CH32V103 Evaluation Board Introduction and Application

Version: V1.2

http://wch.cn

1. Overview

This evaluation board is used to develop CH32V103. The integrated development environment (IDE) is MounRiver Studio (MRS). To simulate and download, the onboard WCH-Link and separate WCH-Link are both available. The application reference examples and demonstrations related to the chip resources are provided.

2. Hardware

For the evaluation board schematic, please refer to CH32V103SCH.pdf.

**CH32V103评估板 \ CH32V103 Evaluation**
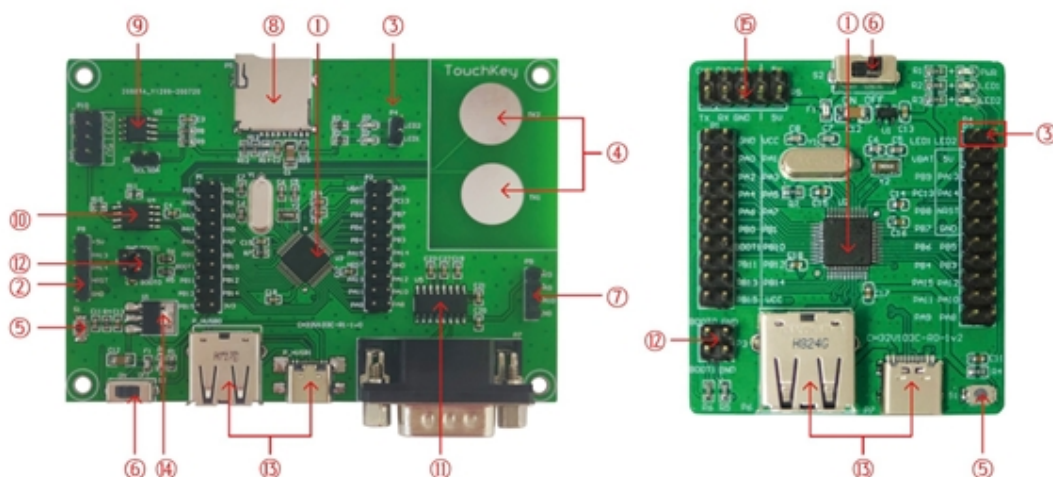
模块说明 \ Descriptions

1. Master MCU	5. Reset Button	9. EEPROM IC	13. USB Host/Slave Interface
2. Online Debugging Interface	6. Power Switch	10. SPI FLASH IC	14. Low Dropout Regulator
3. LED	7. Serial Port 1	11. RS232 Level Converter	15. Debugging Interface
4. Touch-Key	8. SD Card Holder	12. Boot Mode Configuration	

The above two CH32V103 evaluation boards both are equipped with the following resources:

Main board - CH32V103EVT

1. Master MCU: CH32V103C8T6
2. Debugging interface: Used to download and simulate.
3. LED: Controlled by connecting to the IO port of the main chip via the extension connector P4
4. Touch-key button: They connect to touch-key channel0 and touch-key channel1 of the main chip
5. Button (S1): Reset button, used for external manual reset of the supply switch
6. Switch (S2): Used to disconnect or connect to external 5V supply or USB supply

