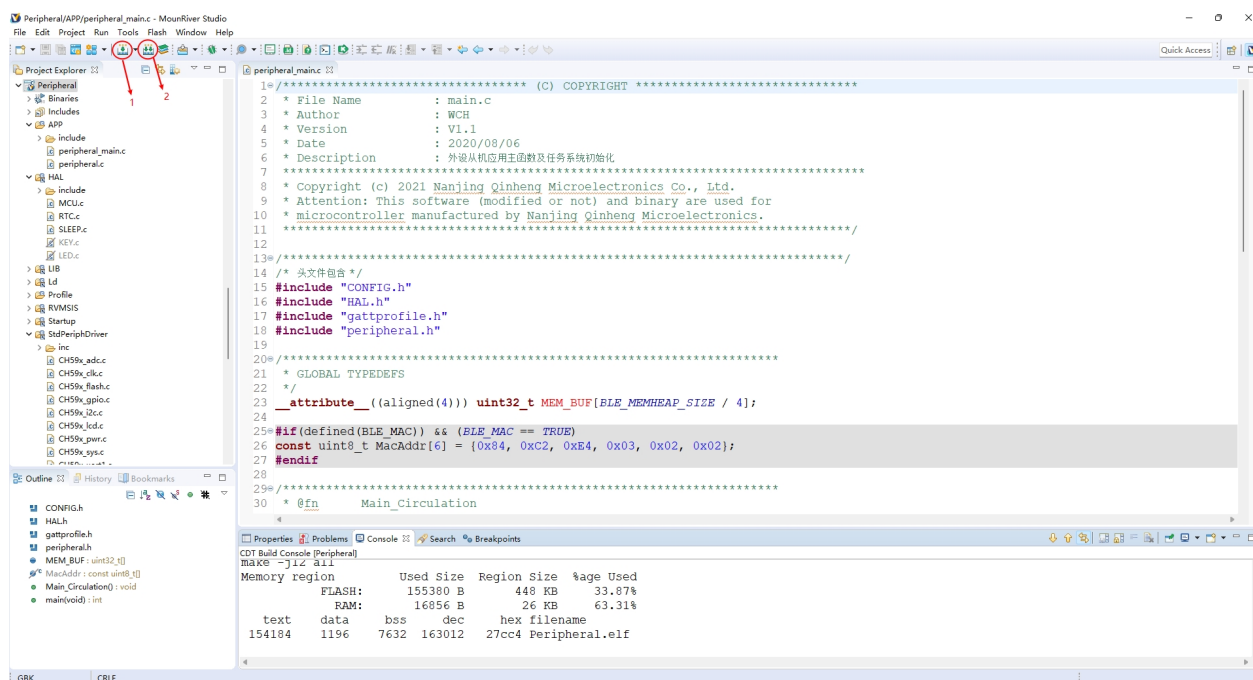
3.3 Compilation

Figure 3-7 Project Interface

In the diagram, 1 represents incremental compilation, which only compiles the modified parts and is faster. 2 represents rebuild, which performs a global compilation on the selected project and is slower. Here, we choose rebuild, and the compilation result is shown in the figure.

The default compilation generates an executable .hex file, which we need to download to the evaluation version to run. Note that the MountRiver compilation settings, such as project file directory, linker, and optimization level, are explained in the MountRiver Studio Help Manual.

