

Beken Flash Image Loader

User guide

Related products

BK7231 series
BK7231N/U series
BK7251 series
BK7256 series
BK7271 series
BK7236 series
BK7238 series



Version 2.0.8.1

Bekencorp

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About this Manual

This document describes the flash downloading process and parameter selection of beken wifi chip. It also lists some common problems and corresponding solutions. This document is intended for download tools 2.0.8.1 and later.

Release note

Date	Version	Release note
2022.01.07	V1.0.0.1	First version
2022.05.31	V2.0.0.0	cmake refactor,add the linux version
2022.10.12	V2.0.3.0	1.Adjustment of organizational structure; 2.Performance optimization; 3.Multi-platform compatibility
2023.2.1	V2.0.8.1	1.Efficiency optimization for the pressure test of business functions; 2.Improve tool stability, compatibility and reliability;



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1.Preparatory work

Software and hardware resources required by Beken wifi chip for Flash downloading and downloading are shown in the figure below (Figure 1-1-1)。

- Hardware device:
 - 1 x uart serial cable;
 - 1 x beken chip;
 - 1 x PC (The operating system supports Windows7 and Windows10, and is compatible with various Linux versions;
- Software device:
 - Download Tool: BKFIL.exe
 - Commandline Tool: bk_loader.exe

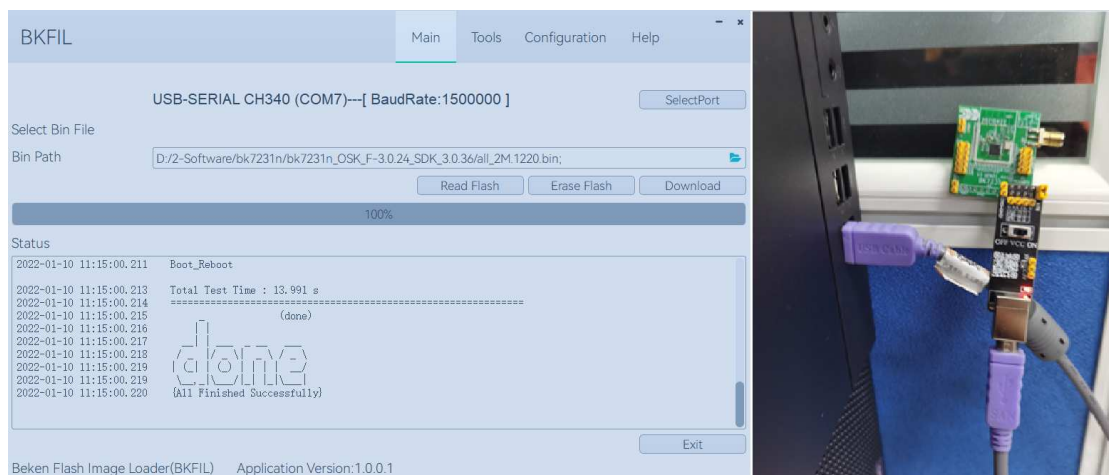


Figure1-1-1 source of software and hardware

2. Hardware description

2.1 Uart Serial port baseplate

In this guide, we use the Beken wifi chip and related modules (as shown in the figure) as the USB to serial board, the core part of which is the USB to UART chip. Customers can also automatically prepare other USB to UART chips or baseboards for connecting the chip to the PC and then downloading the firmware into the device.



