# WCH-MCU-DLUser Manual

**Version: Draft** 

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# 1. Overview

The WCH-MCU-DL is a programing tool, which can be used for batch offline programming of several WCH devices. The supported devices include:CH54x,CH55x,CH56x,CH57x,CH58x, and CH32F/V series.

The WCH-MCU-DL supports 3 download types, namely USB, serial port and SWD. The USB and serial port download types are applicable to all above devices, while the SWD download type is only applicable to CH32F/Vseries.

The WCH-MCU-DL supports machine programming, rolling code function, and custom information writing.

Note: For CH32F/CH32V series, the rolling code and custom information functions are not supported.

# 2. Program procedure

Connect the type-c port on the WCH-MCU-DL to the PC. Power supply & Communication. Press and hold the S1 button for 5s to get the download key [ignorable].
Through the DlPubTool_N_V1.x software, the encrypted file [original file name-key.datekey] is automatically generated in the folder.
Open McuUpdTool.exe. Click Search and then click Download. The encrypted datakey file will be downloaded to the WCH-MCU-DL through the USB port.
Unplug the type-c cable, and supply 5V power to the WCH-MCU-DL through the DC port. Connect to the target board, short press the S3 button, and the user HEX file in the WCH-MCU-DL will be downloaded to the device in the target board.

# 3. Interface description



WCH-MCU-DL

#### **DIP Adapter Board design considerations:**

- (1) The WCH-MCU-DL is used to download the program to the devices. For a socket, a peripheral circuit is required.
- (2) During download, please ensure the stability of the power supply. For 3.3V devices such as CH57X series, it is recommended to add a LDO. Also, pay attention to the quality and the length of the cable.
- (3) For the devices without a built-in high-frequency crystal oscillator, an external crystal oscillator is necessary, otherwise they cannot be programmed. For example, CH571/3 must be connected to an external 32Mcrystal oscillator.
- (4) By default, the jumper on the WCH-MCU-DL shorts BOOT0 to GND. If BOOT1 is shorted to GND, it is in Check mode, and it cannot be programmed.
- (5) After the user file is loaded to the WCH-MCU-DL, a charging head is required to supply power to the WCH-MCU-DL through type-c. If a communication device such as a computer is used to supply power to the WCH-MCU-DL through type-c,the S3 button will not work. (So it is onlyrecommended to use a DC power adapter for power supply)

**Summary:** For hardware design, you must know the features of devices: ① Whether an external crystal oscillator is required, and what is the frequency; ②Whether to led out the download pin; ③ The supply voltage of the device; ④ Download type and the download pin.

# 4. Download a user file to the WCH-MCU-DL

## 4.1Generate a dedicated file

## 4.1.1[Optional] Get a key

This function is optional, if it is not needed, please skip this step. As shown below, the download key is not used.

烧录配置									
超时时间:	5000	ms	写次数:	1000	(< 65535)	电流检测参数:	2000	□秘钥:	

If a download key is needed, please use a type-c cable to connect the type-c port on the WCH-MCU-DL to the USB port on the computer. Generally, the red and green LEDs on the WCH-MCU-DLwill be always on, the buzzer will sound once, and the display screen on the WCH-MCU-DL shows [WCH QinhengOffline Programmer], as shown in the figure below.



**Press and hold the S1 button on the WCH-MCU-DL for 5s**, then the first line of the display will display [Download Key], and the second line will display 12 hexadecimal characters. Note that [a key is generated only when the WCH-MCU-DL is connected tocommunicate with the computer through type-c] as shown in the figurebelow.



## Note:

- (1) The key is one-time. Once you press and hold S1 again to generate a key, or the [original file name-key.datakey] file has been downloaded once, it must be re-generated.
- (2) If the key function is not used, the generated datakey file can be used multiple times by the WCH-MCU-DL.
- (3) To prevent the generation of a new key due to misoperation of the S1 button on the WCH-MCU-DL, resulting in failure to download, it is recommended to remove the S1
- (4) The WCH-MCU-DL must be connected to the computer through a communicable Type-C cable, to generate a download key.

## 4.1.2 Convert a user file to a dedicated file

#### Step 1:Option & configuration

Open the DlPubTool\_N\_V1.X.EXE.Select the chip series and the chip model.

ぶP配置 芯片系列: 8位CH55x系列	芯片型号:	СН551	
☑ 使能代码和数据保护	下载配置脚:	[] P1. 5	◙ P3.6(出厂默认配置)
✓串口免按键下载			
□清空DataFlash			
☑ 使能№1 Г101FЛ于工复应输入51脚 ◎ 使能上电复位后长延时			

Note: The information configured in **DIPubTool\_N\_V1.X.EXE must be consistent with the parameters in CHISPTool.EXE.** If you are not sure about it, please contact us for technical support.

