# CV180X & CV181X Production Burning User Guide

Version: 1.0.5

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# Contents

**Revision History**

| Revision | Date | Description |
|---|---|---|
| 1.0.0 | 2023/08/30 | Draft |
| 1.0.1 | 2023/09/14 | Add usb driver installation and usage guide |
| 1.0.2 | 2023/09/22 | Improve the one-to-many process content |
| 1.0.3 | 2023/09/27 | Modify the image of one-drag-multiple interface and add precautions |
| 1.0.4 | 2023/10/20 | Add ini configuration file description |
| 1.0.5 | 2023/12/10 | Revise the icon and progress bar display of muti-burn. |
| 1.0.6 | 2024/03/29 | Update the content of the driver installation section. |
| 1.0.7 | 2024/11/08 | Reconstruction the tool, updating new setting option and picture. |
| 1.0.8 | 2025/03/19 | Integrate document for uart, usb, sd, tftp and burner. |

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# 2 Overview

## 2.1 Introduction

This article introduces how to use cviDownloadTool to burn the entire single board system file.

This solution completes burning through USB communication, which has the characteristics of low cost and fast burning speed.

## 2.2 Preparation Before Burning

The preparations before burning are as follows:

- USB/UART Burning:
- Prepare original files for burning, including:
  - File system image file.
  - Compressed zip file of the file system image.
  - Compressed file in img/tar/tar.gz format of the file system image. (You need to provide your own unpacking tool, and the tool must be an executable file that can be run directly from the command line.)
- Prepare cviDownloadTool tool.
- Prepare dual USB interface data cables.
- SD Card Buring:
  - File system image file.
  - One SD card.
- TFTP Burning (only support cv186x):
  - File system rawimage file.
  - tftpd64.
- Burner Burning:
  - File system rawimage file.
  - Burner.

# 3 USB Burning / UART Burning

## 3.1 Overview

### 3.1.1 Introduction

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  - Compressed zip file of the file system image.
  - Compressed file in img/tar/tar.gz format of the file system image. (You need to provide your own unpacking tool, and the tool must be an executable file that can be run directly from the command line.)
- Prepare cviDownloadTool tool.
- Prepare dual USB interface data cables.

## 3.2 Install usb Driver (USB Burnning)

Take driver installation under Windows 10 system as an example.

**Step1**

Double click to run CviUsbDownloadInstallDriver.exe and select Next until installation is complete

