CH32F20x Evaluation Board Reference

Version: V1.3 http://wch.cn

1. Overview

This series of evaluation boards are applied to the development of CH32F20x series chips, supporting our official WCH-Link download emulation or other SWD emulation tools download emulation, and providing reference examples and demonstrations of chip resource-related applications.

2. Evaluation board hardware

Please refer to the CH32F20xSCH.pdf document for the schematic of the evaluation board.



Description

| 5.Reset button | 9. Voltage regulator chip | 13.USER button |
|------------------------|--|---|
| 6.Power switch | 10.Download interface | 14.WCH-Link LED |
| 7.USB type-C interface | 11.WCH-Link interface | |
| 8.USB interface | 12.MCU I/O port | |
| | 5.Reset button6.Power switch7.USB type-C interface8.USB interface | 5.Reset button9. Voltage regulator chip6.Power switch10.Download interface7.USB type-C interface11.WCH-Link interface8.USB interface12.MCU I/O port |

The CH32F203R-R1 EVT board comes with the following resources. Motherboard - CH32F203R-R1

- 1. Master control MCU: CH32F203RCT6
- 2. SWD & UART interface: used for downloading, emulation debugging, need jumper to choose whether to use the on-board WCH-Link
- 3. LED: Connected to the I/O port of the master MCU through J3 pins for control
- 4. WCH-Link MCU: MCU that implements WCH-Link function
- 5. Button S1: Reset button for external manual reset of the master control MCU
- 6. Switch S3: Used to cut off or connect external 5V power supply or USB power supply
- 7. USB type-C interface P7: connect the main chip USB communication interface
- 8. USB interface P6: connect the main chip USB communication interface
- 9. Voltage regulator chip U1: used to realize the conversion of 5V voltage to 3.3V supply voltage available to the chip
- 10. Download interface J1: When J1 jumper is shorted, it can be used to achieve WCH-Link firmware update
- 11. WCH-Link interface: for connecting PC and WCH-Link function module
- 12. MCU I/O port: I/O lead interface of the master control MCU
- 13. USER button S2: Connect the I/O port of the master MCU through J3 pins for key control
- 14. WCH-Link indicator: including D1, D2 and D3 three LEDs, indicating the WCH-Link operation status

CH32F203 Evaluation Board



Description

| 1.Master control MCU | 3.LED | 5.Power switch | 7.USB slave interface |
|----------------------|----------------|---------------------------|------------------------------|
| 2.SWD interface | 4.Reset button | 6.Boot mode configuration | 8.USB master-slave interface |

The CH32F203C-R0 EVT board comes with the following resources.

Motherboard - CH32F203C-R0

- 1. Master control MCU: CH32F203CBT6, CH32F203C8T6, CH32F203C6T6
- 2. SWD interface: for downloading, simulation debugging
- 3. LED: Connected to the main chip I/O port through P4 pins for control
- 4. Reset button: for external manual reset power supply switch
- 5. Power switch: used to cut off or connect external 5V power supply or USB power supply
- 6. Boot mode configuration: Select the boot mode when the chip is powered on by configuring BOOT0/1
- 7. USB interface P_USB: USB communication interface of the main chip, only Device function
- 8. USB interface P_HUSB: USB communication interface of the main chip with Host and Device functions.

CH32F203 Evaluation Board



Descriptions

| 1.Master control MCU | 5.Reset button | 9.EEPROM chip U2 | 13.USB master-slave interface |
|----------------------|---------------------|----------------------------|--------------------------------|
| | | | P_HUSB |
| 2.SWD interface | 6.Power switch | 10.Flash memory U4 | 14.Forward low dropout voltage |
| | | | regulator chip U1 |
| 3.LED | 7.Serial port 1 | 11.RS232 level conversion | 15.CAN interface P6 |
| | | chip U5 | |
| 4.Touch button | 8.SD card holder P5 | 12.Boot mode configuration | 16.USB slave interface P_USB |

The CH32F203C-R1 EVT board comes with the following resources.

Motherboard - CH32F203C-R1

- 1. Master control MCU: CH32F203C8T6
- 2. SWD interface: for downloading, simulation debugging
- 3. LED: Connected to the main chip I/O port through P4 pins for control
- 4. Touch button: Connect the main chip touch buttons channel 0, channel 1
- 5. Reset button: for external manual reset power supply switch
- 6. Power switch: used to cut off or connect external 5V power supply or USB power supply
- 7. Serial port 1: connect to the main chip USRAT1 interface to demonstrate the serial port transceiver function
- 8. SD card holder P5: connect SPI1 interface, demonstrate the operation of TF card through SPI interface
- 9. EEPROM chip U2: connects to I2C interface and connects to I/O of main chip through J5
- 10. Serial Flash memory U4: Connect SPI1 interface to demonstrate the operation of Flash memory
- 11. RS232 level conversion chip U5: used to convert TTL signal of serial port to RS232 signal
- 12. Boot mode configuration: Select the boot mode when the chip is powered on by configuring BOOT0/1