7. Serial port 1: It connects to UART1 interface of the chip, to demonstrate the transceiver function of serial port

8. SD card holder (P5): It connects to SPI1 interface, to demonstrate the operation of TF card through SPI interface

9. EEPROM IC (U2): It connects to I2C interface, and connects to the IO port of the main chip through J5

10. Serial Flash memory (U4): It connects to SPI1 interface, to demonstrate the operation of Flash memory

11. RS232 level converter (U5): Used to convert TTL signal of serial port into RS232 signal

12. Boot mode configuration: Select boot mode by configuring BOOT0/1 when the chip is powered on

13. USB interface P_HUSB: USB communication interface of the main chip, with Host and Device function

14. Positive low dropout regulator (U1): Used to convert 5V supply into 3.3V supply which is available to the chip

15. Reserved debugging interface: Used to connect to serial port or online debugging interface
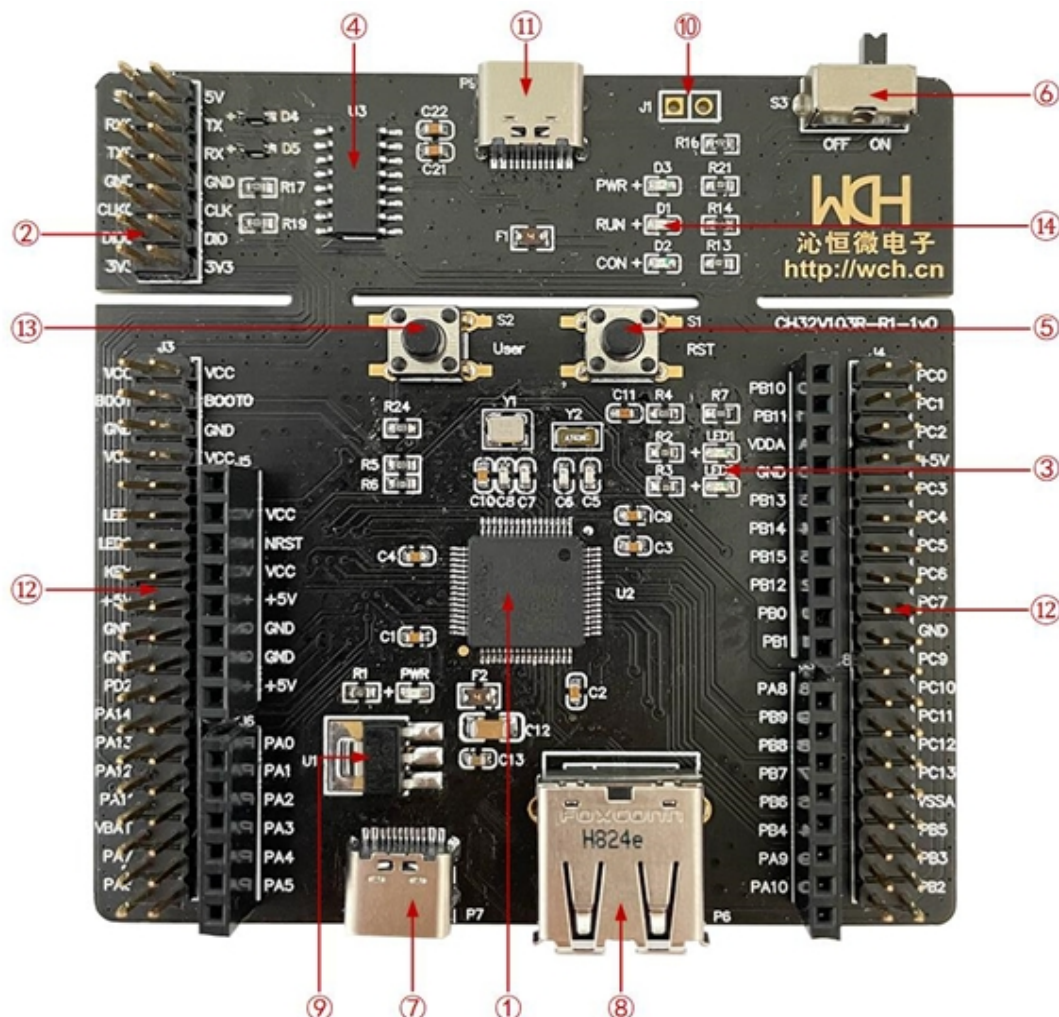
模块说明\Description

1. Master MCU	5. Reset Button	9. Low Dropout Regulator	13. USER Button
2. SWD&UART Interface	6. Power Switch	10. Download Interface	14. WCH-Link Indicator
3. Controllable LED	7. USB type-C Interface	11. WCH-Link Interface	
4. WCH-Link MCU	8. USB Interface	12. MCU I/O Port	

CH32V103R_NUCLEO is equipped with the following resources:

Main board - CH32V103EVT

1. Master MCU: CH32V103R8T6
2. SWD&UART interface: Used to download and simulate, and jumper to select whether to use onboard WCH-Link
3. LED: Controlled by connecting to the IO port of the master MCU through the extension connector J3
4. WCH-Link MCU: MCU implement WCH-Link function
5. Button (S1): Reset button, used for external manual reset of the master MCU
6. Switch (S3): Used to disconnect or connect to external 5V supply or USB supply
7. USB type-C interface (P7): It connects to USB communication interface of the main chip
8. USB interface (P6): It connects to USB communication interface of the main chip
9. Voltage regulator (U1): Used to convert 5V supply into 3.3V supply which is available to the chip
10. Download interface (J1): Used to update WCH-Link firmware when it is short-circuited by jumper
11. WCH-Link interface: Used to connect PC and the functional module WCH-Link
12. MCU I/O port: I/O lead-out port of the master MCU
13. USER button (S2): It connects to the IO port of the master MCU through the extension connector J3 for button control
14. WCH-Link indicator LED: D1, D2 and D3, used to indicate the running status of WCH-Link