Figure2 – 1 - 1 Uart Serial port baseplate

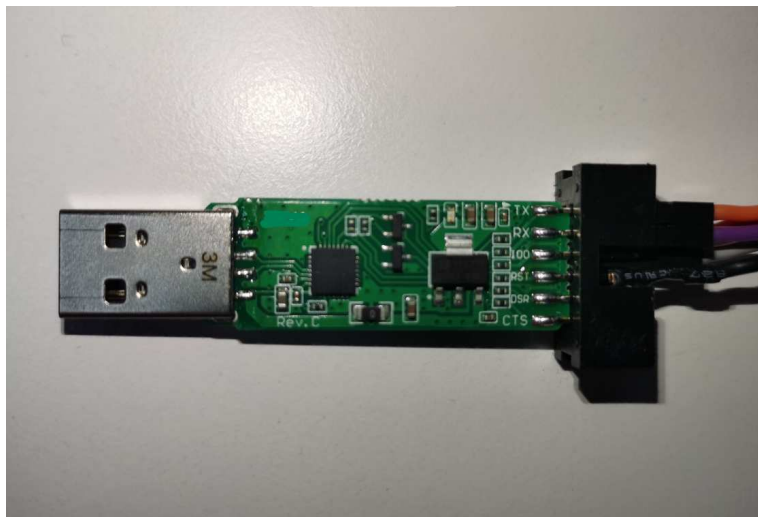


Figure2 – 1 - 2 Serial port baseplate prepared by the user



2.2 Prepare to download

2.2.1 Connect to device

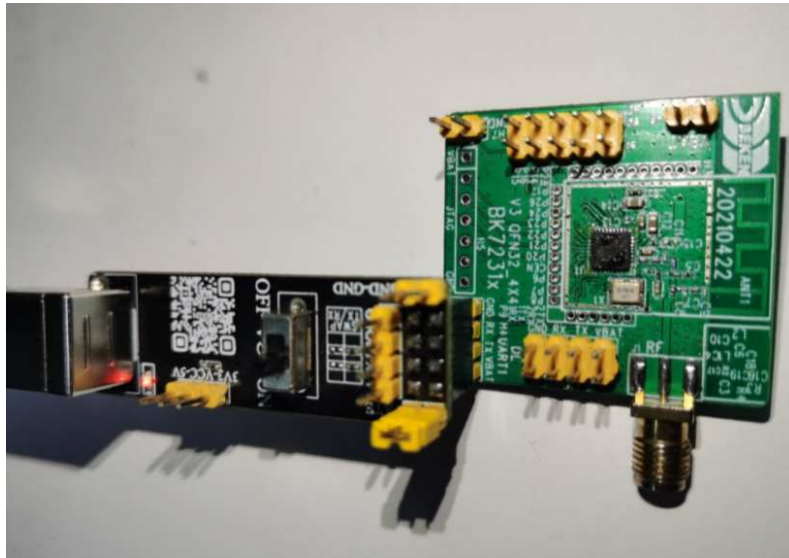


Figure 2-2-1-1 Schematic diagram of device connection - BK7231N series



3. Software description

3.1 UI introduction

Figure 3-1 shows the main window of the BK Flash Image Loader Tool. On the main window, you can select the firmware to be downloaded.

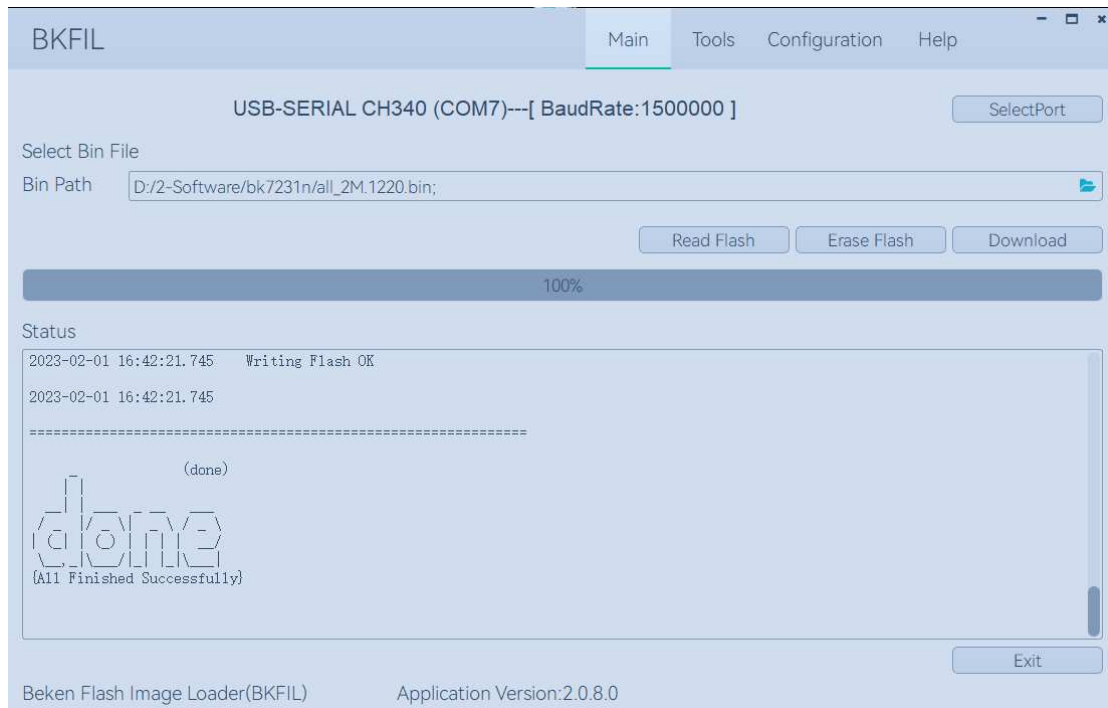


Figure 3-1-1 main window of the download tool



3.1.1 Function introduction

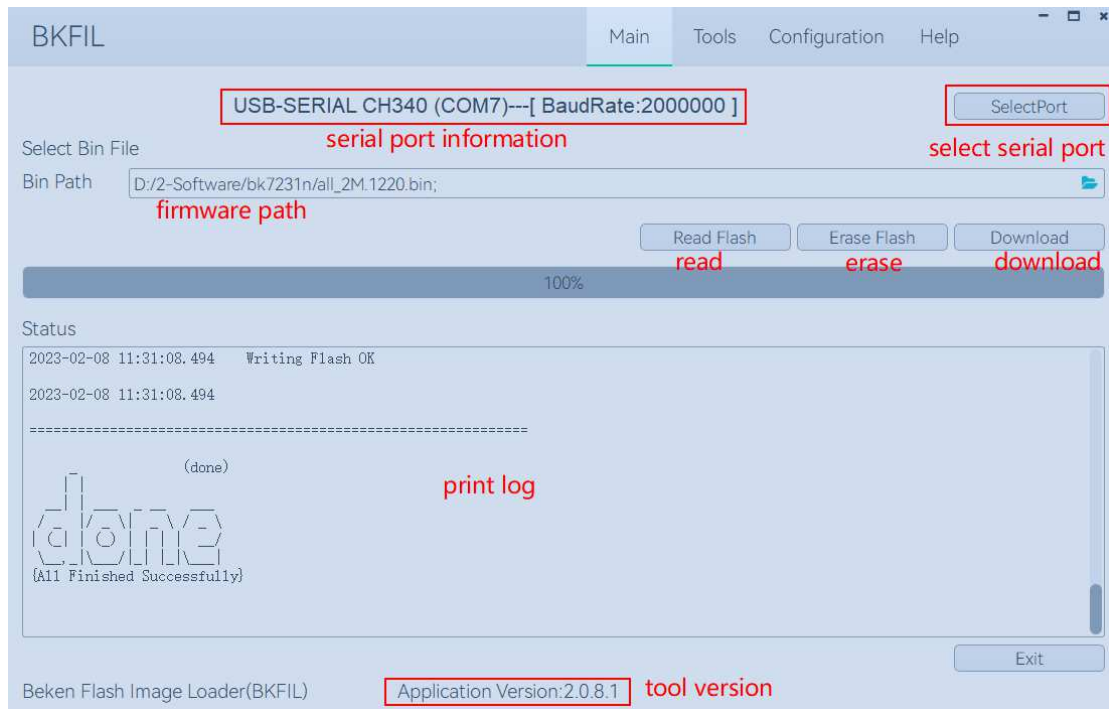


Figure 3 – 1 – 2 main window introduction

As shown in the picture, "BK_Flash_Image_Loader_Tool" UI functions are divided into:

- Serial port information
- select serial port、select baudrate
- select firmware
- read flash
- erase flash
- download flash
- show log

3.2 Configuration introduction

3.2.1 Common configuration

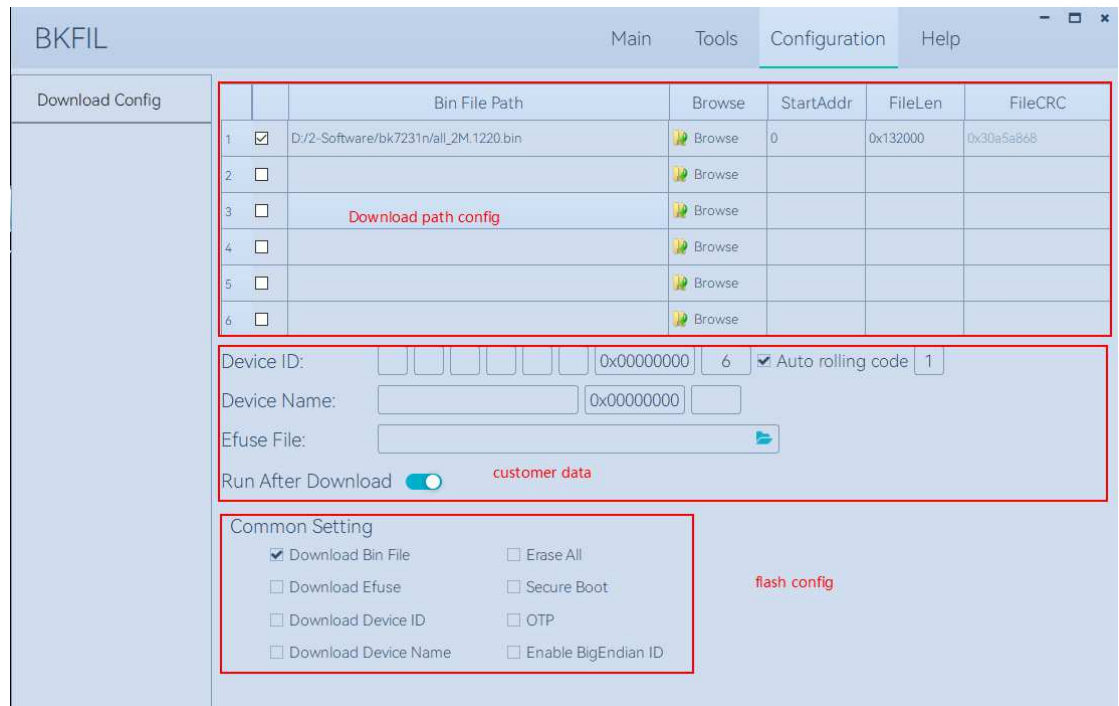


Figure 3 – 2 – 1 - 1 configuration window

As shown in the picture, "BK_Flash_Image_Loader_Tool" UI functions are divided into:

- Download path config
 - Firmware path;
 - Select path;
 - Start address, include in read / erase / download, in Hex;
 - Length of firmware;
 - CRC of firmware;
- Customer data
 - Device ID ,MAC information, include in MAC name, start address, length of MAC, auto rolling code, length of rolling code;
 - DeviceName, include in device name, start address, length of device name;
 - Efuse key file, path of efuse file, include in efusekey, secure boot, OTP, and other data;
 - Reboot after download;
- Flash Config
 - Download firmware;
 - Erase all;
 - Download efuse data;



- Download secureboot data;
- Download OTP data;
- Download DeviceID;
- Download DeviceName;
- Enable bigendian;

3.3 Help introduction

3.3.1 Language and Theme

This function is based on the user's usage habits, customize the usage environment, currently supports switching between Simplified Chinese and English, as well as different UI theme colors;