#### Step 2: Modify parameters & key

By default, the current detection parameter is 2000 [if the load is large, it can be modified to 50000]. Fill the 12-bit hexadecimal download key into the [Key] space of [Burning Configuration] inDlPubTool\_N\_V1.X.EXE (if the key function is not used, please ignore it), as shown in the figure below:

火江	烧录配置 超时时间: 5000 ms 写次数: 1000 (< 65535) 电流检测参数: 2000									
	Configuration option	Recommended value	Configuration value							
	Timeout	5000	From 1 to 65535, in unit of 20ms							
	Number of writes	1000	From 1 to 65535. "0" represents no limit.							
	Current detection parameter	50000	From 2000 to 65535							
	Key	6-byte	6-byte							

#### Step 3: Generate a key file

Click the [...] button in the [User File] row, select the file in HEX or BIN, and then click the [Generate File] button to generate a datakey file in the DlPubTool\_N\_V1.X.EXE folder for the WCH-MCU-DL: original file name-key.datakey. As shown below:

DIPubTool_N_V1.20	
ISP配置	
芯片系列: 8位CH55x系列	芯片型号: CH551
■ 使能代码和数据保护	下载配置脚: []P1.5 []P3.6(出厂默认配置)
✓串口免按键下载	
一清空DataFlash	
▼使能RST Pin作为手工复位输入引脚	
□ 使能上电复位后长延时	
	一 白田 庭和 修売・ Adde・ I am
	Len.
· 烷汞配置	
超时时间: 5000 ms 与次数: 1000 ((66	535) 电流检测参数: 2000 V 秘钥: 04cbdb2be4td
■启用滚码 起始值: 0x	(16进制字符, eg:78b3b9102ce3) 步进值:
☆(/+売)署	
田 白文件、 E:\WCH\TOOL\CH32 PRGMR\CH32DOWNLOA	
H/2/H	
CRC16: 5C51  文件大小:1704字	节   最后修改日期:2021年4月6日,13:47:59
数据文件:	* * *
他寻哭升织	
200×留/19X	地志 ゴバロ
汉国 25.22	12条 71级
晶作状态· upy立件结构字比)	
1来1F1八运: 加A人计转换元干:	生成文件

For example: The name of a file in HEX is [CH551\_DEMO.hex], and the key is c4cbd626e4fd, then a CH551\_DEMO-c4cbd626e4fd.datakey file is generated. If there is no key, a CH551\_DEMO.datakey file is generated.

## 4.2 Download the dedicated file to the WCH-MCU-DL

## 4.2.1 Connect the WCH-MCU-DL to a PC

Connect the type-c port on the WCH-MCU-DL to the USB interface on a PC through a type-c cable or a type-c to type-c cable.



If the key function is used, indicating that the WCH-MCU-DL has been successfully connected to a PC during key generation, please ignore this step.

## 4.2.2Download the file to the WCH-MCU-DL

Move the generated [original file name-key.datakey] file to the MCU\_UpdTool.EXE directory file [If the file already exists, please ignore this step]. After the WCH-MCU-DL is connected successfully to the PC, open MCU\_UpdTool.EXE, click [Search] (generally automatically loaded, no need to click Search). If successful,

it will display as follows.

JID: 00-00-00-00-00-00-00-00-	00, BTV	ER: 02.50	_	
□ 启用USB状态监控,自动下	载 🗌	搜索		下载
数据文件解密成功!				~ 下载
ISP参数设置成功!				状态
				U 💌

Then click [Download].(The left figure indicates that the download is in progress. The right figure indicates that the download is successful.)

JID: 00-00-00-00-00-00-00, BTVER: 02.50		UID: 00-00-00-00-00-00-00, BTVER: 02. 50	
「 启用USB状态监控,自动下载 捜索 捜索	下载	「 启用USB状态监控,自动下载 搜索	下载
ISP参教设置成功! ISP参教设置成功! 写烧录参教成功! <0#ISP DEV:00-00-00-00-00>开始下载	◆ 下载 状态: ◆ <b>区</b>	写烧录参数成功! <0#ISP DEV:00-00-00-00-00-00> 开始下载 <0#ISP DEV:00-00-00-00-00> download succ 下载计数:1,成功:1,失败:0	▲ 下載 大恋

When the loading is finished, the display on the WCH-MCU-DL shows the loading completion information, as shown in the figure below.



Note: After the key function is enabled, the datakey file can only be downloaded once. If the user downloads it again in MCU\_UpdTool.EXE, it will prompt that the key does not match, and the display will show [No key]. To update firmware or download times, please start over.

## 5. Download the file to devices

The last step of offline programming is to download the user file pre-stored in the WCH-MCU-DL to the target board. [Note: At this time, please switch the power source for the WCH-MCU-DL. Disconnect the type-c port, and supply 5V power through the DC port.]