3.4 Example Program Demonstration

### 3.4.1 Bluetooth Peripheral Example Demonstration

1. Open the example: "CH585EVT\EXAM\BLE\Peripheral\Peripheral.wvproj", click compile, and then use the ISP tool.

Open the generated "Peripheral.hex" file. Power on the board by pressing and holding the download button, and connect the serial port for easy viewing of the example program's serial output. Connect the hardware to serial port 1 (the program default). Open the serial port tool, set the serial port parameters to baud rate 115200, data bits 8, stop bits 1, no parity, and then download the program.
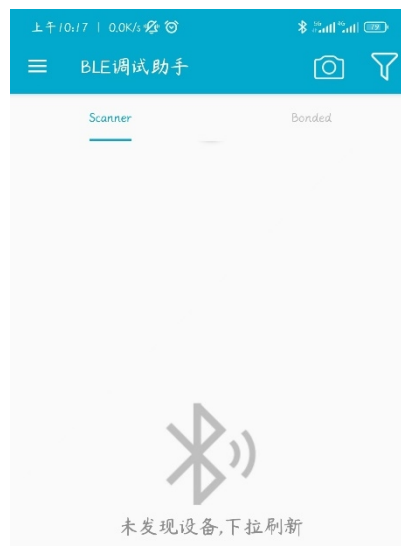
2. The serial port tool will display:

CH58x_BLE_LIB_V1.00
    Initialized...
    Advertising.

At this point, the board's Bluetooth has started broadcasting, as shown in the image below:
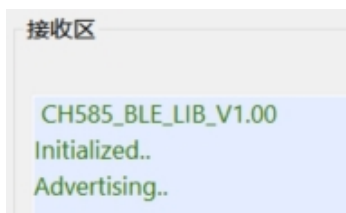
3. Open the mobile app. (If not installed, please download and install it from our website.) After opening the software, you will see the following interface:

4. Pull down to scan for Bluetooth devices. A "Simple Peripheral" device will appear in the interface; this is the example module.

The proposed Bluetooth device is shown in the image below:
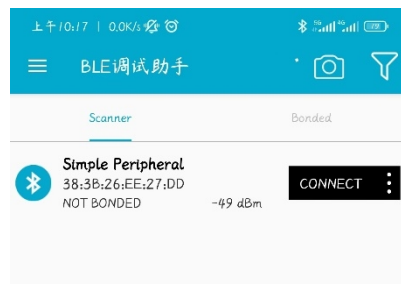
5. Click the "Simple Peripheral" device entry to connect. Once the connection is successful, the serial port will output: "Connected...".

The software will switch to the connection completion screen, displaying all services included in the device, including "Generic Access," "Generic Attribute," "Device Information," and "Unknown Service," as shown in the image below:
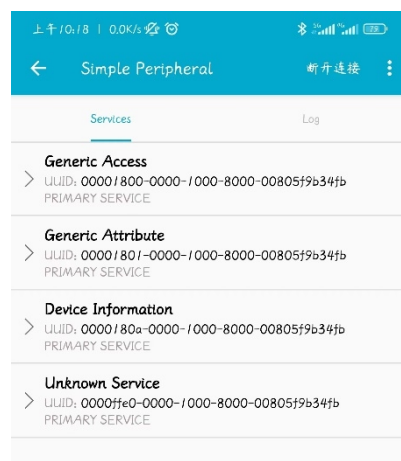
6. Unknown Service is a custom communication service defined in the program, with a UUID of 0xFFE0. Clicking this entry will display...

The following image shows all characteristics under the 0xFFE0 service, including "0xFFE1", "0xFFE2", "0xFFE3", "0xFFE4", and "0xFFE5", and displays the properties of this service:
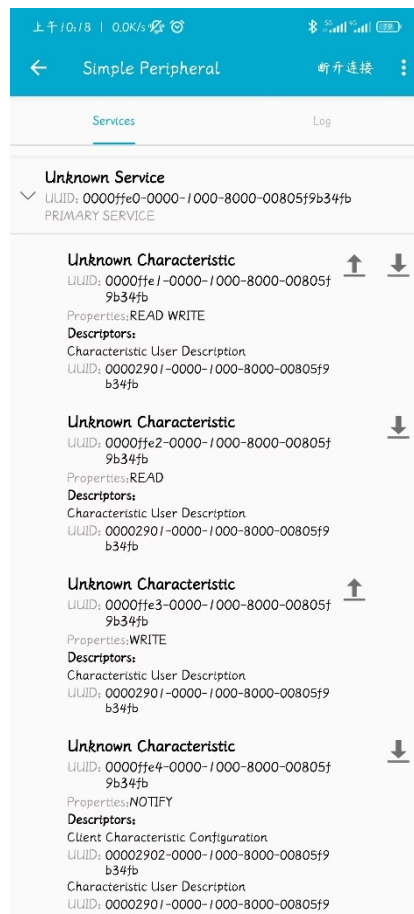
7. Click the send and read buttons to the right of the first characteristic (i.e., the "0xFFE1" service). This service has read and write attributes.