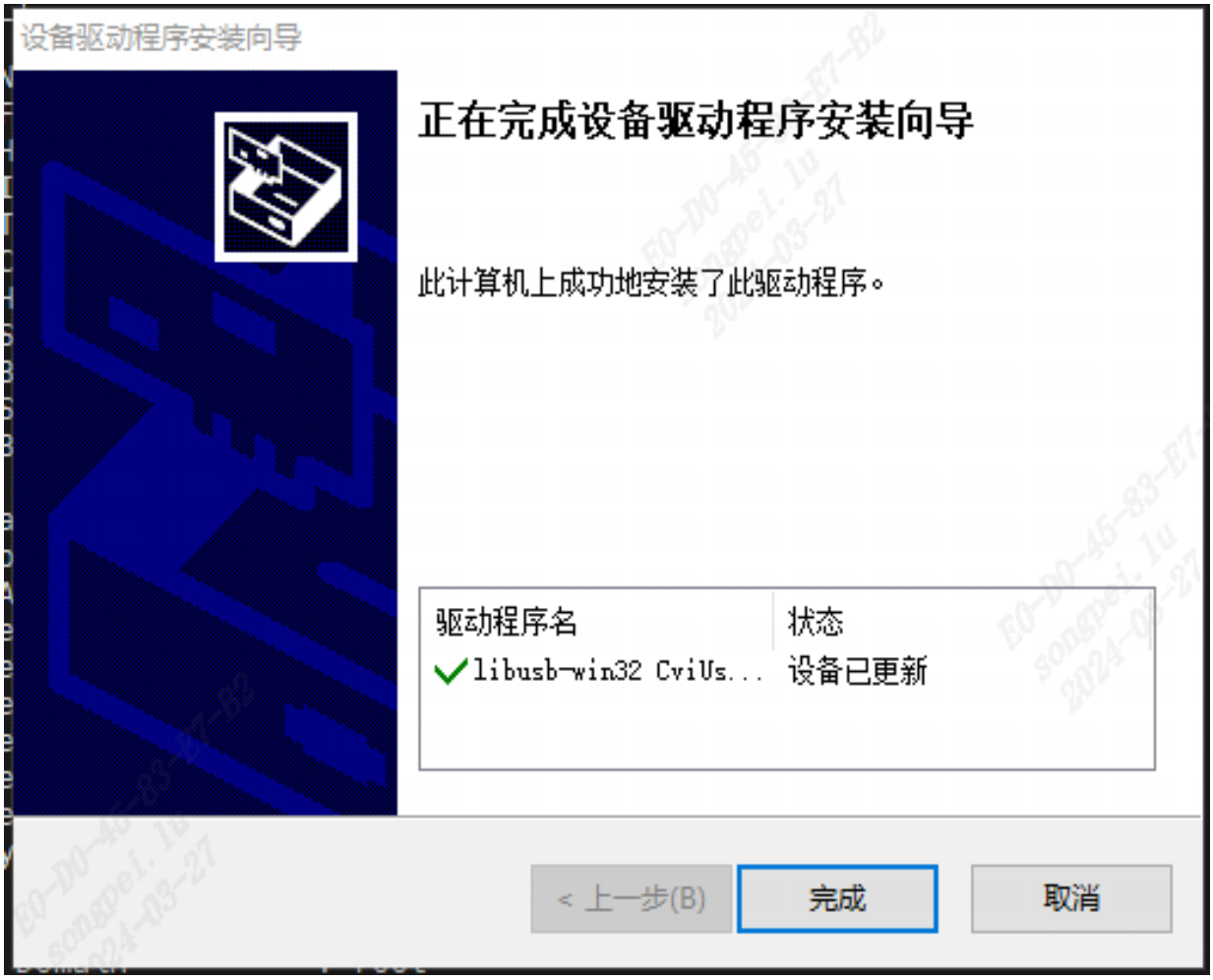


Fig. 3.1: execute CviUsbDownloadInstallDriver.exe

After the driver installation is complete, the CviDownload tool can be used to flash the firmware. For specific burning steps, please refer to the "cviDownloadTool" section in the "Production Burning User Guide"

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**Step2**

Find a board that has been flashed with u-boot. After entering u-boot, type "cvi_utask vid 0x3346 pid 0x1000" to set the cv18xx board as a device connected to the computer. Open "Device Manager" on the computer, and if a device named "CviUsbDownload" appears under "libusb-win32 devices," it indicates that the installation is normal.


Fig. 3.2: Verify if the driver installation is correct

**Note:** Please refrain from reinstalling the drivers repeatedly.

## 3.3 Uninstall Usb Driver (USB Burnning)

Windows offers the pnputil command-line utility for managing driver packages. The following command can be used to list all third-party drivers:

```
pnputil /enum-drivers
```

Filter out the drivers of cviusbdownload that have been installed from the output results:

```
发布名称: oem88.inf
原始名称: cviusbdownload.inf
提供程序名称: libusb-win32
类名: libusb-win32 Usb Devices
类 GUID: {eb781aaf-9c79-4523-a5df-642a87eca567}
驱动程序版本: 03/26/2024 1.0.0.0
签名者姓名: libusb-win32 (CviUsbDownload.inf) [Self]

发布名称: oem136.inf
原始名称: cviusbdownload.inf
提供程序名称: libusb-win32
类名: libusb-win32 Usb Devices
类 GUID: {eb781aaf-9c79-4523-a5df-642a87eca567}
驱动程序版本: 03/26/2024 1.0.0.0
签名者姓名: libusb-win32 (CviUsbDownload.inf) [Self]
```

From the example above, the cviusb driver has been installed twice. You can choose one of them to uninstall (Note: You need to open the command line tool with administrative privileges):

```
pnputil /delete-driver oem88.inf /uninstall
```


Fig. 3.3: 如何验证驱动卸载是否正确

# 3.4 cviDownloadTool

## 3.4.1 CviDownloadTool Introduction

Cvi download tool is a visual burning tool.

The cviDownloadTool is a visual Burning tool that supports bare chip programming as well as U-Boot programming (provided the hardware supports it). It can support up to 8 devices for burning at the same time.

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**Note:** To burn the board through USB, the following conditions must be met:

- The USB interface of the PC is connected to the USB2.0 port of the board
- The board must satisfy a system reset, which can be power-on reset or system soft reset.

When the above conditions must be met at the same time, the board can enter the USB burning process.

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## 3.4.2 How to Use CviDownloadTool

### Burning Tool Operation Process

**Step1.1**

Start cviDownloadTool, Enter the visual interface.