- 13. USB interface P_HUSB: USB communication interface of the main chip, with Host and Device functions
- 14. Forward low dropout voltage regulator chip U1: used to realize the conversion of 5V voltage to 3.3V supply voltage available to the chip
- 15. CAN interface P6: connects to the main chip via CAN chip U6
- 16. USB interface P_USB: USB communication interface of the main chip, only Device function

CH32F207 Evaluation Board



Descriptions

- 1.Master control MCU 5.User key
- 2. Screen interface
- 3. SD card holder 7.MC
- 6.DEBUG interface 7.MCU I/O

8.USB full-speed interface9.Power switch10.Network port

11.USB high-speed interface12.Download button13.Reset button

4.DVP interface

2

The CH32F207V-R3 EVT board comes with the following resources.

Motherboard - CH32F207V-R3

- 1. Master control MCU: CH32F207VCT6
- 2. Screen interface P3: realize MCU external SPI port display
- 3. SD card holder P7: connect SDIO interface, demonstrate the operation of TF card through SDIO interface

- 4. DVP interface P10: realize MCU external camera (DVP-8bits)
- 5. Key: User key
- 6. Debug interface P2: for downloading, simulation debugging
- 7. MCU I/O ports P1, P2, P6, P10: the master control MCU I/O pinout interface
- 8. USB full-speed interface P5, P9: to provide electrical power, connected to the main chip USB2.0 full-speed communication interface
- 9. Power switch S2: Used to cut off or connect external 5V power supply or USB power supply
- 10. Network port P4: network communication interface of the main chip, 100 Gigabit Fiber
- 11. USB high-speed interface P11: provide electrical power, connected to the main chip USB2.0 high-speed communication interface
- 12. Download button S8: used to start downloading from BOOT
- 13. Reset button S1: for external manual reset of the master control MCU

CH32F207 Evaluation Board



Descriptions

| 1.Power switch | 5.MCU I/O port | 9.Download button | 13. MCU power supply |
|---------------------------|-------------------|--------------------|-----------------------|
| | | | row pin |
| 2. Voltage regulator chip | 6.Power row pin | 10.KEY | 14.Master control MCU |
| 3.USB interface | 7.DEBUG interface | 11.KEY and LED row | |
| | | pin | |
| 4.USB interface | 8.Reset button | 12.Network port | |

The above CH32F207 evaluation board comes with the following resources.

Motherboard - CH32F207EVT

- 1. Switch S1: Used to disconnect or connect external 5V power supply or USB power supply
- 2. Forward low dropout voltage regulator chip U1: used to realize the conversion of 5V voltage to 3.3V supply voltage available to the chip
- 3. USB interface P5, P15: USB communication interface PB6, PB7 of the main chip
- 4. USB interface P4, P14: USB communication interface PA11, PA12 of the main chip

- 5. MCU I/O ports P6, P7, P9: I/O pinout interface of the master control MCU
- 6. Power supply pin P3: 5V, 3.3V, GND external power supply pin
- 7. Debugging interface P10: for downloading, emulation debugging
- 8. Button S3: Reset button for external manual reset of the master control MCU
- 9. Button S4: Download button, used to start download from BOOT
- 10. Key S2: Connects to the I/O port of the master control MCU through the P1 row of pins for key control
- 11. KEY and LED row pin P1: P1 row pin connects to the I/O of the master MCU to control LED and KEY
- 12. Network port: Network communication interface of the main chip
- 13. MCU power pin P11: for master control MCU power supply selection
- 14. Master control MCU: CH32F207VCT6

CH32F208 Evaluation Board



Descriptions

| 1.Power switch | 5.Download button | 9.LED row pin | 13.USB interface |
|---------------------------|---------------------------|-----------------------|------------------|
| 2. Voltage regulator chip | 6.Reset button | 10.Master control MCU | 14.USB interface |
| 3.Power supply row pin | 7.KEY | 11.MCU I/O port | |
| 4.DEBUG interface | 8.Boot mode configuration | 12.Network port | |

The CH32F208 evaluation board shown above comes with the following resources.