Enter one byte in the input box and click send. The transmission will output "profile ChangeCB CHAR1...". Click the "Read" button to retrieve the

byte you just sent, as shown in the image below:

8. Click the close button to return to the previous level. "0xFFE2" and "0xFFE3" have read and write attributes respectively, allowing for separate access.

Read and write operations.

9. Click the "Read" button to the right of the "0xFFE4" service. This service has a notification function, meaning it actively sends data to the host.

In the operation interface, turn on the "Receive Notification Data" option button. The receiving box will receive the byte "0x88" sent by the device every second. To return, you need to

turn off notifications (NOTIFY), cancel the "Receive Notification Data" button option, and click the close button to return to the previous level, as shown in the following figure:

10. Click the "0xFFE5" service. This service has an authenticated read attribute and requires a pairing key to read. Click on the send/receive interface.

Clicking the "Read" button will bring up the Bluetooth pairing interface (the timing of pairing varies depending on the phone; some pair after a successful connection, while others pair only when

operating a service requiring pairing). Enter the pairing code, which defaults to "000000". Select the PIN code and click the "OK" button. The host and device will then pair. Once paired successfully, you

can operate the service; otherwise, you will be unable to operate the service or the device will disconnect, as shown in the image below:

IV. Program Download(Taking the CH585 chip as an example)

The CH58x chip's ISP download methods include serial port download and USB download.

Default download bootloader:PB22;

USB download channel:USB Full Speed　Port (FS);

Serial port download channel:UART1(PA8/PA9); UART0_(PA14/PA15)Supports downloading without pressing any buttons;

4.1 Download Tool

Please openhttp://www.wch.cn/downloads/WCHISPTool_Setup_exe.html Software tools. Follow the _____ Link to download our MCU programming software