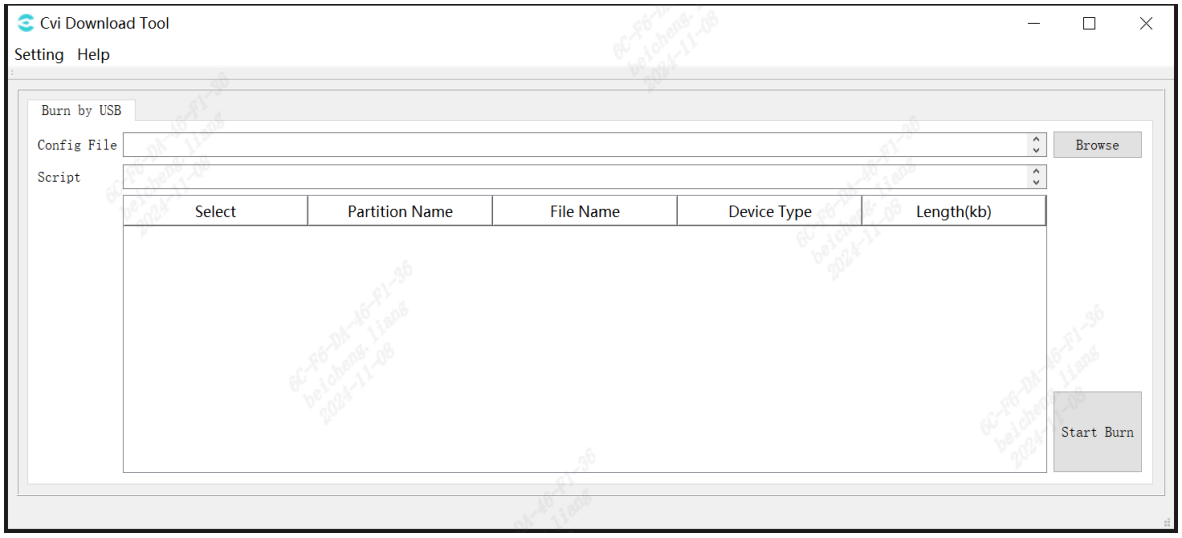


Fig. 3.4: Cvi Download Tool interface

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**Step1.2**

Click Setting->Language to select the language.

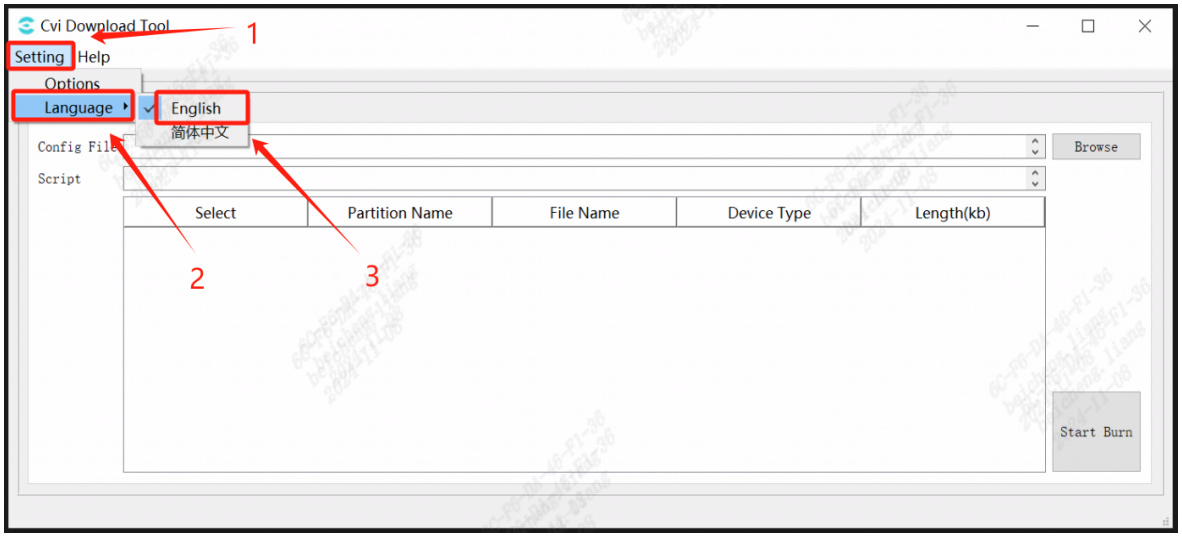


Fig. 3.5: Cvi Download Tool language switch

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**Step1.3**

Configure Burning Tool Parameters

The first step for the user before burning should be to open the Settings panel and configure it according to the requirements of the current burning session.