3. Software

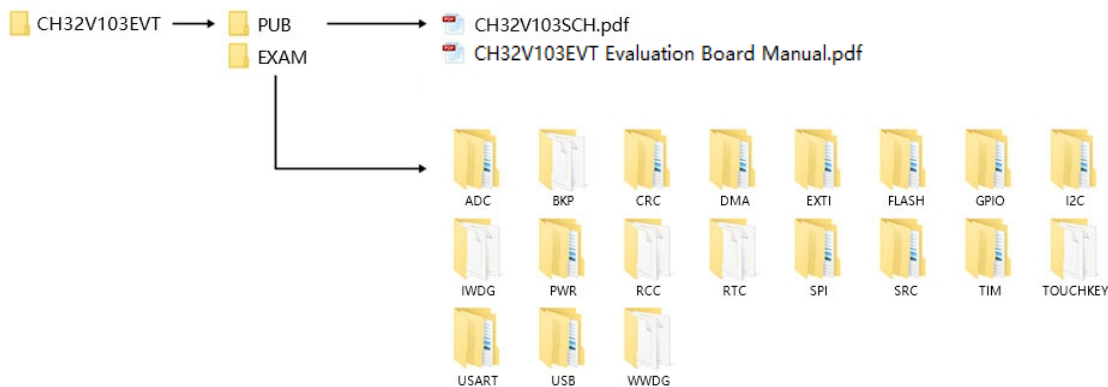## 3.1 Directory structure of EVT packet

Figure 3-1 Directory structure of EVT packet

Note:

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

"EXAM" folder: CH32V103 controller software development driver and corresponding examples, classified by peripherals. Each peripheral folder contains one more functional application routine folders.
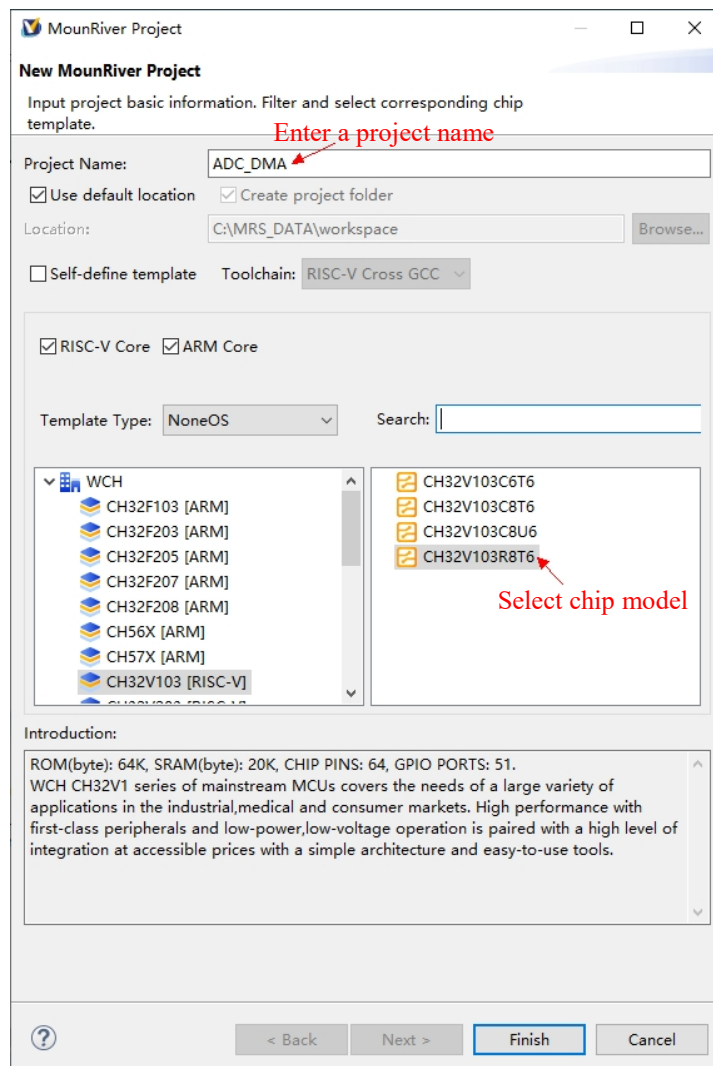
3.2 IDE–MounRiver

Download MounRiver_Studio. Double-click to install, and it can be used after installation.