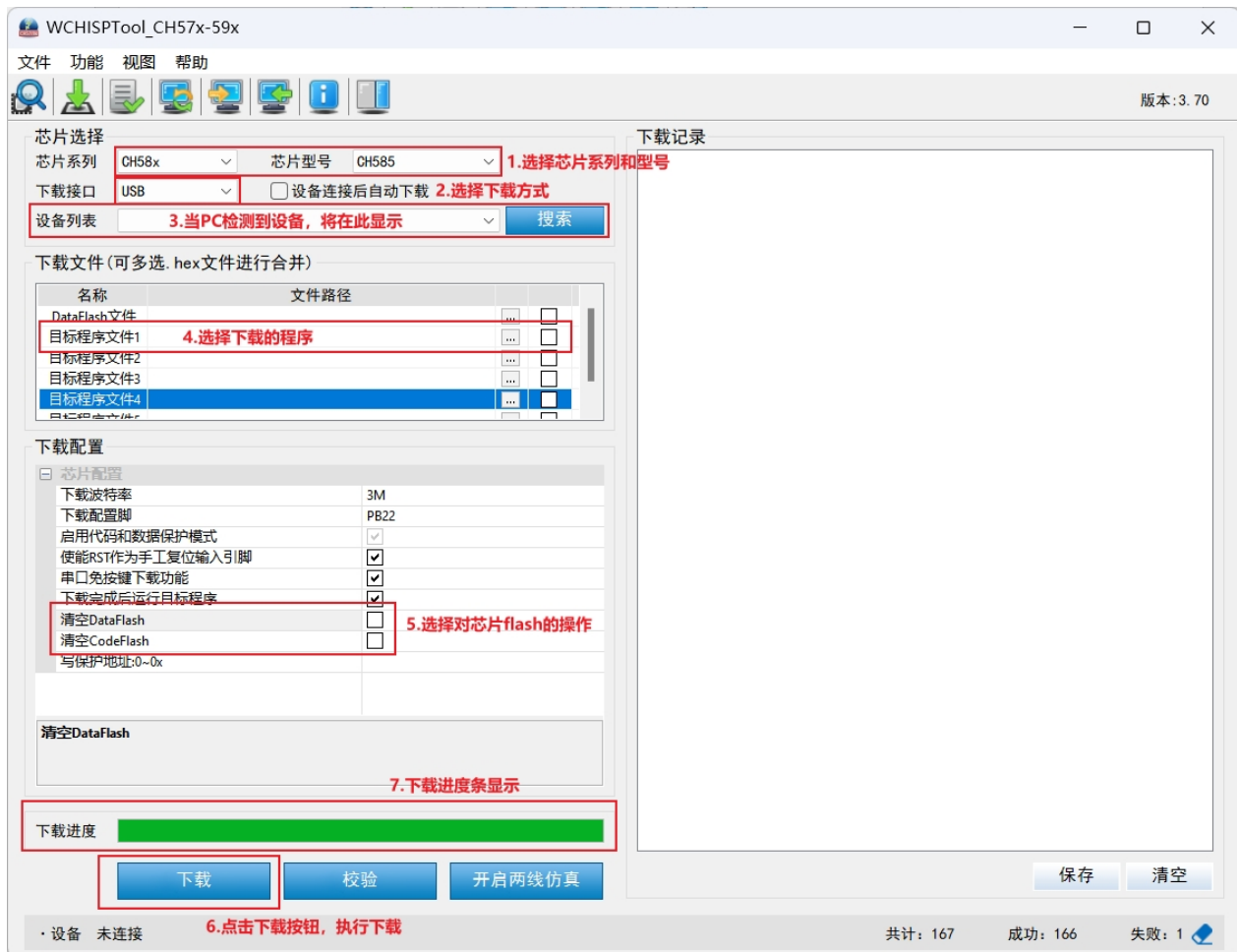installation wizard to complete the software installation.

Figure 4-1 Download tool interface

4.2 Serial Port Download

Step 1: Open the "WCHISPTool.exe" software tool and select the chip model: CH585 (specifically match the chip model currently being programmed).

Download method: Serial port download, Serial port device list: Select the COMx to use.

Step 2: Connect the MCU's PB22 pin to GND (Do not power on the MCU during this process.Step 3:

Power on the download board.

Step 4: The programming software on the computer detects the available "serial port device list". (If not, please check your serial port device.)

Click the "Download" control to perform the burning process.

Step 5: Check the burning results in "Download History". After completion, the user program will run directly. Alternatively, you can power on and reset the hardware.

Use this step to run the user program just burned into the download board. If it fails, repeat steps 4-5

above. No-button download method: Step 1 -> Step 4 -> Step 5.