The USB and serial ports are applicable to all WCHdevices. The default download type is USB, as USB transfer download is faster than that of serial port. In addition, 3 download types are supported for CH32F/V series: USB, serial port and SWD.

## 5.1 USB download

Connect the 4 connectors [POW,D+,D-,G] at J7or the P\_HUSB1 USB female port to the USB interface of the target device.



Note: The P\_HUSB1 USB female port on the WCH-MCU-DL can supply power to the external, and the supply voltage depends on the version of the selected WCH-MCU-DL: The WCH-MCU-DL-5V outputs 5V, and the WCH-MCU-DL-3.3V outputs 3.3V.

The WCH-MCU-DL with pre-stored firmware is supplied through the P1 port [DC port] or the J1 connectors [+5V, G](Must select one of the 2 supply modes, and the WCH-MCU-DL cannot be supplied by PC).

The WCH-MCU-DL works normally, and the display shows[Offline Download Mode Total Times: xxxxDevice No.: CHxxx], as shown below:



Step 1: Configure the download pin

The download pins of some devices need to be configured, to implement download through the S3 button on the WCH-MCU-DL. Example: For CH579, short PB22 to GND, and then press the S3 button on the WCH-MCU-DL to download.

Download pins of devices:

Device No.	Button-free ☑ / Non-button-free⊠								
CH54X	CH546☑	CH547☑	CH548☑	CH549☑					
CH55X	CH551☑	CH552☑	CH554☑						
	CH558⊠P46-GND	CH559⊠P46-GND							
CH57X	CH577&CH578&CH57	′9⊠PB22-GND							
	CH571F &CH573 ⊠PB	22-GND							
CH32F/V	CH32F/V BOOTO	-VCC/BOOT1-GND							

Note: If you do not know the download configuration pins, please refer to WCHISPTool.exe. Take the download configuration pin of CH579as an example:

WCHISPTool(V3.00_T: 2件(F)功能(U)视图(	3) /) 帮助(H)				- 0
<ul> <li>32位 CH56X 8位 CH54</li> <li>芯片下载选择</li> </ul>	5X 8位 CH54X	32位 CH57X	32位 CH32F10X	32位 CH32V10X	32位 CH58X
芯片型号 CH5	79	~	下载方式	USB	~
下载配置 ☑ 启用代码和数据	保护模式		下载波特室	115200	~
☑使能RST作为手	工复位输入引脚		☑串口免按键	下载功能	
🗌 使能两线仿真调	试接口		□启用IAP	IAP起始地址:0x	
☑ 下载完成后运行	目标程序		●下载校验	O DataFla	sh枝验
□清空DataFlash					
下载配置脚:	OPB11	) PB22 (出厂	"默认设置)		

Download WCHISPTool.exefrom: http://www.wch.cn/downloads/WCHISPTool Setup exe.html

Step 2: Connect the USB port or theD+/D- connector at J7 to the USB pin of the device

Connect the USB port or theD+/D- connector at J7 to the D+/D- pin of the device, then short press the S3 button on the WCH-MCU-DL, and the display will show that the download is successful.



## 5.2 Serial port download

The J5 connectors on the WCH-MCU-DL are used to upgrade serial port. Connect the connectors [G,POW,TX,RX] at J5 to the serial pins of the target device.

#### Step 1: Configure the download pin

Device No.	Download configuration pin							
CH54X	CH546&CH547&CH548&CH549⊠P51-VCC							
CH55X	CH551&CH552&CH554⊠P36-VCC							
	CH558& CH559図P46-GND							
CH57X	CH577&CH578&CH579図PB22-GND							
	CH571F &CH573 ⊠PB22-GND							
CH32F/V	CH32F/V							

Note: If you do not know the download configuration pins, please refer to WCHISPTool.exe. For Example: The download configuration pin of CH554 is P36, which is connected to VCC. The download configuration pin of CH579 PB22, which is connected to GND.

WCHISPTool(V 文件(F) 功能(U)	3.00_T3) 视图(V) 帮助(H)	1					- 1
32位 CH56X 8( 芯片下载选择 芯片型号	☆ CH55X 8位 CH54X CH579	32位 CH57X 32位	2 CH32F10X	32位 CH32V10X USB	32位 CH58X ~	32位 CH56X         8位 CH55X         8位 CH54X         32位 CH57X         32位 CH32F10X         320 CH32F10X	纪位 CH58X ~
下载配置 ② 自用代码 ② 使能用代码 ③ 使能两线 ③ 下载完成 ③ 青空Data 下载配置群	和數据保护模式 作为手工夏位输入引脚 仿真调试接口 后运行目标程序 sFlash 〇 PB11 ①	т 区 (@ РВ22 (出厂製)))	「戦波特案 ③串ロ免技罐T 〕自用IAP ⑨下戦校验 役置)	115200 「戦功能 IAP起始地址:0x 〇 DataFlas	~ ab校验	<ul> <li>下载配置</li> <li>使能PSTPin 作为手工更拉输入引脚:</li> <li>○ 角形(行间和鼓振保护模式)</li> <li>○ 使能上电复位后长疑时(未迭中 遮延时度认):迭中 增加44ms长疑时)</li> <li>□ 下载完成后运行目标程序</li> <li>□ 查自由APL MP起始地址: 0x</li> <li>□ 应用APL MP起始地址: 0x</li> <li>□ 应用免产结束有式功能</li> <li>□ 下载配置脚:</li> <li>○ P1.5</li> <li>● P3.6 (出厂就认设置)</li> </ul>	