### 3.2.1 Create New Project / Open Project / Import Keil Project

➢   Create new project:

1.   Open the MounRiver Studio. Click on File menu, and click New, then click MounRiver Project;

2.   Enter a project name in the MounRiver Project window, and select location.

Click Finish, and then the project is created.

3.   Add peripheral functions. Take ADC_DMA as an example, open the CH32V103EVT folder, then open the ADC_DMA folder, select all files in this folder and copy them.
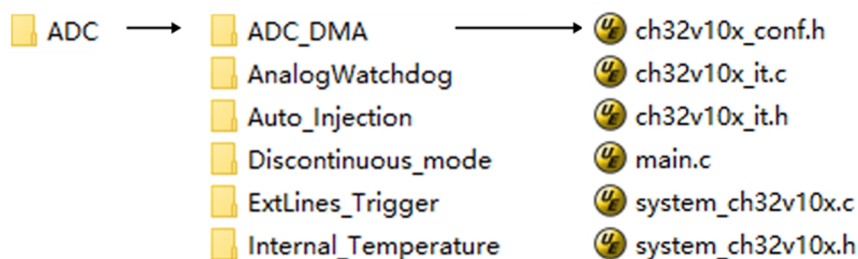
Right-click on the project name in MounRiver IDE, then click Open from File System, then double-click "User" folder, then paste the files which are copied over, as shown in the figure:
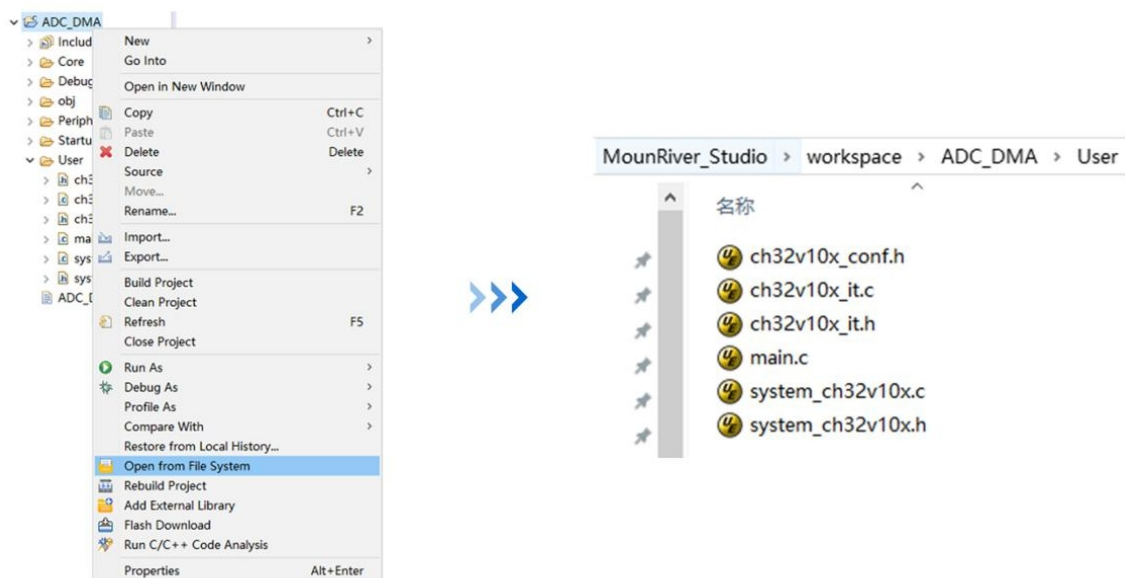
Note: When operating the memory device to use the file system library, it is needed to copy and paste the related examples in the HOST_Udisk folder, and the files in the Udisk_Lib folder are also needed .