Motherboard - CH32F208EVT

- 1. Switch S1: Used to cut off or connect external 5V power supply or USB power supply
- 2. Forward low dropout voltage regulator chip U1: used to realize the conversion of 5V voltage to 3.3V supply voltage available to the chip
- 3. Power supply pin P3: 5V, 3.3V, GND external power supply pin
- 4. DEBUG interface P6: for downloading, simulation debugging
- 5. Button S4: Download key, used to start download from BOOT
- 6. Button S3: Reset button for external manual reset of the master control MCU
- 7. Key S2: Connect to the I/O port of the master control MCU for key control through the P1 row of pins
- 8. Boot mode configuration: Select the boot mode when the chip is powered on by configuring BOOT0/1
- 9. The row of pins connects to the I/O of the master control MCU to control the LED
- 10. Master control MCU: CH32F208WBU6

- 11. MCU I/O port: I/O pinout interface of the master control MCU
- 12. Network port: Network communication interface of the main chip
- 13. USB interface P5, P15: USB communication interface PA11, PA12 of the main chip
- 14. USB interface P4, P14: USB communication interface PB6, PB7 of the main chip

CH32F205 Evaluation Board



Descriptions

| 1.Master control MCU | 2.Reset button | 3.LED row pin |
|----------------------|-----------------|----------------|
| 5.USB interface | 6.USB interface | 7.Power switch |

4.Boot mode configuration 8.MCU I/O

The CH32F205R-R0 EVT board comes with the following resources.

Motherboard - CH32F205R-R0

- 1. Master control MCU: CH32F205RBT6/ CH32F203RBT6/ CH32F203RCT6
- 2. Reset button S1: for external manual reset of the master control MCU
- 3. LED row pin: P4 row of pins connected to the master MCU I/O, control LED
- 4. Boot mode configuration: Select the boot mode when the chip is powered on by configuring BOOT0/1
- 5. USB interface P10, P11: USB communication interface PB6, PB7 of the main chip
- 6. USB interface P12, P13: USB communication interface PA11, PA12 of the main chip
- 7. Power switch S2: Used to cut off or connect external 5V power supply or USB power supply
- 8. MCU I/O port: I/O pinout interface of the master control MCU

CH32F203 Evaluation Board



Descriptions

1.Master control MCU2.USB interface3.MCU I/O port4.LED row pin5.Power switch6.Reset button7.Boot mode configuration8.SWD interface

The CH32F203K-R0 EVT board comes with the following resources.

Motherboard - CH32F203K-R0

- 1. Master control MCU: CH32F203K8T6
- 2. USB interface P6, P7: USB communication interface PA11, PA12 of the main chip
- 3. MCU I/O port: I/O pinout interface of the master control MCU
- 4. LED row pin: The row pin connects to the I/O of the master control MCU to control the LED
- 5. Power switch: for cutting off or connecting external 5V power supply or USB power supply
- 6. Reset button: for external manual reset power supply switch
- 7. Boot mode configuration: Select the boot mode when the chip is powered on by configuring BOOT0
- 8. SWD interface: for downloading, simulation debugging

3. Software Development

3.1 EVT package directory structure



Description:

PUB folder: Provides evaluation board manuals, schematics of the evaluation board, and chip support package library files.

EXAM folder: Provides software development drivers and corresponding examples for the CH32F20x controller, grouped by peripheral. Each type of peripheral folder contains one or more functional application routines folders.

3.2 Open Project - MDK5

The CH32F20xEVT development kit provides MDK5 project files for each application routine, which users can simply open by default without additional configuration.

3.2.1 Project file location

1.Startup file: located under "CH32F20xEVT\EXAM\SRC\Startup".

2.Core system header file: located under "CH32F20xEVT\EXAM\SRC\CMSIS".

3.Peripheral driver source file: located under "CH32F20xEVT\EXAM\SRC\StdPeriphDriver".

4.Peripheral driver header file: located under "CH32F20xEVT\EXAM\SRC\StdPeriphDriver\inc".

5.Serial port configuration, system delay function source file: located under "CH32F20xEVT\EXAM\SRC\Debug".

3.2.2 Basic peripheral application routines

The basic peripheral routines are located in the "CH32F20xEVT\EXAM" directory, which is divided into different folders according to different peripherals. Each peripheral folder provides a demonstration project of the function of this peripheral, take the "ADC" folder as an example.



As shown above, "ADC" means ADC basic function demo, double click in this folder to open the project " CH32F20x.uvprojx "

3.3 Compile Software Configuration

CH32F203 is a Cortex-M3 core MCU that supports MDK compilation environment. If you want to recreate a project, you need to pay attention to some software configurations. The following is an example of MDK5 to illustrate these configuration options.

3.3.1 Chip model selection

First, select Keil.WCH32F2xx_DFP. x. x. x.pack in the "CH32F20xEVT\PUB" directory and click Install. Next, select the chip model, as follows.



3.3.2 Code and RAM configuration

CH32F203RC ROM start address: 0x8000000; RAM start address: 0x20000000.

ROM and RAM sizes are configurable with four options (ROM-192KB RAM-128KB, ROM-224KB RAM-96KB, ROM-256KB RAM-64KB, ROM-288KB RAM-32KB), which can be configured by the user as needed with the WCHISPTool tool.