DownloadWCHISPTool.exe from: http://www.wch.cn/downloads/WCHISPTool\_Setup\_exe.html

Step 2: Connect the serial connectors at J5 to the serial pins of the device.

Device No.		Set	rial pins	
CH54X	CH546&CH547&C	СН548&СН549—Р30	/P31	
CH55X	CH551—P30/P31	СН552&СН554—Р	16/P17	CH555
	СН558&СН559—І	P02/P03		
CH57X	CH577 &CH578&0	CH579—PA8/PA9		
	СН571 &СН573—	PA8/PA9		
CH32	CH32F/V—PA9/PA	10		

Serial port download pins of devices:

Short press the S3 button on the WCH-MCU-DL, or pull down the IO port of S3, to start the download. The third line of the display will display [Is Programming], and it will display [Success: xxx] after several seconds.



## 5.3SWD download (For CH32 series)

The J4 on the WCH-MCU-DL is used for SWD download. For CH32F/V, Connect the connectors [G, SWCLK\_OUT, SWIO\_OUT, POW] at J4 to the target SWD interface for SWD download

Note: The output voltage of the WCH-MCU-DL corresponds to the supply voltage required by the board.

Connect the J4 connectors on the WCH-MCU-DL to the target SWD interface, then short pressthe S3 button, to download offline for CH32F/V series.

Note: The SWD download is only for CH32F/V series.

The CH32 series support read protection, power-down and power-on operations, so they must be controlled by the J4 power supply of the WCH-MCU-DL.

(The software reset mode is added to enable or disable read protection.)

# 6. Check

Short BOOT1 to GND, to enter Check mode. The S3 button is used for check.

The check function of the WCH-MCU-DL is to compare the pre-stored firmware in the WCH-MCU-DL with the firmware in the target board and determine whether they are identical.

To check through serial port or USB, the connection is the same as the connection when downloading.

# 7. Machine download

The programming machine can be connected to the WCH-MCU-DL for machine download. The user can process and view the running status of the WCH-MCU-DL through the [START,BUSY,OK,NG] signals of J6.

The S\_H pin is to input a High signal over 50ms, and the S\_L pin is to input a Low signal over 50ms.

(Choose one)

The BUSYpin outputs high level, indicating that it is downloading. The OKpin outputs high level, indicating that the download is successful. The NGpin outputs high level, indicating that the download fails. **Note:** 

- (1) S\_H,S\_L:IO input signals.
- (2) BUSY,OK and NG: IO output signals, active high.

## (3) The S3 button cannot be used to trigger the download timing.

The figure below shows the success timings of the 4 lines (START,BUSY,OK,NG).



The screenshot of the logic analyzer interface when it succeeds:

0 - START	<b>E</b>	
1 - BUSY	[ <b>f</b> ] <sup>-</sup> , <b>t</b> ]-	
2 - ОК	( <b>F</b> , <sup>-</sup> , <b>E</b> , -)	
3 - NG	[ <b>f</b> <sub>1</sub> <sup>-</sup> , <b>1</b> <sub>1</sub> -)	

Failure timings:



The screenshot of the logic analyzer interface when it fails:



# 8. Firmware upgrade of the main MCU on the WCH-MCU-DL(3 methods)

## 8.1USB upgrade in WCHISPTool

**Step 1:** The firmware of the main MCU on the WCH-MCU-DL can be upgraded through CH32Fx USB. **Connect BOOT1to GND, and connect BOOT0to VCC33**.

Step 2: Connect the P\_HUSB1 USB female port on the WCH-MCU-DL to the USB port on the PC.



**Step 3:** Open [WCHISPTool], select CH32Fx, and select the USB download type. Add the updated file in HEX to user file. Click [Remove Protect].