➢   Open project:

1）Directly double-click the project file with the suffix .wvproj under the corresponding project path;

2）Click on File menu in MounRiver IDE, then click Load Project, select the file with the suffix .project under the corresponding path, click Confirm to apply.
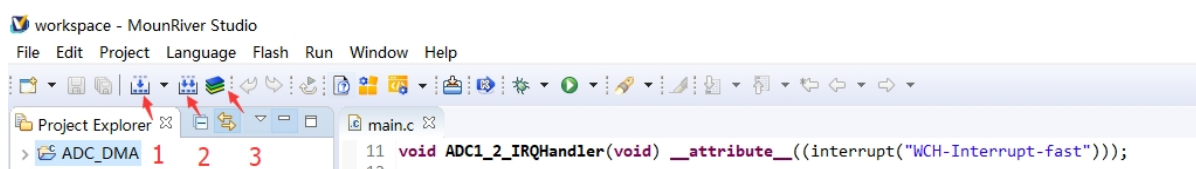
➢   Import keil project
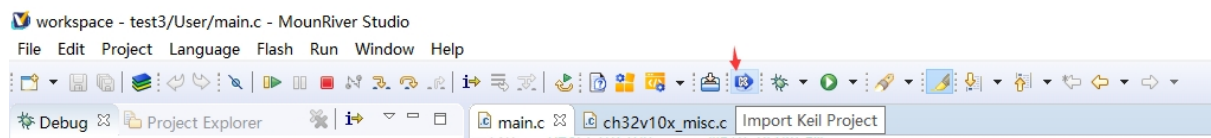
Click on the Import Keil Project button in IDE, then select the keil project location, to import CH32F103 project.

3.2.2 Compile

MounRiver contains three options to compile, as shown in the figure:

Button marked as 1: Incrementally Build, compile the modified part of the selected project;

Button marked as 2: ReBuild, compile the selected project globally;

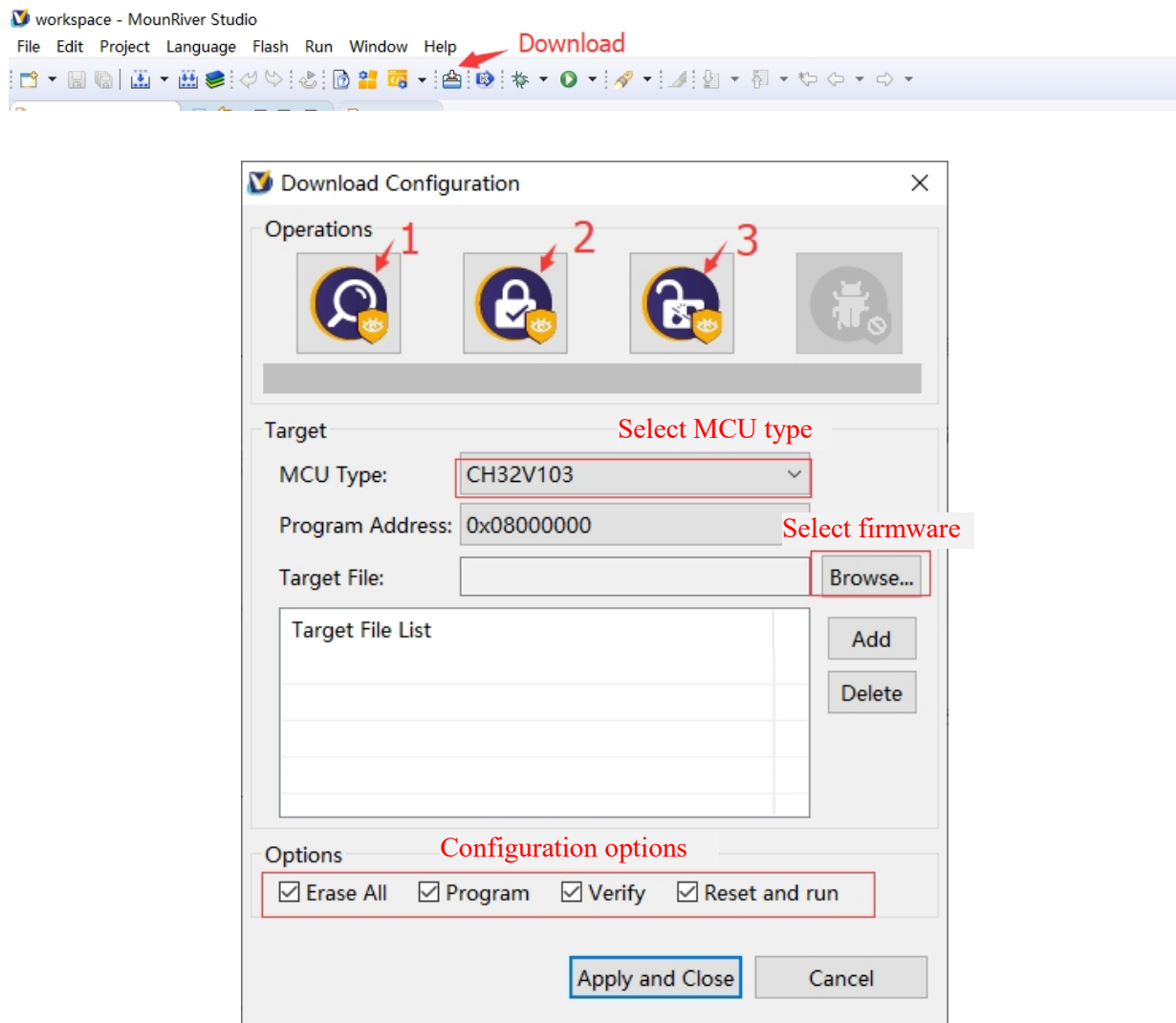Button marked as 3: All Build, compile the whole project globally.