3.3.2 Upgrade online

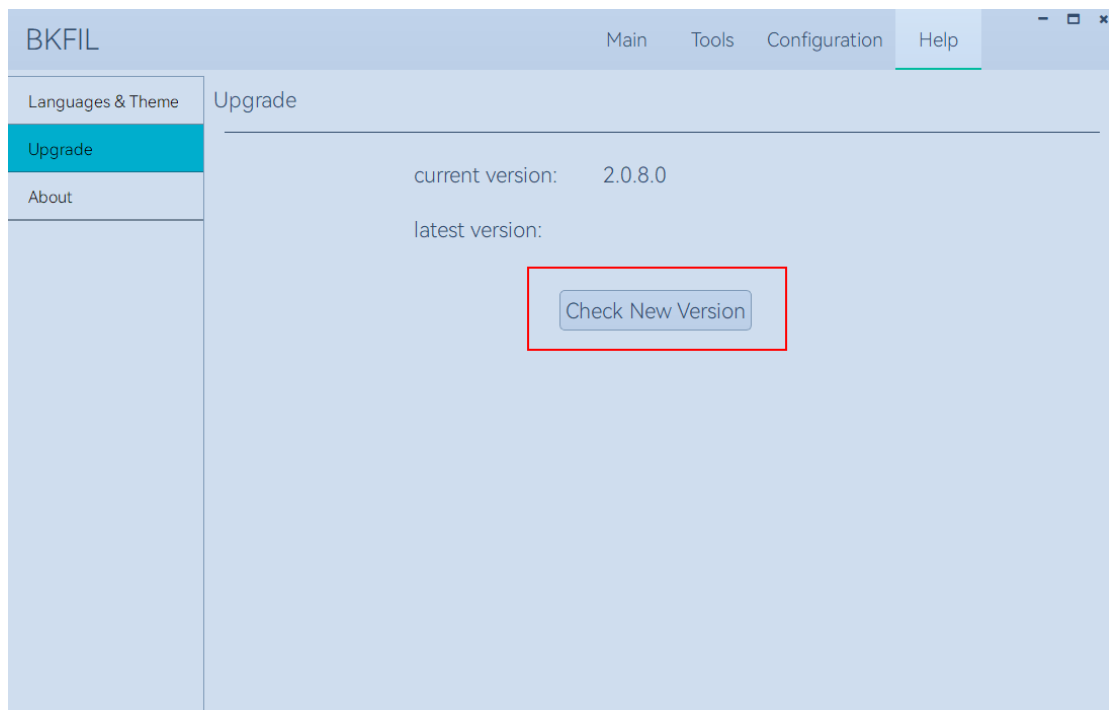


Figure 3 – 3 – 2 - 1 Upgrade online

Important function;

- 1、Click button “Check New Version”, find the new version, select it as required;
- 2、To select the historical version, click "latest version" on the interface continuously, Figure3



– 3 – 2 – 2, Follow the steps: ①->②->③;

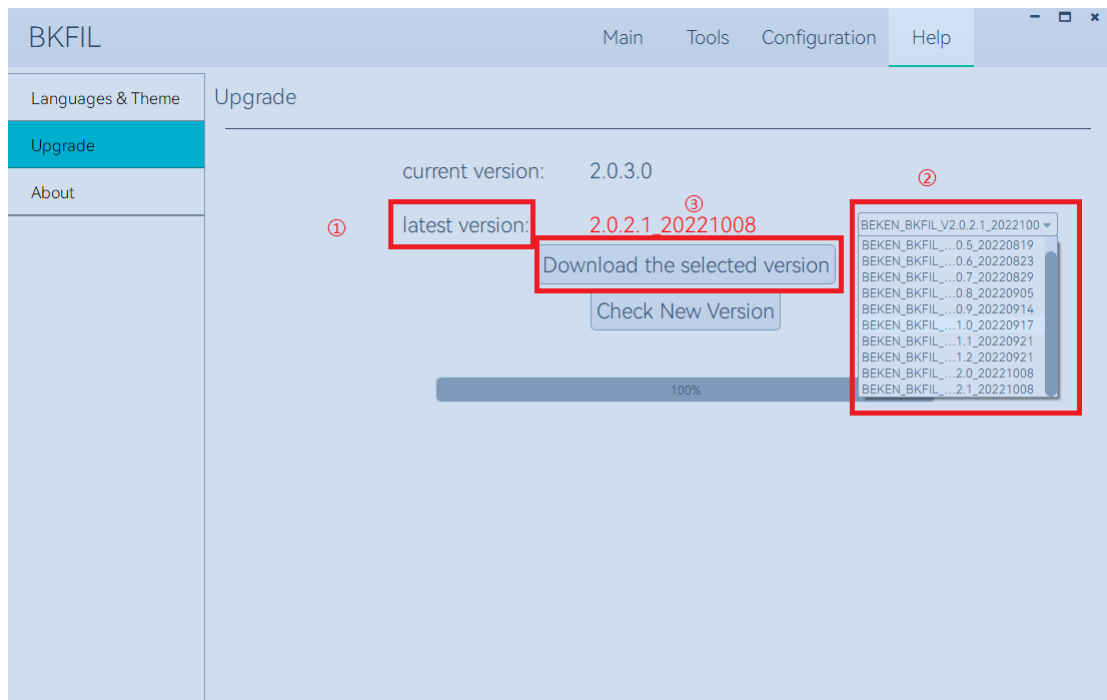


Figure 3 – 3 – 2 - 2 historical version,upgrade online

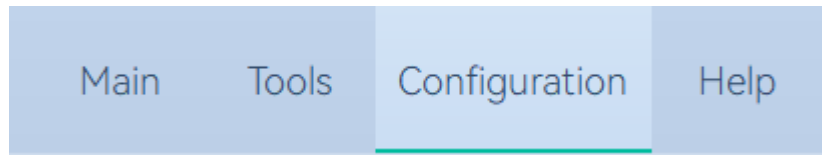
3.3.3 About introduction

This page shows the information of beken;






4. Download process

4.1 Configure parameters before download


- click on the toolbar at the top of the Configuration button, switch to download Configuration interface;



- click Browse button, select need to download the firmware;

		Bin File Path	Browse	StartAddr	FileLen	FileCRC
1	<input checked="" type="checkbox"/>	D:/2-Software/bk7231n/all_2M.1220.bin	 Browse	0	0x132000	0x1e60cf02
2	<input type="checkbox"/>		 Browse			
3	<input type="checkbox"/>		 Browse			
4	<input type="checkbox"/>		 Browse			
5	<input type="checkbox"/>		 Browse			

- according to the requirements of write/read/erase, fill out the start address of the corresponding. The default is 0, the start address of the part of the chip is: 0 x11000 (bk7231 and download bk7271 safe mode, etc.), **pay attention to the need to input hexadecimal data**;
- according to the requirement, choose corresponding EfuseKey files, used for download Efuse encrypted information;

Efuse Key: 