Note: Serial port download is relatively slow, and some large target code may take tens of seconds. It is recommended to use USB download.
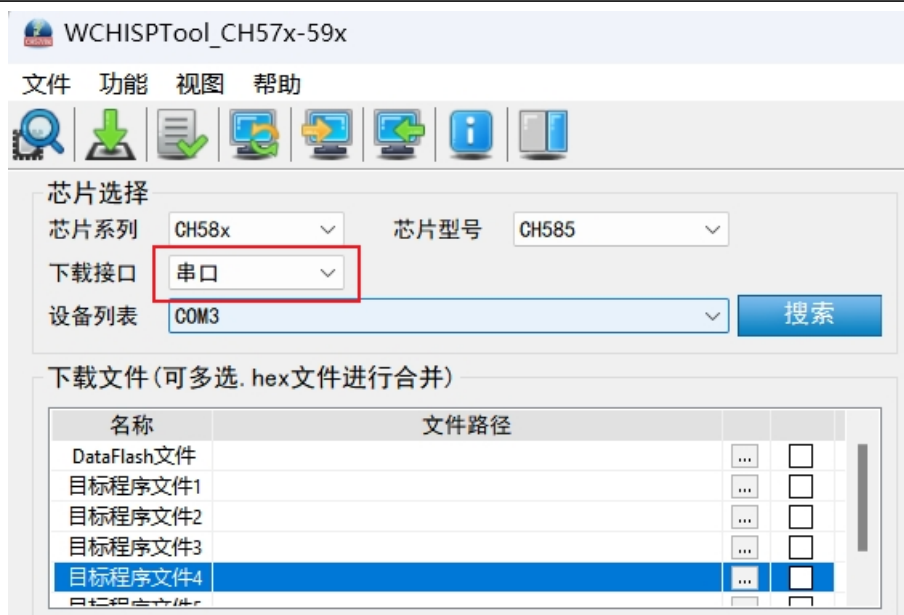
Figure 4-2 Serial port download

4.3 USB Download

Step 1: Open the "WCHISPTool.exe" software tool, select the chip model: CH585 (specifically match the chip model you are programming).

Download method: USB download (number).

Step 2: Connect the PB22 pin of the MCU 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 burning software on your computer detects the "USB device" (if not, repeat steps 1-3 above), then click "Download".

Controls are used to perform the burning process.

Step 5: Check the burning results in "Download History". After completion, the user program will run directly. Alternatively, you can power on and reset the hardware.

Use this step to run the user program that was just burned into the download board. If it fails, repeat steps 4-5 above.
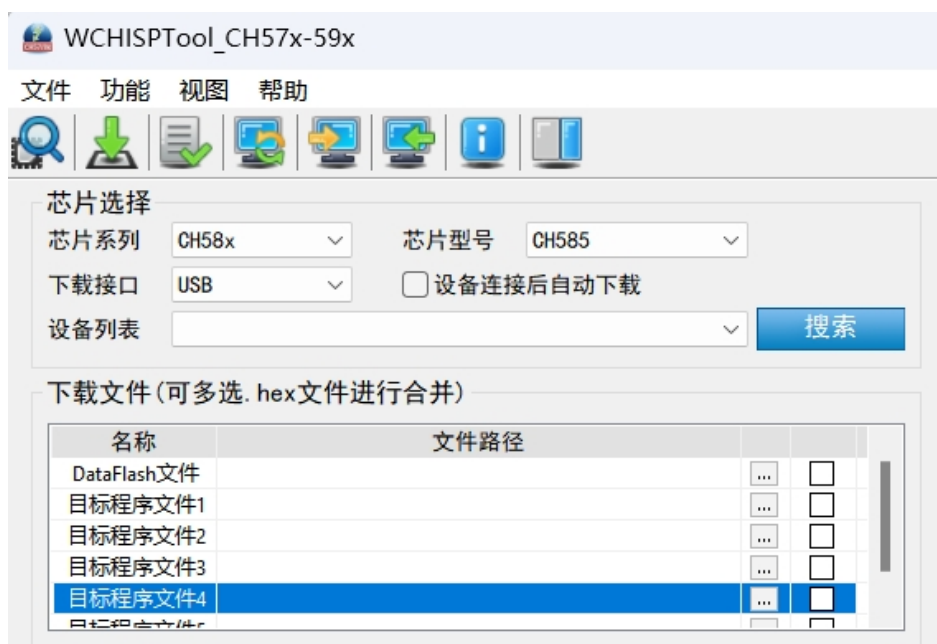

Figure 4-3 USB Download