3.2.3 Download/Simulate

➢   Download

1）   Debugger download

Connect the hardware via WCH-Link ((For detailed introduction to WCH-Link, see:

MounRiver\MounRiver_Studio\LinkDrv), click on the Download button in IDE, and select options as required on the Download Configuration window, as shown in the figure:

In the figure: Icon marked as 1: Query read protection status of the chip.

                     Icon marked as 2: Set the chip read protection, and it will take effect after power-on.

                     Icon marked as 3: Release the chip read protection, and it will take effect after power-on.

2） WCHISPTool Download

Use the WCHISPTool tool to download. Two download types are supported, USB and SerialPort. USB pins are PA11(DM), PA12(DP). SerialPort pins are PA9(TX), PA10(RX).

(1) BOOT0 to VCC, BOOT1 to the ground, connect to PC via serial port or USB;

(2) Open the WCHISPTool tool, select the corresponding download type, select the firmware to download, select download configuration options, and click Download;
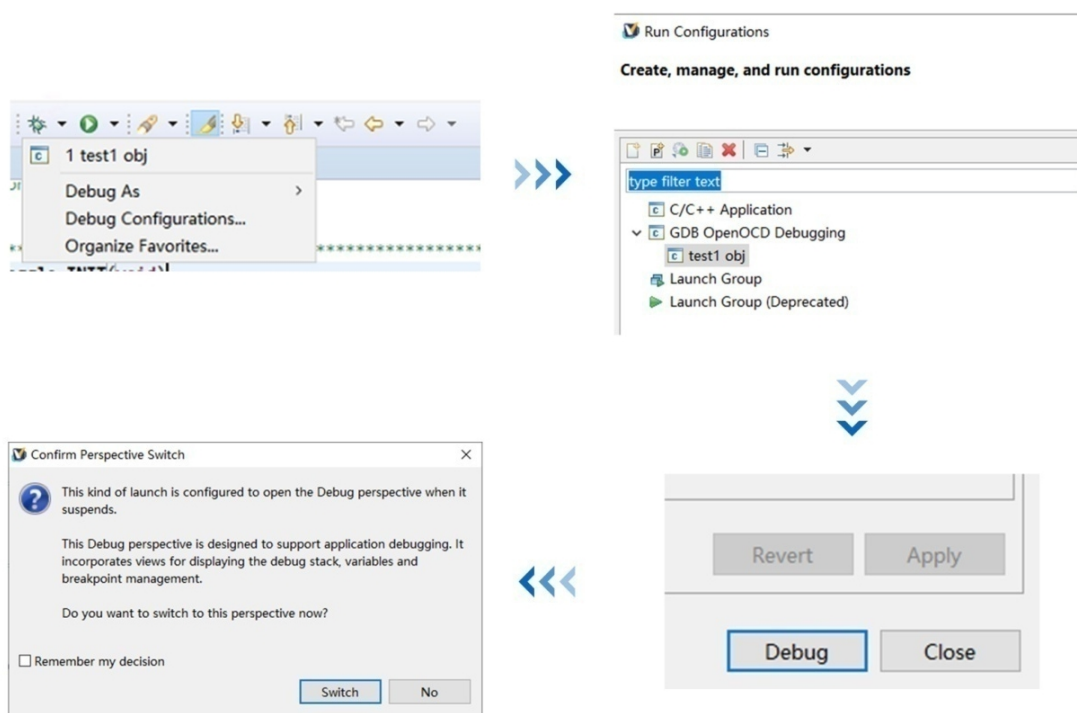
(3) BOOT0 to the ground, power on again, run APP program.