🔅 WCHISPTool(V	/2.90)							
文件(F) 功能(U)	视图(V)	帮助(H)						
	₽ I	≡∛ 🖩	i ?					
32位 CH56X系列	间 8位 CH5	5X系列 8位	CH54X系列	32位 CH5	7X系列 32位	2 CH32F1系	列 32位 CI	H32V1系列
芯片型号	CH32F103	1	~		下载方式	USB		~
下载配置								
<ul> <li>✓ 关闭停</li> <li>□ 使能U</li> <li>□ 使能L</li> <li>□ 自用读</li> </ul>	□止模式下低 SBD低速模式 电时长复位 ℃保护	功耗复位 式 解除低	彩护		<ul> <li>□ 使能US</li> <li>☑ 关闭待机</li> <li>☑ 软件开加</li> <li>☑ 软件开加</li> <li>☑ ATA0: 0x</li> </ul>	BD内部上拉 机模式下低功 自WDG,禁J 0 DAT	电阻 耗复位 止硬件开启 A1: 0x 0	
WRP0: 0x FF	<mark>∕ bit0</mark>	<mark>∕ bit1</mark>	⊡ bit2	⊡ bit3	<mark>⊡ bit4</mark>	<mark>∕ bit5</mark>	<mark>∕ bit6</mark>	bit7
WRP1: 0x FF	✓ bit8	✓ bit9	✓ bit10	✓ bit11	✓ bit12	✓ bit13	✓ bit14	✓ bit15
WRP2: 0x FF	✓ bit16	✓ bit17	✓ bit18	✓ bit19	✓ bit20	✓ bit21	✓ bit22	✓ bit23
WRP3: 0x FF	✓ bit24	✓ bit25	✓ bit26	✓ bit27	✓ bit28	✓ bit29	✓ bit30	✓ bit31
开始下载								
USB设备列表	表 型号CH3	2F1031号	设备				~ #	搜索(E)
IAP程序文件	÷						<i>6</i>	
用户程序文件	# E:\WCH\	TOOL\CH32	PRGMR\CH	32PMR_ <u></u> ‡	空\CH32F10X	_V2401_20	<i>2</i>	
DataFlash文件	‡						6	
	下载(D)					停止(S	)	
下载记录								
Device ID: 0	x410						▲ 清雪	2记录(C)
Revision ID: 0	x2000							
Flash size: 6	4Kbytes	64-48-43-07	-53 BTVER	231				
Dencente OID	SO NO DE	10 10 01	out britering				-	

Note: Download WCHISPTool from: http://www.wch.cn/downloads/WCHISPTool\_Setup\_exe.html

Step 4: Click [Download].And it will show that the download is successful.

TED ALL						-	
用户程序文件	E:\WCH\TOOL\CH	32_PRGMR\CH	H32PMR_主控	CH32F10X	_V2401_20	ן 🚰 נ	
DataFlash文件						6	
Г	⊼载(D)				停止(	S)	
下载记录							
完成						^	清空记录(C)
第1号设备下载兵	成 北市教·1.4 防教·0						
本次下戰急致. J <<<< 本次用时:1	89)致.1. <del>天</del> 败致.0 .811s					~	
共计 1	剩余 0		成功 1	失	败 0		重置计数(R)
evice Removed!		USB下载模T	đ 🗌		1009	%	

**Step 5:** Connect the BOOT0 to GND on the WCH-MCU-DL, then power on, and the display will show the version information (V2417 now).

## 8.2 Serial port upgrade in WCHISPTool

**Step 1:**The firmware of the main MCU on the WCH-MCU-DL can be upgraded throughCH32Fxserial port. **Connect BOOT1 to GND, and connect BOOT0to VCC33**.

**Step 2:** Use aUSB-to-serial tool. Connect one end of it to the USB port on the PC, and connect the other end to the serial pins [3V3,GND,TX,RX] at J2 on the WCH-MCU-DL.



**Step 3:** Open[WCHISPTOOL]. Select CH32F103. Select the serial port download type. Select the required updated file in HEX. Click [Remove Protect], and the LOG area shows that the protection is successfully removed.

芯片下载选择	列 <mark>8位</mark> CH5	i5X系列 8位	z CH54X系列	32位 CH5	7X系列 32位	立 CH32F1系	列 32位 CH	l32V1系列
芯片型号	CH32F103	3	~		下载方式	串口		$\sim$
下载配置	事止模式低功 JSBD低速模∷ ⊢电时长复位	耗复位 式			□ 使能US ☑ 关闭待 <sup>。</sup> ☑ 软件开	SBD内部上拉 机模式低功耗 自IWDG,棽	电阻 复位 止硬件开启	
	佣读保护	解除保持	<u> </u>		DATA0: 0	c DAT	A1: 0x	
WRP0: 0x FF WRP1: 0x FF WRP2: 0x FF	bit0	⊠bit1 ⊡bit9 ⊠bit17	⊡bit2 ⊡bit10	⊠ bit3 ⊠ bit11 ⊠ bit19	<ul> <li>✓ bit4</li> <li>✓ bit12</li> <li>✓ bit20</li> </ul>	⊠ bit5 ⊡ bit13	⊠ bit6 ⊠ bit14	⊡ bit7 ⊡ bit1
WRP3: 0x FF	⊡ bit24	⊡ bit25	bit26	⊡ bit27	⊡ bit28	✓ bit29	⊡ bit30	⊡ bit3
开始下载 串口设备列 IAP程序文(	表 COM13 生 件 .v105\ch	32_主控_v2;	311\CH32F10	×_脱机烧录	器主控_1211	_21_20.hex	✓ 携	索(E)
用户程序文							1	

Step 4: Power on the WCH-MCU-DL again, click [Download], it will show that the download is successful.