- according to the requirement, choose corresponding functions in the Common Setting:
 - download the main program, the default download condition is need to select this checkbox button;
 - erase all, mainly for download and erase, whether to enable the whole piece of erasure;
 - download efuse data, Select as required based on the current chip type and requirements;
 - download secureboot data, Select as required based on the current chip type and requirements;
 - download OTP data, Select as required based on the current chip type and requirements;
- After the configuration is complete, click the Main/ Home button to return to the home screen and perform related requirement;
- in the main interface will provide a set of the current default insert PC USB device and



the default baudrate, if not satisfied, then click on the "SelectPort" button, choose according to needs precise need serial port information, click OK to save the Settings, See Figure 4-1-1 and Figure 4-1-2 below:

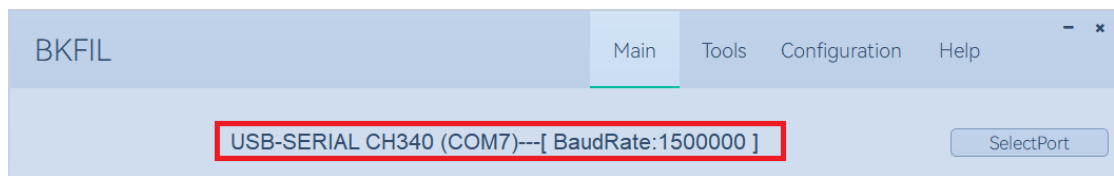


Figure 4-1-1. Serial port information



Figure 4-1-2. Interface for selecting serialport information

4.1.1 Download

1、Enter the configuration interface, fill in the bin file to be downloaded and the corresponding download address, and fill in Erase ALL, Download Efuse, SecureBoot, Run After Download, COM and BaudRate information according to your actual requirements. Figure 4-1-1 shows the configuration page;

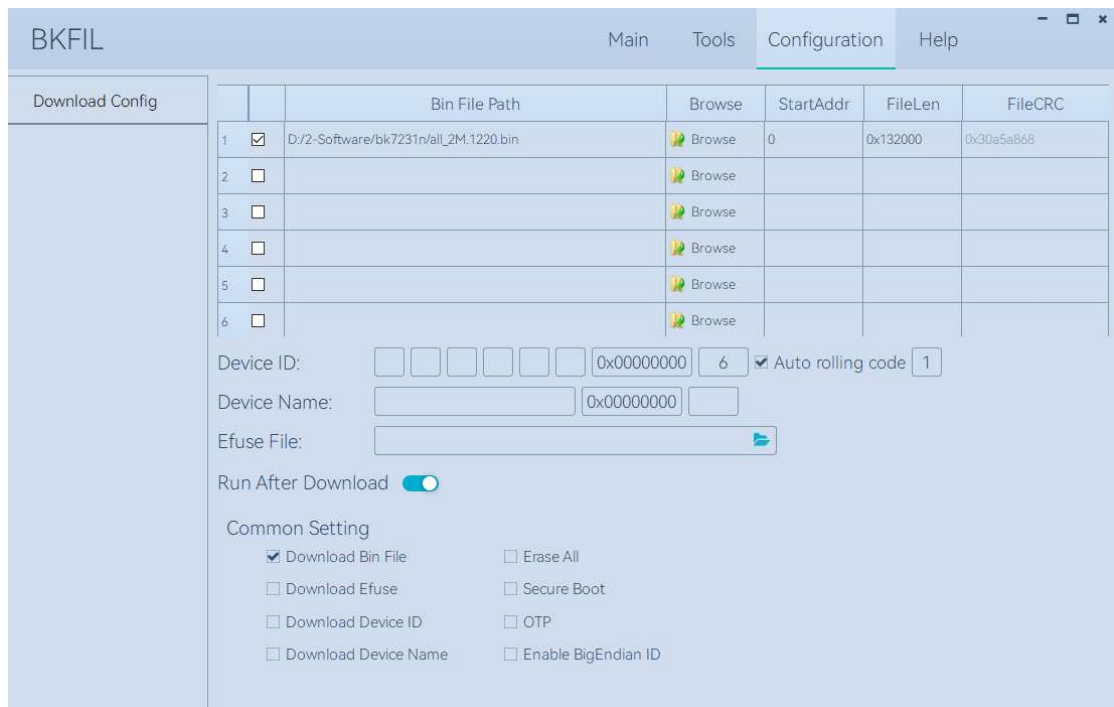


Figure 4-1-1-1. the configuration is complete

- 2、Click Download on the home screen to download the file. During the download, the bin file and Efuse information are downloaded according to the information configured by the user;
- 3、After download, the tool interface is shown in the figure below (4-1-1-2).