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|---|
| 🙀 CH32F20x 🛛 🖓 🚠 🖷 🗇 🕎 🍘 |
| ₽ 🛛 system ch32f20x.c |
| 799 } |
| Options for Target 'CH32F20x' |
| (_it.C Device Target Output Listing User C/C++ Asm Linker Debug Utilities |
| ch32f20x WCH CH32F203C8 Code Generation ARM Compiler version 5 |
| Xtal (MHz): 12.0 |
| Operating system: None Use Cross-Module Optimization |
| System Viewer File: Use MicroLIB Big Endian |
| CH32F203xx.svd |
| Use Custom File |
| Read/Only Memory Areas |
| default off-chip Start Size Startup default off-chip Start Size NoInit |
| □ ROM1: □ □ RAM1: □ □ |
| |
| □ ROM3: □ □ RAM3: □ □ |
| on-chip on-chip |
| IROM1: 0x8000000 0x10000 € IRAM1: 0x20000000 0x5000 |
| |
| ROM and RAM accord to ISP tool configuration |
| OK Cancel Defaults Help |
| / nato official to ready / |

3.3.3 Exporting target files

We support burning .hex and .bin files, according to the configuration shown below, the project will output the target file .hex for burning after successful compilation.

| P Image: System_ctrl 32f20x.c | |
|---|---|
| 799 - } | - |
| Options for Target CH32F20x' | × |
| .C Device Target Output Listing User C/C++ Asm Linker Debug Utilities | _ |
| Select Folder for Objects Name of Executable: CH32F20x | |
| | |
| Debug Information Create Batch File | |
| Create HEX File Create HEX File | |
| Browse Information | |
| C Create Library: .\obj\CH32F20x.lib | |
| | |
| | |
| | |
| | |
| | |
| | |
| OK Cancel Defaults Help | |

3.3.4 Exporting target files

Any files that are not self-contained by the system software need to inform the compiler of their location, i.e. add the compiled file path, as shown below.

| 🛱 CH32F20x 🖂 🐼 🏝 🖷 🗇 🕎 🎒 | |
|---|------|
| ₽ 🛛 📄 system_ch32f20x.c | |
| 799 - } | |
| I Options for Target 'CH32F20x' | × |
| jt.C Device Target Output Listing User C/C++ Asm Linker Debug Utilities | |
| n32f20x Preprocessor Symbols | - 11 |
| Define: | - |
| Undefine: | - |
| Language / Code Generation | _ |
| Execute-only Code Strict ANSI C Warnings: All Warnings |] |
| Optimization: Level 0 (-O0) 🗨 📄 Enum Container always int | |
| Coptimize for Time Plain Char is Signed No Auto Include | s = |
| 🗌 Split Load and Store Multiple 👘 Read-Only Position Independent 👘 C99 Mode | |
| ✓ One ELF Section per Function ✓ Read-Write Position Independent ✓ GNU extensions | |
| Include Paths\.SRC\StdPeriphDriver\inc;\.\SRC\CMSIS;\.\SRC\Debug;\GPIO_Toggle . | |
| Misc Include the path of the compiled file | |
| Compiler control string | ſ |
| OK Cancel Defaults Help | , |

The projects already provided in the EVT package have the relevant configuration saved and the user opens the project directly. If the user re-creates the project himself, he needs to confirm the project configuration according to the necessary points mentioned above.

4. Debugger download and simulation

The evaluation board uses USB or SWD emulation interface to provide 5V power. Downloading the program to the evaluation board can be done using our official WCH-Link or other SWD emulation tools, with the correct boot configuration as follows.

4.1 Connecting Emulator Models

| LMM CH32F20x ✓ ▲ ▲ ◆ ◆ ● Image: CH32F20x Image: CH32F20x Image: CH32F20x Image: CH32F20x ● | |
|--|--|
| Device Target Output Listing User C/C++ Asm _ch2 C Use Simulator with restrictions Settings Image: Comparison of the set o | Linker Debug Utilities Use: CMSIS-DAP Debugger Ger ULINK Pro Cortex Debugger Load J-LINK / J-TRACE Cortex itializatic Models Cortex-M Debugger ST-Link Debugger NULink Debugger Restore SiLabs UDA Debugger SiLabs UDA Debugger Watch Windows V Tracepoints Wemory Display System Viewer |
| CPU DLL: Parameter: D SARMCM3.DLL -REMAP S Dialog DLL: Parameter: D DCM.DLL -pCM3 1 Warn if outdated Executable is loaded D Manage Component Viewe | river DLL: Parameter: ARMCM3.DLL Parameter: ialog DLL: Parameter: TCM.DLL PCM3 Warn if outdated Executable is loaded r Description Files |
| OK Cancel | Defaults Help |