市口设备列表	COM13 ~	搜索(E)
IAP程序文件		-
用户程序文件	_v105\ch32_主控_v2311\CH32F10x_脱机烧录器主控_1211_21_20.hex 🞯	
DataFlash文件		-
Г	<b>∇载(D)</b> (停止(S)	
·载记录 完成		- - - - - - - - - - - - - -
载记录 完成 INCOM13接口下	载完成	清空记录(C)
载记录 完成 1.COM13接口下 本次下载总数:1.6 <<<本次用时:1	载完成 成功数:1.失败数:0 4.328s	清空记录(C)

Step 5: Connect the BOOT0 to GND on the WCH-MCU-DL, then power on, and the display will show the version information (V2417 now).

## 8.3Upgrade itself

**Step 1:** The firmware of the main MCU on the WCH-MCU-DL can be upgraded through CH32 serial port. **Short BOOT1 to GND, and connect BOOT0 to VCC33.** 

**Step 2:** Open [DlPubTool\_N\_V1.X.EXE]. Use a USB-to-serial tool.Connect one end of it to the USB port on the PC, and connect the other end to the serial pinsat J2 on the WCH-MCU-DL. Click Search. Select the corresponding COM port.

烧录器升级		
设备列表: 3#ISP DEV:\\.\COM5	搜索	升级

The D1PubToo1\_N\_V1. X. EXEsoftware has built-in the firmware of the main MCU (CH32). Click [Upgrade], and the firmware will be automatically upgraded.

The operation status bar will display the prompt message [Successfully get device information through serial port], and then it will display the prompt message [Is Downloading....]. Wait for about 10s, and a dialog box [Programmer Upgrade Successfully] will pop up.



[Last step]: Connect BOOT0 to GDN on the WCH-MCU-DL, then power on, and the display will show the version information (V2417 now).

# 9. Rolling code function & Custom information

#### 9.1Online download - serial port customization

Online download is to write user-defined information into the specified address bit of the programming deviced at a flash through serial port pins at J2 on the WCH-MCU-DL during download.

Currently, the CH32 does not support the online function.

**Step 1:** The software needs to be configured first to enable the online function. This is completed in the process of generating the encrypted datakey file, not a separate step. Addreefers to the start address of dataflash, and Len refers to the length of the opened space.

Note: The data file must be loaded, otherwise the datakey file cannot be generated.

DIPubTo	ol_N_V1.50		_ <b>D</b> X
ISP配置			
芯片系列:	32位CH57x系列	芯片型号: CH571	*
▼使能代	码和数据保护	下载配置脚: [] PB11	● PB22 (出厂默认配置)
▼串口免:	按键下载		
□清空Da	taFlash		
☑ 使能RS	I Pin作为手工复位输入引脚		
		☑启用联机烧录: Addr:	0 Len: 32
烧录配置 #20101词:	5000 - 王次恭 1000	(/ 45525) 中:在检测绘教, 2000	<b>Ξ</b> \$λ\$9.
		(185555) 电流磁测验数(. 2000	
启用:滚体	9 起始值: 0x 1122334455	i66 (16进制字符, eg:78b3b9102ce3	) 步进值: 1
文件配置			
用户文件:	E:\WCH\TOOL\CH32_PRGMR\CH32	RGTESTHEX\CH571_3\CH573_ADC_PA12. B	IN
	CRC16: B27  文件大小:0	6840字节   最后修改日期:2021年6月23	日,11:23:11
数据文件:	E:\WCH\tool\CH32_PRGMR\CH32	rgTestHex\blankBIN\512_0xFF.BIN	
烧录器升级			
设备列表:		<b>v</b>	援索 升级
操作状态:	数据文件加载成功!		生成文件

**Step 2:** Connect to the J2 connectors on the WCH-MCU-DL via a USB-to-serial tool or other serial ports. Open the serial port tool, set the baud rate to 115200, and other parameters are set as shown in the figure. The data is transferred based on HEX format [0x24+LEN+DATA+CRC(datasum)+0x23]. For example:

Baud rate	115200	•	
Data bits	8	•	
Stop bits	1	•	□ HEX显示 但方参增 □ 接收数据到文 □ HEX常
Parity	None	•	✓ 加时间戳和分包显示超时时间 20 ms 第1 字节 至
Flow contr	None	-	240501010101010523

The corresponding serial port will return the following LOG errors when the input data is wrong.