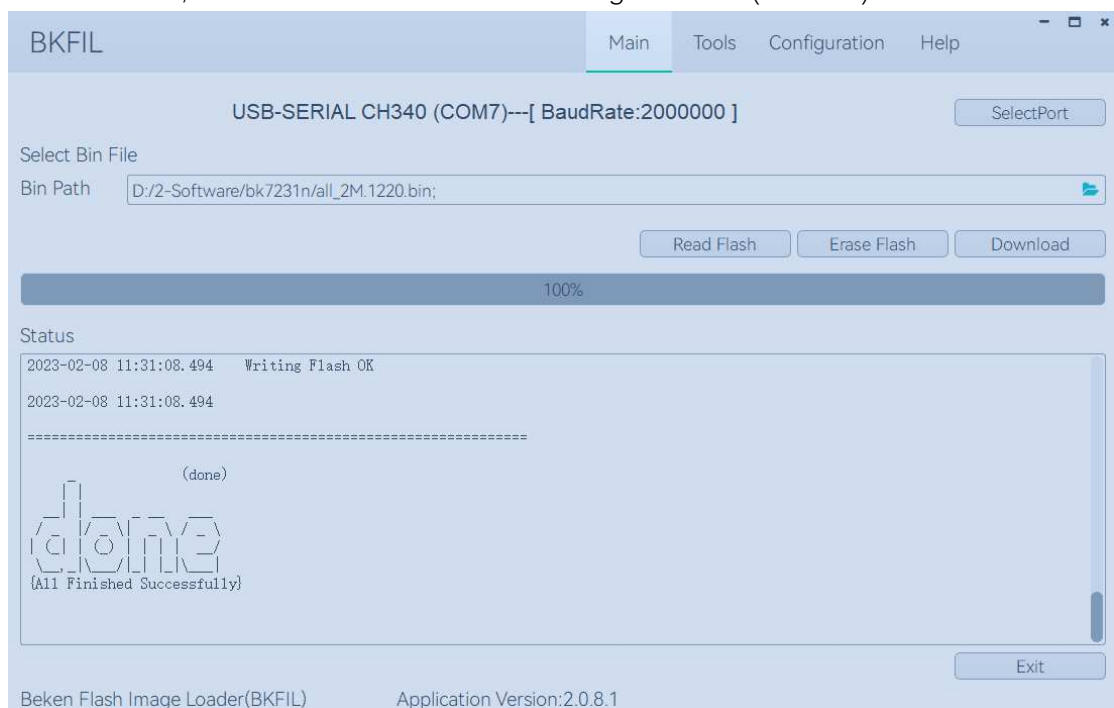


Figure 4-1-1-2. The download is complete



4.1.1.1 Enable encryption function

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Open the configuration file. In [efuse_cfg], the related configuration items are described as follows (True: enable, False: disable).:

- [efuse_cfg]-coef1/2/3/4

The configuration item is Efuse password configuration information;

- [efuse_cfg]-enEncryptWord

Efuse Specifies whether encryption needs to be enabled, that is, encryption is written into the password. However, this parameter does not take effect after the system is powered on;

BK7271 series

To configure the encryption function, Open the configuration file. In [public_key], the related configuration items are described as follows (True: enable, False: disable).:

- [public_key]- boot_key0 / .../15

This configuration item is the public key information to be written to the register;

- [security_boot]- security_boot

This parameter is set to security_boot whether to start the system. That is, public key information is written. However, this parameter does not take effect after the system is started;

- [security_boot]- DeviceID

This parameter is set to the ID of the latest production version of 7271. Only the latest version of the chip supports SecureBoot. SecureBoot is used to intercept ids of non-latest versions;

Note: After the encryption function is enabled, the downloading is started, which is divided into two stages. Firstly, the encryption process is carried out, and then the downloading process is entered after the encryption is completed. Firmware downloading process, will be to chip efuse downloading key and other information. After the firmware and efuse are downloaded, "done" is displayed to complete the downloading.

4.1.2 Erase

The user can choose erase all or partial erasure according to the demand;

Erase all: Erase the whole piece, according to the current model of Flash, erase the length of a fixed size, that is, erase the whole piece;

Partial erase: Determines the start address and length of the erase based on the start address entered by the user and the length of the bin file.

As shown in Figure 4-1-2-1:



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Figure 4-1-2-1 is erasing

Important configuration:

If you need to perform operations, perform the following operations:

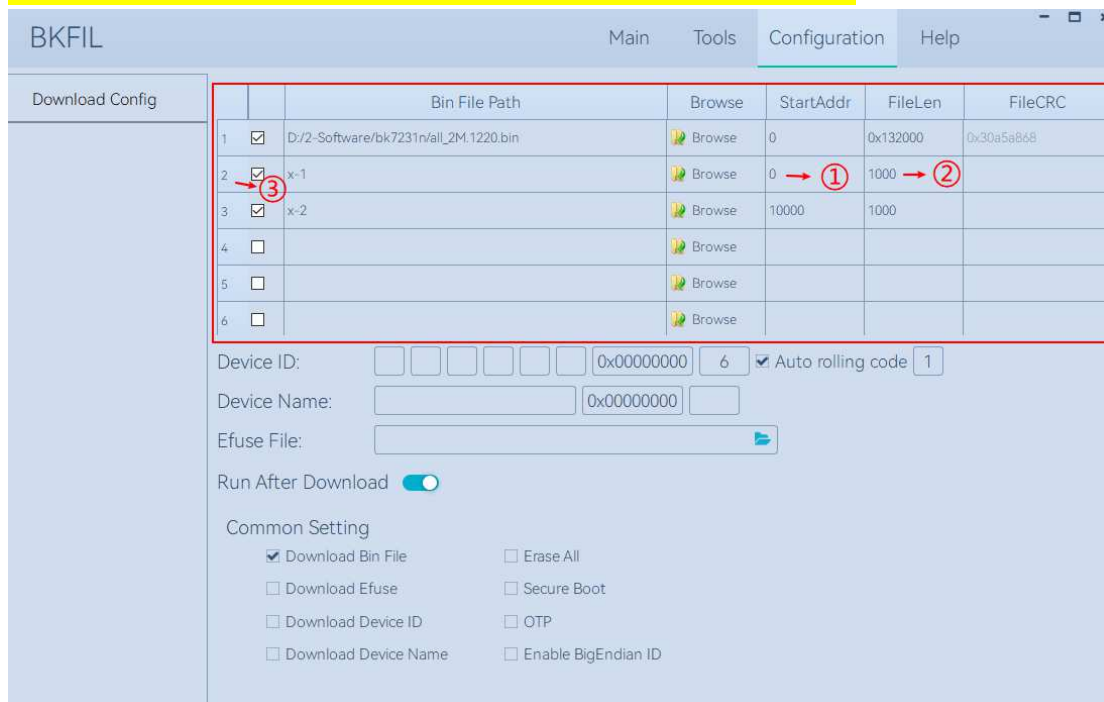


Figure 4-1-2-2 Set a special erasure mode

Scenario 1: You need to customize the range of erasure. If the length of erase from address 0x00 is 0x1000, as shown in the red box in the above figure, double-click in a blank area in the StartAddr column and enter the start address of erasure 0. Then double-click in a blank area in FileLen column ②, enter the erase length: 1000, and press enter. Then click the check box at ③, and an x-1 string is generated in the BinFilePath column, indicating that a custom



task created has been generated;