4.2 PORT Selection

| CIVISIS-DAP Cortex-INI Target Driv | rer Setup | : |
|---|---|----|
| Debug Trace Flash Download | Pack | |
| CMSIS-DAP - JTAG/SW Adapter | SW Device | |
| WCH CMSIS-DAP | Error | ve |
| Serial No: 0001A000000 | SWDIO SWD/JTAG Communication Failure | р |
| | Do | wn |
| Firmware Version: j2.0.0 | | _ |
| SWJ Port: SW - | Automatic Detection ID CODE: | |
| Max Clock: JTAG | C Manual Configuration Device Name: | |
| SW | Add Delete Update AP: | |
| Select Port | | |
| Debug | Cache Options Download Options | |
| Connect & Reset Options | | |
| Connect & Reset Options Connect: Normal Rese | t: SYSRESETREQ 🗸 🛛 🔽 Cache Code 👘 Verify Code Downloa | ad |
| Connect & Reset Options Connect: Normal Reset R | et: SYSRESETREQ Cache Code SYSRESETREQ Download to Flash | be |
| Connect & Reset Options Connect: Normal Rese Reset after Connect Log Debug Accesses S | et: SYSRESETREQ Cache Code Stop after Reset | be |
| Connect & Reset Options Connect: Normal ▼ Rese ▼ Reset after Connect Log Debug Accesses S | et: SYSRESETREQ Cache Code Stop after Reset | ad |

4.3 Target Driver Selection

| Lime CH32F20x ✓ ▲ ▲ ◆ ◆ □ system_ch32f20x.c 1 1 system_ch32f20x.c |
|---|
| B01 Image: CH32F20x' X !Ox_it Device Target Output Listing User C/C++ Asm Linker Debug Vtilities |
| n_ch3 Configure Flash Menu Command Use Target Driver for Flash Programming ULINK2/ME Cortex Debugger ULINK2/ME Cortex Debu |
| Configure Image File Processing (FCARM): Output File: Add Output File to Group: User Image Files Root Folder: Generate Listing |
| OK Cancel Defaults Help |

4.4 Adding algorithm files

| Options for Target 'CH32F2 | 20x' | | | × |
|--|--|--|--|------|
| ULINK2/ME Cortex-M Target | Driver Setup | | | × |
| Debug Trace Flash Downlo | ad Pack | | | |
| Download Function C Erase Full Chip C Erase Sectors C Do not Erase Programming Algorithm | ✓ Program ✓ Verify ✓ Reset and F | RAM for A Start: 0 | lgorithm x20000000 Size: 0x00002 | 2800 |
| Description CH32F2xx Flash Programming Al | Device Size 480k ogorithm gener | Device Type On-chip Flash ral automatic additi | Address Range 08000000H - 08077FFFH on | |
| | | Start: | Size: | _ |
| | Add | Remove | | |
| | OK | Cance | 2 | Help |
| | ОК | Cancel | Defaults | Help |

Note: When you select the algorithm file, you need to fill in the size of RAM for Algorithm as 0x2800.

4.5 Adding algorithm files

The download and emulation buttons are illustrated in the figure below.

| File | Edit | View | Project | Flash | Debug | Peripherals | Tools | SVCS | Window | w He | elp | | | | | | | | |
|------|-------------|-------|---------|-------|---------|--------------------------------------|----------|------------|--------|------|---------|---------------------|--------|---------|----------|-------|-------|----------|------------------|
| | <u> </u> | | XB | | | key downloa | d progra | | | //≣ | //👷 🛛 🖄 | xPortSysTickHandler | \sim | à 🏴 | ۰ 🜔 | ٠ | 0 (| 8 | R • 🔳 • |
| ٩ | | 🗄 🗳 | - 📖 📘 | CH | H32F20x | | - X | å 7 | • 🔶 🔶 | > 餘 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| File | Edit | View | Project | Flash | Debug | Peripherals | Tools | SVCS | Window | v He | lp | | | | | | | | |
| | <u>i</u> | | X 🖻 | | 20 | $\leftrightarrow \Rightarrow \mid q$ | 1 27 | 1 A B | | //≞ | //👷 🛛 🖄 | xPortSysTickHandler | \sim | à 🏴 | ۹. | ٠ | • (| <u>م</u> | <u>R</u> - 🗉 - |
| ٩ | (1) | 🖞 🐝 • | - | СН | 132F20x | | ~ 🕅 | 1 | 🔶 🔶 | · 餘 | | | | Click D | ebug Kej | ,Debu | gging | g and | simulation |

4.5.1 Toolbar description

_ _ _ _

Click debug, and the debugging tool is shown in the following figure.

— .

| 1 | | 1 | | | | | |
|-------------------|---------|------|---------------|---------|---------|--------|---------------|
| 🍇 🗐 🚳 🖓 🖓 | Ռ ♥ ⇒ | N B. | IS = 3 | - 🐺 - 🛙 | - 🛃 - 🛽 | 💷 | 🖬 - 🎌 - |
| Registers | XX | | | Д X | 📄 ch32 | f20x.h | Main.c 📄 star |
| Register 1 2 3alu | 4 5 | 6 | | | 1119 | ul6 | Flash_Model; |
| 🖵 — Core | | | | | 1120 | ul6 | ADC val2,ADC |

. .