WCHISPTool window is as shown in the figure:
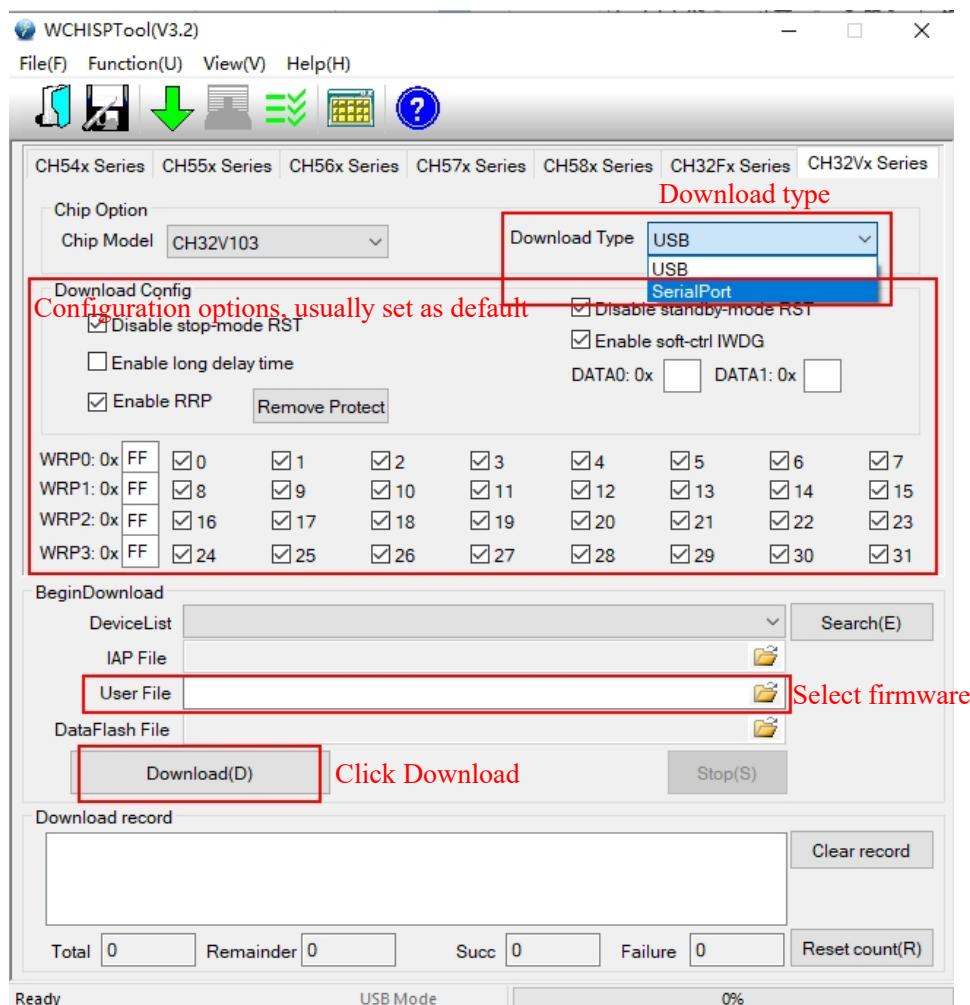
> Simulate
1. Start simulation

Click Debug Configrations, and double-click GDB OpenOCD Debugging, then click Debug, finally click Switch, as shown in the figure:

2. Stop simulation

   Click on Terminate button to stop simulation. Click on the IDE icon button, to revert to the window
   displayed before simulation, as shown in the figure.