Scenario 2: Multi-segment erasure is required, On the basis of scenario 1, generate multiple x-n tasks in the same way. Check the checkbox in the list according to your requirements. If it is checked, it indicates that you want to use this task for operation;

4.1.3 Read

According to the demand, the user selects the bin file content downloaded in the wifi chip; According to the start address entered by the user and the length of the bin file, confirm the start address and read length of the Flash.

As shown in Figure 4-1-2-2:



Figure 4-1-2-1 flash reading

Important configuration:

If you need to perform operations, perform the following operations:

For details, see Erase;



5. Download from the command line

5.1 Instruction manual

- command line need to use bk_loader.exe program;
In the command line window, input "--help" to view all command sets. Each command has instructions. For illegal commands, an error message will be displayed, as shown in the following figure:

```
01/02/2023 17:11:55 /drives/d ./bk_loader.exe --help
bk_loader
Usage: D:\bk_loader.exe [OPTIONS] [SUBCOMMAND]

Options:
-h,--help          Print this help message and exit
-v,--version       bk_loader version

Subcommands:
download          download flash
erase            erase flash
read            read flash
```

Figure 5-1-1 Help manual

You can see the current version number and the three subfunctions in Subcommands.

```
01/02/2023 17:11:55 /drives/d ./bk_loader.exe download --help
download flash
Usage: D:\bk_loader.exe download [OPTIONS]

Options:
-h,--help          Print this help message and exit
-p,--portinfo INT:INT in [0 - 255] REQUIRED      input a serialport number
-b,--baudrate INT:INT in [0 - 3000000]          input a serialport baudrate
-i,--infile TEXT:FILE Excludes: --safe-infile   input a bin file path
--safe-infile TEXT:FILE Excludes: --infile       input a safe bin file path
-s,--startaddress TEXT [0]                      input startaddress,Hex data
-d,--debug INT                                         set debug mode,use to record log and detail information
--boot TEXT:INT in [0 - 1] [reboot]              set enter boot command
-r,--reboot INT:INT in [0 - 1]                   set reboot mode,auto reboot when download finished
--enable TEXT [2]                                set enable option
-g,--getbus-timeout TEXT [15]                   set getbus timeout
--retrycnt TEXT [20]                             set retry counts
--stay-in-rom                                     set stay in rom
--secureboot                                       set write secureboot information,except enable is true or false
--enable-sec-boot                                set secureboot enable
--efuse-key TEXT Excludes: --efuse-file          input efuse key
--efuse-file TEXT:FILE Excludes: --efuse-key     input efuse file path
--publickey TEXT Excludes: --publickey-file     input publickey
--publickey-file TEXT:FILE Excludes: --publickey input publickey file path
--deviceID TEXT                                  set deviceID manufacture information
-c,--chip-erase                                  set erase all
--disable-dco                                    set disable-dco
--spi-clk-div INT                                set spi-clk-div
-m,--mac TEXT                                   set mac information,include : [data:staraddress-length],such as : --mac=aabccddeeff0x1e000-0
--dev-name TEXT                                  set device name,include : [data:staraddress-length],such as : --dev-name=bken@0x2e000-5
--big-endian                                     write device name,set big-endian
--otp                                             enable otp
--app-public-key TEXT                           input app public key
--aes-key TEXT                                  input aes key
--schipmodel TEXT                              input schipmodel
--ota-key TEXT                                  input ota key
--ota_lv TEXT                                   input ota_lv
--mainbin-multi TEXT                           input some bin files path,such as "bootloader.bin@0,bsp.bin@11000",the first file name is bootloader.bin,startaddress is 0x00 and second file is bsp.bin,startaddress is 0x11000
--enable-sec-boot-log                           set secure boot print log enable
```

Figure 5-1-2 Help manual-download

```
01/02/2023 17:11:55 /drives/d ./bk_loader.exe erase --help
erase flash
Usage: D:\bk_loader.exe erase [OPTIONS]

Options:
-h,--help          Print this help message and exit
-p,--portinfo INT:INT in [0 - 255] REQUIRED      input a serialport number
-b,--baudrate INT:INT in [0 - 3000000]          input a serialport baudrate
-i,--infile TEXT:FILE Excludes: --infile       input freedom address and file length,Hex data,such as " [0-10000 or x-1.bin@0-10000,D:\all.bin@10000-1000,20000-10000]"
--safe-infile TEXT:FILE Excludes: --infile       input a bin file path
-s,--startaddress TEXT [0] Needs: --infile       input startaddress,Hex data,such as "0" or "0-10000"
-c,--chip-erase                                  set erase all
--disable-dco                                    set disable-dco
--spi-clk-div INT                                set spi-clk-div
-d,--debug INT                                         set debug mode,use to record log and detail information
--stay-in-rom                                     set stay in rom
--mainbin-multi TEXT                           input some bin files path,such as "bootloader.bin@0,bsp.bin@11000",the first file name is bootloader.bin,startaddress is 0x00 and second file is bsp.bin,startaddress is 0x11000
```