1-Reset: Its function is equivalent to the reset button on the hardware, the code will be executed again from the beginning after pressing it once.

2-Execute to the breakpoint: used to quickly execute to the breakpoint, if you don't need to watch how each step is executed, but quickly execute to a certain place of the program to view the result, you can put a breakpoint at

the place to view the result.

3 - Stop execution: Stop the program to enter single-step debugging mode.

4-Single-step debugging: used to implement the execution to a function inside.

5 - Step-by-step debugging: When you come across a function again, you can execute it in a single step through this button without entering this function in a single step.

6 - Jump out debugging: When entering the single-step debugging of this function, this button directly executes the rest of the function and jumps out of the function to the position where the function was called.

4.5.2 Commissioning use

The debugging interface is described in 4.5.1, and the following figure shows the debugging interface.



Take the ADC_DMA program in EVT as an example, single-step debugging is applied, the debugging position is displayed by cursor, and the serial assistant is applied to view the result. The result of single-step operation is shown in the figure below.

http://wch.cn

| 🔔 WCH串口调试工具V130 - [CC | DM] | | - 0 | \times |
|---|--------------------|------------------------------|-------------------|----------|
| : 🔁 文件(F) 视图(M) 窗口(M) | 工具(T) 帮助(H) | | _ | .a× |
| | 9 🔋 | | | |
| COM 1.Select serial port number | | 3.0 | ancel HEX_display | ▼ × |
| 串口配置 | 接收区 | □ 停止显示 □ 日志模式显示 | : DHEX显示 | |
| 串ロ号 <u>COM1 ~</u> 刷新 | 2.Select baud rate | | | 1 |
| 波特率 115200 ~ | - | | | |
| 数据位 8 ~ | | | | |
| | | | | |
| 检验应 None ✓ | | | | |
| 流控制 None ✓ | | | | |
| □非标准波符率 200000 ∨ | | | | |
| 17月二日 17月二日 11月二日 11月1日 11月11日 11月11日 11月11日 11月11日11111111 | 4.Open serial port | | | |
| ─ 计数 | | | | |
| 接收计数 0 | | | | |
| 发送速度 | | | | |
| 接收速度 | <u> </u> | | | |
| 清空计数 | □ 实时保存至文件 | | 清空 | |
| | 发送区(字节<64KB) | 🗹 开启接收 🗌 定时发送 1000 🛛 ms 🗌 帧换 | 行 🗌 HEX发送 | |
| 流控设击>> | abcdefg | | | |
| ──────────────────────────────────── | | | | |
| ORTS DSR | | | | |
| BREAK RING | →/L /# #\$ | | 115.552 | |
| cbOutQue | 又[[传制>> | 产生随机数 | 反法 | |
| cbInQue | | | | |
| | | | | |
| 4 | | | | ► la |
| 就绪 | | | CAP NUM S | CRL . |

5. Engineering chip selection

EVT Engineering provides different chip selections used to complete different chip model functional peripherals in the following steps.

- 1) Select the chip type, see 3.3.1 Selecting the chip type enabled by the PACK packet for details.
- Modify the declaration, select the ch32f20x.h file, select the declaration according to the chip type, take CH32F203RCT6 as an example, select the declaration CH32F20x_D8. (Note: select different types of declarations according to the comments)

| Repiret CH22E20v | |
|------------------------|--|
| | 7 * Copyright (c) 2021 Nanjing Qinheng Microelectronics Co., Ltd. |
| E A CH32F20x | 8 * SPDX-License-Identifier: Apache-2.0 |
| 🖃 🖾 user | 9 |
| iii iii ch32f20x_it.c | |
| ⊜- [™] Main.c | 10 HitmderCH32F20x_H |
| ch32f20x.h | 11 #defineCH32F20x_H |
| ch32f20x_adc.h | 12 |
| ch32f20x_bkp.h | 13 d#ifdefcplusplus |
| ch32f20x_can.h | 14 extern "C" { |
| ch32f20x_conf.h | 15 #endif |
| ch32f20x_crc.h | 16 - |
| ch32f20x_dac.h | 17 H#if Idefined(CH32E20x D6) && Idefined(CH32E20x D8) && Idefined(CH32E20x D8C) && Idefined(CH32E20x D8W) |
| | 10 / / #define (H2) = 0.00 / H = (4.5 (H2) = 0.02 / H = 0.00 / H |
| ch32f20x dma.h | 18 //#uerine chozezox_06 /* chozezox6c-chozezo0c6-chozezo0c6 */ |
| ch32f20x extila | 19 #define CH32F20x_D8 /* CH32F203C <mark>B-CH32F2</mark> 03RB-CH32F203RC-CH32F203VC */ |
| al-20620, flash h | 20 //#define CH32F20x D8C /* CH32F207x-CH32F205x */ |
| | 21 //#define CH32E20v D8W /* CH32E208v */ |
| | |
| ch32f20x_gpio.h | 22 Rendlit |