Open the menu in the upper left corner of the burning tool, select Setting->Option to configure the various options needed for burning.

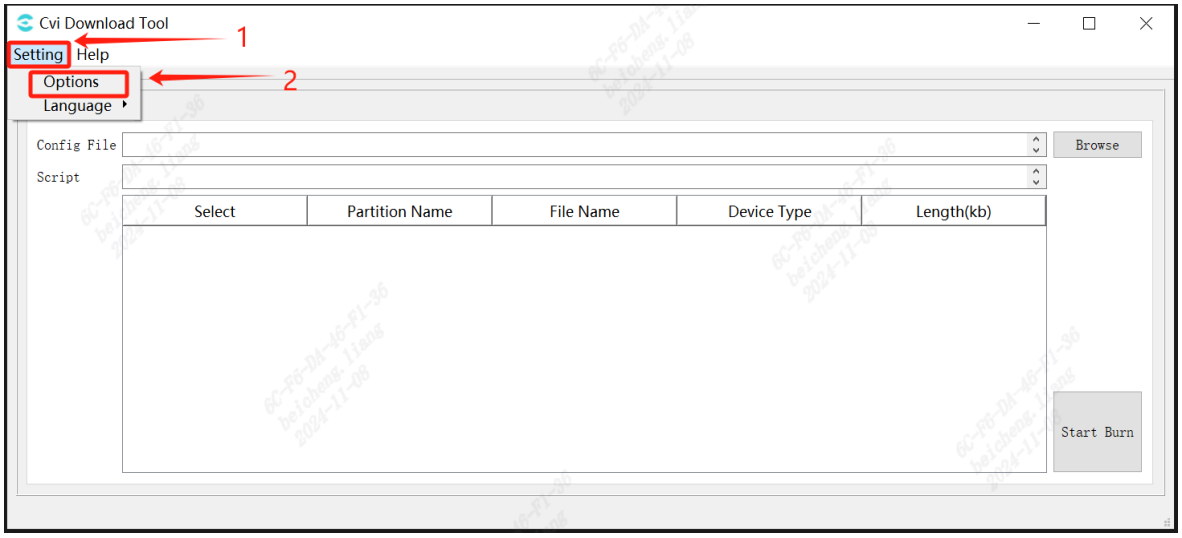


Fig. 3.6: Option

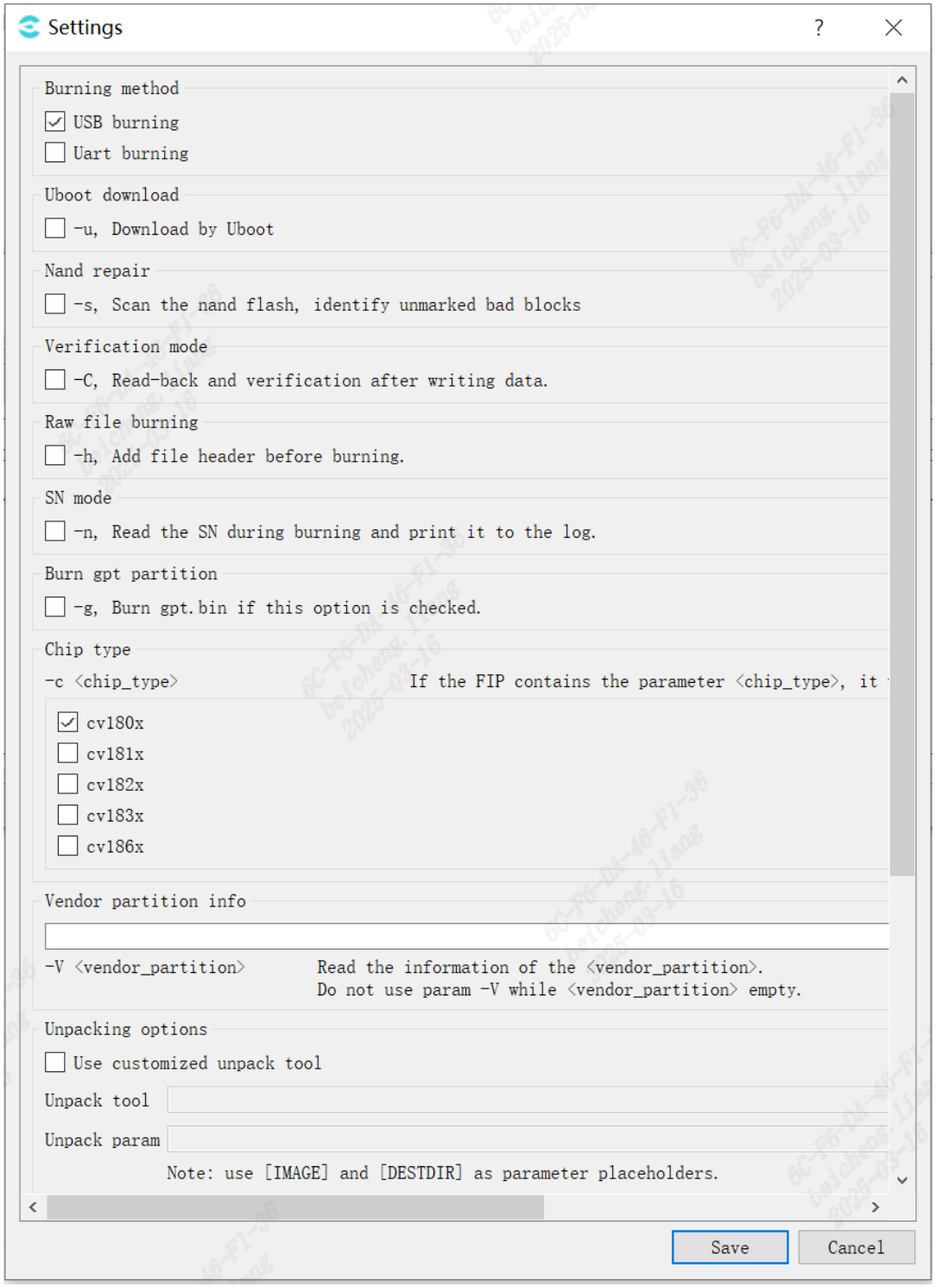


Fig. 3.7: Settings interface

- Setting Options
  - **Programming Method:**
    - UART Programming: Programming via the UART interface.
    - USB Programming: Programming via the USB interface.
  - Uboot download: If this option is checked, the built-in U-Boot on the board will be

used for burning; otherwise, the U-Boot that loads the image file via USB will be used.

- Verification mode: If this option is checked, data will be read back and verified during burning.
- raw file burning: Check this option if the input image file does not have a file header.
- SN mode: Read the serial number during burning and print it in the detailed log.
- Burn gpt partition: Include the gpt partition during burning.
- Chip type: Specify the chip type corresponding to the programming board. If this parameter exists in the fip file of the image, the parameter in the fip will take precedence.
- vendor partition info: Input the partition index. If this value is not empty, the corresponding vendor partition value will be read during burning and printed in the detailed log.
- Upacking options:
  * Use Customized Unpack Tool: Check this option to customize the unpacking tool.
  * Unpack tool: Select the custom unpacking tool. This tool must be an executable file and should be able to be executed via command line for unpacking.
  * Unpack param: The command line parameters for the unpacking tool use the placeholders [IMAGE] and [DESTDIR] to represent the image path and destination path in the command line, such as *-unpack [IMAGE] [DESTDIR]*.
  * File format: File format extension of the image compressed package.
- Burning filr selection: you can specify which files on the partition table do not need to be burned.
- Burn detail: If this option is checked, the main interface will display the command line parameters used during burning.
- Burning button: If the board to be burned requires pressing a burn button to enter burn mode, this option should be checked.

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**Note:** Do not check the option arbitrarily if you are unsure whether the device' s hardware and software environment supports it, as this may result in an unsuccessful Burning process.

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**Step1.4**

Click the Browse button to locate the XML file for the file system configuration or the compressed package of the image file that needs to be burned.