Figure 5-1-3 Help manual-erase



```

C:\D1\0272023> C:\1215\02> C:\drivers\rd .\bk_loader.exe read --help
read flash
Usage: D:\bk_loader.exe read [OPTIONS]

Options:
  -h, --help                Print this help message and exit
  -p, --portinfo INT:INT in [0 - 255] REQUIRED    input a serialport number
  -b, --baudrate INT:INT in [0 - 1500000]         input a serialport baudrate
  -f, --freedom-read TEXT Excludes: --startaddress input freedom address and file length, Hex data, such as " [0-10000 or x-1.bin@0-10000,0:\all.bin@000-1000,20000-10000]"
  -i, --infile TEXT        input a bin file path
  -s, --startaddress TEXT [0] Needs: --infile Excludes: --freedom-read
                                Input startaddress, Hex data, such as "0" or "0-10000"
  -d, --debug INT          set debug mode, use to record log and detail information
  --stay-in-rom            set stay in rom
  --disable-dco            set disable-dco
  -c, --force_create INT   create default file path and file , from user input content
  --main@in-multi TEXT     input some bin files path, such as "bootloader.bin@0.bsp.bin@1000,", the first file name is bootloader.bin, startaddress is 0x00 and second file
                           is bsp.bin, startaddress is 0x1000

```

Figure 5-1-3 Help manual-read

5.2 Examples of common command lines

function	cmd	notes
download	bk_loader download -p 7 -i all.bin	General default download
	bk_loader download -p 7 -b 2000000 -i all.bin	Set the baud rate of the serial port to 2M (1.5M by default)
	bk_loader download -p 7 -i all.bin -s 11000	Set the start address to start downloading from 0x11000
	bk_loader download -p 7 --mainBin-multi all_2M.1220.bin@0x0-0x1000, all_2M.1220-4k.bin@0x132000-0x1000	Multi-file downloading, using the --mainBin-multi parameter, according to the format, enter the path name + @ + "start address" + "file length"
	bk_loader -h	For other customer data writes, see BKFIL -h for more information on writing
read	bk_loader read -p 7 -i all.bin	The general default value is read from the start address 0 and the length is all.bin
	bk_loader read -p 7 -i all.bin -s 0-1000	The start address is 0 and the length is 0x1000
	bk_loader read -p 7 -f 10-1000	The starting address is 10 and the length is 0x1000
	bk_loader read -p 7 -f 10-1000, 1000-1000, 10000-1000	In the example, three pieces of content are to be read: 1: The start address is 0 and the length is 0x1000. 2: The start address is 0x1000 and the length is 0x1000. 3: The start address is 0x10000 and the length is 0x1000;



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	<code>bk_loader read -p 7 -f all_2M.1220.bin@0x0-0x132000,x-1@0x0-0x1000,x-2@0x2000-0x2000</code>	<p>In the example, three pieces of content are to be read:</p> <p>1: indicates the file name all_2M.1220.bin, the start address is 0, and the length is 0x132000.</p> <p>2: indicates the file name x-1.bin. The start address is 0 and the length is 0x1000.</p> <p>3: indicates the file name x-2.bin. The start address is 0x2000 and the length is 0x2000;</p>
erase	<code>bk_loader erase -p 7 -i all.bin</code>	The normal default value is deleted. The value is deleted based on the length of all.bin and the start address is 0
	<code>bk_loader erase -p 7 -i all.bin -s 0-1000</code>	The start address is 0 and the length is 0x1000
	<code>bk_loader erase -p 7 -f 10-1000</code>	The starting address is 10 and the length is 0x1000
	<code>bk_loader erase -p 7 -f all_2M.1220.bin@0x0-0x132000,x-1@0x0-0x1000,x-2@0x2000-0x2000</code>	<p>In the example, you want to erase three pieces of content, namely:</p> <p>1: indicates the file name all_2M.1220.bin, the start address is 0, and the length is 0x132000.</p> <p>2: indicates the file name x-1.bin. The start address is 0 and the length is 0x1000.</p> <p>3: indicates the file name x-2.bin. The start address is 0x2000 and the length is 0x2000;</p>
other	<code>bk_loader -h</code>	For other features, see <code>bk_loader -h</code> for more



6. Common Errors

6.1 COM / Serialport related Errors

1. You cannot find the corresponding serial port in the COM/ttyUSB drop-down list after opening the tool?

Reply: Check the device manager and ensure that the serial port is successfully installed.

If not, check whether the driver is faulty.

6.2 Efuse-related Errors

2. After starting downloading, if the message "BEKEN_SWDL_LinkCheck timeout" is displayed, the chip may have done Efuse and cannot be downloaded again. In this case, it is necessary to contact beken to obtain the corresponding solution;

6.3 Downloading related errors

3. There is an error in the process of downloading, what reason?

reply: Please confirm the downloading problem first:

- select the correct serial port;
- baud rate conform to the requirements of the Uart board protocol;
- firmware bin file size no greater than the size of the Flash chip;

6.4 Command Line Parameters are Incorrect

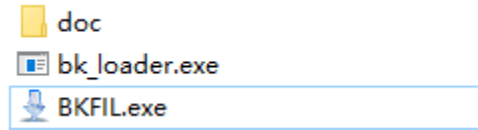
4. The baudrate is incorrectly set. The baudrate limit ranges from 0 to 3000000;

5. The input file does not exist;



Appendix A. struct of the program

beken wifi chip download tool is a zip compressed file package, containing executable files, subfolders, as shown in the figure below:



- Doc folder: deposit documentation;
- BKFIL.exe: downloading tool executable file, GUI project;
- bk_loader.exe: Command line download tool;
- settings.ini : **The file is generated dynamically. The file does not exist initially. The memory file is generated only after it is used again;**



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