3) Select add startup file, the file name is selected according to the statement, take step 2 as an example, the steps are shown below, first click manage project item select startup group select the appropriate startup file to add (the file path is: CH32F20x\CH32F20xEVT\EVT\EXAM\SRC\ Startup), click OK.

| 🙀 CH32F20x 🗸 🖉 🐔 🔁 💠 🗇 🍘 | |
|--|------|
| ₽ 🛛 📄 system_ch32/20x.c 📄 startup_ch32f20x_D6.s 📄 Main.c | |
| 29 * @brief Initializes GPIOA.0 30 * 31 * @return none | |
| _{Dx_it} Manage Project Items | × |
| Project Items Folders/Extensions Books Project Info/Layer | |
| _ch: If startup file is incorrect, need to dela | ite. |
| Project Targets: X + F Groups: X + Files: X + | t |
| CH32F20x user startup_ch32f20x_D6.s | |
| 2 Core debug 3 peripheral 5 | |
| Set as Current Target 4 Add Files | |
| OK Cancel Hel | P |

| CH32F20xEVT | > EVT > | EXAM | > SRC | Startup |
|--------------|------------|------|-------|-----------------------------|
| 名称 | | | ^ | |
| startup_ch32 | 2f20x_D6.s | ; | | |
| startup_ch32 | f20x_D8.s | ; | | |
| startup_ch32 | 2f20x_D8C | .s | | |
| startup_ch32 | 2f20x_D8V | V.s | | |

Complete the above steps and click compile to finish compiling the project for different chip types. In addition, it should be noted that since the peripherals of different chips are different, the project may have an error if the wrong chip type is selected by the build engineer.

6. WCHISPTool.exe Download

Use WCHISPTool tool to download the chip, support USB and serial port two download methods. USB pins are PA11 (DM), PA12 (DP), serial port pins are PA9 (TX), PA10 (RX) (if there is no PA9, PA10 pins choose PA2, PA3). The download process is:

- 1) BOOT0 to VCC and BOOT1 to ground, connected to PC via serial or USB.
- 2) Open the WCHISPTool tool, select the appropriate download method, choose to download the firmware, check the chip configuration and click on download.
- 3) BOOT0 is grounded, re-powered and running the APP program.

The WCHISPTool tool interface is shown in the following figure.

| WCHISPTool_CH32Vxxx WCHISPTool_CH3 | 2Fxxx x | | MCU series selection |
|--|------------------------------------|---|---------------------------------------|
| | | | 1.MCU series selection |
| nip Option | | Download Record | |
| Chip Series CH32F20x V Chip Me | del CH32F203RCT6 ~ | 14:43:34:317>> Device: CH32F203RCT6 | • RISC-V MCUs |
| ownload Port USB | matic Download When Device Connect | 14:43:34:318>> Flash size: 256Kbytes | |
| Day List CH22E20x==#1 dayiog | y O Soarch | 14:44:05:743>> Begin to disable code protect | |
| Dev List Gh32F20x#1 device | automatic recognition | 14:44:05:837>> Succeed! | |
| ownload File | actomate recognition | 14:44:06:252>> Device: CH32F203RCT6 | • Cortex-M MCUs |
| Name File | Path 4 Select target File | 14:44:06:933>> Target bin file length:2904 | |
| Object File1 20xEVT_V1.6\CH32F20xEVT_V | .6\CH32F20xEVT\EVT\EXAM | 14:44:06:943>> Please choose the target device at first! | |
| Object File2 | | 14:44:12:430>> Device: CH32F203RC16 14:44:12:437>> Flash size: 256Kbytes | • High-Speed MCUs |
| Object File3 | | Device#0 UID:60-90-49-BC-CD-AB-76-F8, BTVER:02.80 | |
| | | 14:44:15:726>> Target bin file length:2904 | |
| S Download Contig | inustion | 14:44:15:758>> BTVER:02.80 | BLE MOUL |
| Chip Config | 115300 | 14:44:15:760>> UID:60-90-49-BC-CD-AB-76-F8 | DEL MOUS |
| Chin Memory Allocation | RAMX 128KB + ROM 192KB | 14:44:15:854>> Erasing 14:44:15:888>> complete | |
| Stop-Mode RST | Disable | 14:44:15:899>> Programing | |
| Standby-Mode RST | Disable | 14:44:15:952>> complete | • E8051 USB MCUs |
| Soft-Ctrl IWDG | Enable | 14:44:15:953>> Ventying 14:44:16:089>> complete | |
| RRP | Enable | 14:44:16:092>> Succeed! | - |
| Clear CodeFlash | Disable | 14:44:16:093>> time used:0.358s | |
| Perform a soft reset After Download | Enable | 14:46:24:367>> Device: CH32F203RCT6 | [Nore information] |
| User data DATA0 | 0x00 | Device#0 UID:60-90-49-BC-CD-AB-76-F8, BTVER:02.80 | |
| Write protection control bit WPD0 | 0x00 | | WCH MCU selection: |
| Write protection control bit WRP1 | 0xFF | | http://wcb.cp/search?t=all&g=MCLH |
| | | | |
| | | | WCH Chip Manual: |
| | | | https://wcb.cp/sparch?t=all&a-brochur |
| | | | |
| rogress: | Concel due on the moto of | | MCU LDE MRS download: |
| a bownoad | Scancer chip code protect | | Litt for and dominida. |
| | | Save Clear | http://www.mounriver.com/download |
| 🚛 Download 💈 | erity 💿 Deprotect | Cure Cicar | |