- a. Not comply with the protocol \$\*END\*A\*#
- b. Data Check Error \$\*END\*B\*#
- d. Download successful \$\*END\*D\*#
- e. Download timeoutglobal\_timeout

## 9.2Rolling code function

Rolling code function: Add 12 bits in HEX to device Dataflash. The data is automatically updated through the step value. The rolling code function is the basis of online download, which limits the data written to the dataflash to 12bits in HEX, and the data is changed by the step value. At this time, the data is automatically generated by the WCH-MCU-DL and written into the dataflash of the device, with no external serial port required.

First check [Enable Online Download], fill in the parameters, then check [Enable Rolling Code], and fill in the parameters.

ISF配置       芯片系列:       32位CH57x系列          「        32位CH57x系列           「              「               「                 「
芯片系列:32位CH57x系列       芯片型号:CH571         ■ 使能代码和数据保护       下载配置詞: □PB11         ● PB22(出厂默认配置)         ● ADD免按键下载         □ 清空DataFlash         ● 使能KSJ Pin作为手工复位输入引脚         ● 小倉用联机烧录:Addr:0         Len:32         焼录配置         42040月15000         AB10月前:5000         AB10月前:5000
■ 使能代码和数据保护     下载配置脚: □ PB11     ● PB22 (出厂默认配置)       ● 用令技键下载     酒空DataFlash     ●       ● 使能FST Pin作为手工复位输入引脚     ●     Ⅰ an: 32       ● 焼汞配置     日本粉1000 (( 65535) 由: 法检测绘教: 2000 ● 私知:
<ul> <li>✓ 串口免按键下载</li> <li>清空DataFlash</li> <li>✓ 使能AST Pin作为手工复位输入引脚</li> <li>✓ 启用联机烧录: Addr: 0</li> <li>Len: 32</li> <li>烧录配置</li> <li>按理相对词: 5000 ms 写次数: 1000 (&lt; 65535) 由: 高於副參對: 2000 承知目:</li> </ul>
□清空DataFlash ▼使能RST Pin作为手工复位输入引脚 「自用联机烧录: Addr: 0 Len: 32 烧录配置 42040月间: 5000 ms 写次数: 1000 (( 65535) 由语检测终数: 2000 □秘钮:
▼使能IST Pin作为手工复位输入引脚           ▼信用联机烧录: Addr: 0         Len: 32           烧录配置
✓ 启用联机烧录: Addr: 0 Len: 32 烧录配置 超相相间: 5000 ms 写次数: 1000 (( 65535) 由) 奇於副參数: 2000 副泌钼:
✓ 启用联机烧录: Addr: 0 Len: 32 烧录配置 把d8di间: 5000 ms 写次数: 1000 (( 65535) 由)忘检测参数: 2000 □秘钮:
焼泉配置 超明時前回、5000 ms 写次教・1000 (く 65535) 由注意检测参数・2000 可約組・
- 招助財前· 5000 ms 写次教· 1000 (< 65535) 由: 高校測参教· 2000 回秘祖·
☑ 启用滚码 起始值: 0x 112233445566 (16进制字符, eg: 78b3b9102ce3) 步进值: 1
マレート  CHECK  E: \WCH\TOOL\CH32 PRGMR\CH32PRGTESTHEX\CH571 3\CH573 ADC PA12, BIN
PPC12、1927日文件十小・2020字本 日本氏統計回期、2020年2月22日 11/22-11
CRUID: D21 又什人小.0040子中 1 取用修改口册.2021年6月23日,11.23.11
数据文件: E: WUR/tool/UR32_PROMMX/UR32PrgTestNex/blankBlN/b12_0xPF.BIN
烧录器升级
·设备列表:
操作状态: 数据文件加载成功! 生成文件

Note the rule: The first generated value is 11 22 33 44 55 66, the second generated value is 12 22 33 44 55 66, and the third generated value is 13 22 33 44 55 66.

## 10. FAQ

## 10.1 Why does the WCH-MCU-DL download fail?

Main reasons: ①Power supply of the WCH-MCU-DL; ②Board or socket with the device to be downloaded; ③Selection & connection; ④ Hardware of the WCH-MCU-DL.

## (1) Supply

Power can be supplied to the WCH-MCU-DL through type-c port when the user downloads the user file to it. Power can be supplied to the WCH-MCU-DL through P1 DC port when the user downloads the user file to the target device from the WCH-MCU-DL, and the power of the adapter is 5V/1A.

#### (2) Product selection & connection

- (a) Confirm whether the DlPubTool\_N\_V1.xx configuration information is exactly the same as the programmed device number, and confirm whether the device number is the same as the one shown on the display.
- (b) Whether the user file is downloaded to the WCH-MCU-DL (view the firmware name in the

WCH-MCU-DL by pressing the S2 button).

(c) Whether the connection between the WCH-MCU-DL and the device& communication.