- 1. select MCU series and chip models.
- 2. select the USB or serial port download method.
- 3. Identifying the device, generally automatically, and if it fails to do so, it needs to be selected manually.
- 4. Select the firmware, choose the downloaded .hex or .bin target program file.
- 5. download configuration as required.
- 6. Click Download.

7. WCH-LinkUtility.exe Download

The download process for the chip using the WCH-LinkUtility tool is:

- 1) Connect WCH-Link
- 2) Select chip information
- 3) Add firmware
- 4) If the chip is read protected, you need to release the chip read protection.
- 5) Execute

| WCH-LinkUtility V1.50 – X |
|--|
| File Target View Query ,Set ,Cancel chip read protect |
| 🔁 🗟 🗟 🕰 🕹 🔂 Each International Chip Flash |
| MCU Core: ARM V Series: CH32F20X V Address: 0x08000000 V Name Value |
| 4.Configuration Options Flash Size |
| Erase All Program Verify Reset and Run Read-Protect Disable |
| ○ Enable Protect 	O Disable Protect CLK Speed: High 		 Link Version |
| Close 3.3V output after operation Close 5.0V output after operation Disable Two-Line Interface |
| ☑ Disable Stop-Mode RST ☑ Disable Standby-Mode RST ☑ Enable Soft-Ctrl IWDG |
| DATA0: 0x FF DATA1: 0x FF 256K ROM + 64K RAM ~ |
| WRP0: 0x FF 🕑 0 🕑 1 🕑 2 💟 3 💟 4 💟 5 💟 6 💟 7 |
| WRP1: 0x FF 🛛 8 🗹 9 🖓 10 🖓 11 🖓 12 🖓 13 🖓 14 🖓 15 |
| WRP2: 0x FF 216 217 218 219 20 21 22 23 |
| WRP3: 0x FF 24 25 26 27 28 29 30 31 |
| Firmware: T\CH32F20xEVT_V1.6\CH32F20xEVT_V1.6\CH32F20xEVT\EVT\EXAM\GPIO\GPIO_Toggle\obj\CH32F20x.he |
| Auto download when WCH-Link was linked Detection Interval(S): 5 |
| Chip Flash Addr: 0x 8000000 V Size: 0x 10000 Data Width: 16bytes V Show ASCII Clear |
| |
| |
| |
| |
| Query,select ,Set Link mode |
| Current WCH-Link Mode: WCH-LinkDAP v Get Set |
| Operation Result: 📀 Result Collect: Succ:2 Toatal:2 Clear |
| 15:11:31:301>> Operation is Successful 15:11:31:302>> Begin to close 5.0v output 15:11:31:303>> Succeed! |

8. Statement of attention

- 1) If you use WCH-Link for downloading, you need to set Link to ARM mode, that is, the CON indicator is lit, if CON is not lit, refer to the WCH-Link instruction for the specific switching mode method.
- Keil-ARM mode-WinUSB device use conditions: Keil V5.25 and above; ARM-CMSIS V5.3.0 and above. 2) If you use Keil-V5.25 or below, you can update WCH-Link firmware to V2.3 (this version DAP for HID devices), WCH-LinkE does not support Keil-V5.25 or below.
- If the following error is reported for the program download, you should use the ISP tool to unprotect it. see 3) Chapter 6 for instructions on using the ISP tool.



If the following error is reported for program download, choose size 0x2800. configuration as shown in 4.4. 4)



Detailed inquiries\questions can be logged in the following.

WCH Microelectronics Community: http://www.wch.cn/bbs/forum-106-1.html

WCH official website: http://www.wch.cn/

WCH-LINK instructions for use: https://www.wch.cn/products/WCH-Link.html