#### (3) Board or socket with the device to be downloaded

The board or socket with the device to be downloaded needs to be designed according to the reference schematic of the correspondingdevice. Take CH554T as an example, Pin19 and Pin20 need to be connected to 2 0.1uF capacitors to work normally when supplying power and using the USB or serial port.

For all devices, it may occur that the first download is successful while the second download is not successful. This is mainly due to Boot. Check whether PB22 of CH57X is connected to GND and it enters Bootmode.

The easiest way is to check whether the file is downloaded successfully to the board or socket in WCHISPTool.

#### (4) Hardware of the WCH-MCU-DL

Check whether there is a hardware problem in the WCH-MCU-DL board, for example, whether it is in Download mode (BOOT0 connects to GND).

## 10.2 How to supply power to the WCH-MCU-DL?

- (1) During configuration, the WCH-MCU-DL is powered and communicated through the type-c female port, and is connected to the PC through a communicable type-c cable.
- (2) During download, power is supplied to the WCH-MCU-DL through the DC port (5V/1A). If power is supplied through the type-c female port, the user can use an adapter, but it cannot be supplied by the PC

Note: The supply voltage depends on the version of the selected WCH-MCU-DL: The WCH-MCU-DL-5V outputs 5V, and the WCH-MCU-DL-3.3V outputs 3.3V.

## 10.3 Whether the key is necessary for offline download?

The key is not necessary. If the key is not required, the user can uncheck [Fill in the key]. Note that the generated datakey file can be downloaded and used unlimited times when the key function is disabled. Pay attention to security.

## 10.4 How to know whether the hardware of the WCH-MCU-DL is OK?

Connect the type-c port on the WCH-MCU-DL to the PC through a type-c cable. Open DlPubTool\_N\_V1.X.EXE, the display shows [Pre-load Mode], indicating that the WCH-MCU-DL works normally.



## 10.5 How to determine whether the type-c cable which connects the WCH-MCU-DL to

#### the PC is communicable?

Connect the WCH-MCU-DL to the PC through a type-c cable. Open [McuUpdTool.EXE], the display on the WCH-MCU-DL shows that [Pre-load Mode Is Loading ...].

Or download the WCHISPTool(<u>http://www.wch.cn/downloads/WCHISPTool\_Setup\_exe.html</u>). Open WCHISPTool after installation.



The display on the WCH-MCU-DL shows that [Pre-load Mode], indicating that the WCH-MCU-DL can communicate with the PC.



## 10.6 What is the function of the S2 button on the WCH-MCU-DL?

The S2 button can be used to know the name of theoriginal file downloaded by the user, check code and the size of the file.

Press S2 once, to display the name of theoriginal file downloaded by the user. Press S2 twice, to display the check code and the size of the file.

For example, the name of the downloaded user file is [FIIl\_Light\_CH551\_V0009\_20201212.BIN], and then the display shows [FIIl\_Light\_CH551\_V0009\_20201212].



## 10.7 How to generate a random key?

Press and hold the S1 button on the WCH-MCU-DL for more than 5s, to generate a random key.

## 10.8 How to download the file manually?

Short press the S3 button. The function of the S3 button is to check and download. Check when BOOT1 is shorted to GND. Download when BOOT1 is not connected to GND.

## 10.9 Why cannot the DlPubTool\_N\_V1.X.EXE software be opened on PC?

Download the WCHISPTool. Be sure to close WCHISPTool after installation, and then open DlPubTool\_N\_V1.X.EXE.

Link: <u>http://www.wch.cn/downloads/WCHISPTool\_Setup\_exe.html</u>

## 10.10 ISP configuration description

■使能代码和数据保护
 ▼串口免按键下载
 □清空DataFlash
 ▼使能RST Pin作为手工复位输入引脚
 □使能上电复位后长延时
 □使能晶体振荡器

下載配置脚: □ P5.1 □ P4.6(出厂默认配置) ☑ 使能系统复位期间P0端口的内部上拉电阻

Currently, configuration information in DlPubTool N V1.X is copied from WCHISPTool.

Option 1: Enable code and data protection mode

Option 2: No-key serial port download

Option 3: Clear DataFlash

Option 4: Enable RST as manual reset input pin

Option 5: Enable reset long delay time

Option 6: Enable crystal oscillator

Option 7: Enable internal pull-up resistor of P0 port during system reset

Option 8: Download configuration pin

The option 1 is enabled by default, which means that the downloaded firmware cannot be read. The other 7 options can be configured. Generally, please refer to WCHISPTOOL.EXE for configuration information. If not necessary, default options.

Note:

Option 4: It should not be checkedunless otherwise specified when the RST Pin is alternate.

Option 7: There is a requirement for the internal pull-up resistor of the P0 port during system reset.

Option 8: Generally, the download configuration pin is not recommended to be modified. This pin is used to go into the BOOT, unless otherwise specified.

---end----