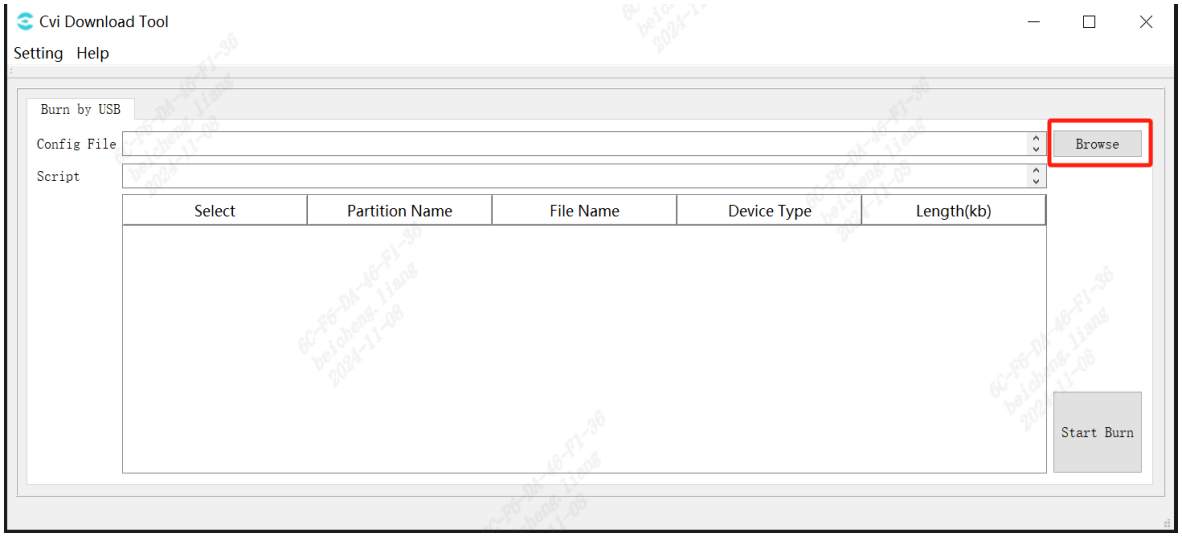


Fig. 3.8: Click on the Browse button

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**Note:** If a compressed package is selected, the tool will check for the existence of the CviBurnImage folder in the same directory before extracting. If it exists, it will be deleted to remove old image files!

This folder is used to store all files extracted from the image. please avoid having a folder with the same name in the path.

Please ensure that the contents of the image compressed package contain only one xml or yaml file, as the current tool will retrieve the path of this file as the path for burning.

If both xml and yaml files must exist in the directory, please manually extract the image package and click the Browse button to select the XML or YAML file.

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**Step1.5**

After selecting the file, click Confirm, and a message such as Fig. 3.9 will appear.

The table will list the files that need to be burned and their attributes.

Users can manually uncheck to indicate which files do not need to be burned.

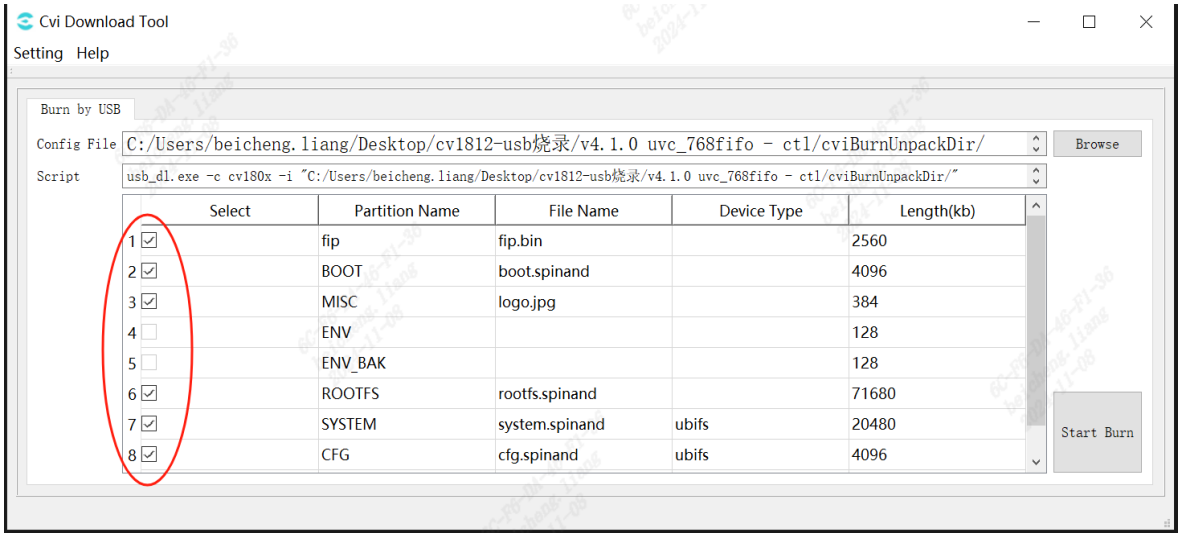


Fig. 3.9: Select the file to be downloaded

**Step1.6**

Click the Start Burn button to enter the burning subpage.

At this point, it is in a ready state, and you can start the burning process directly.

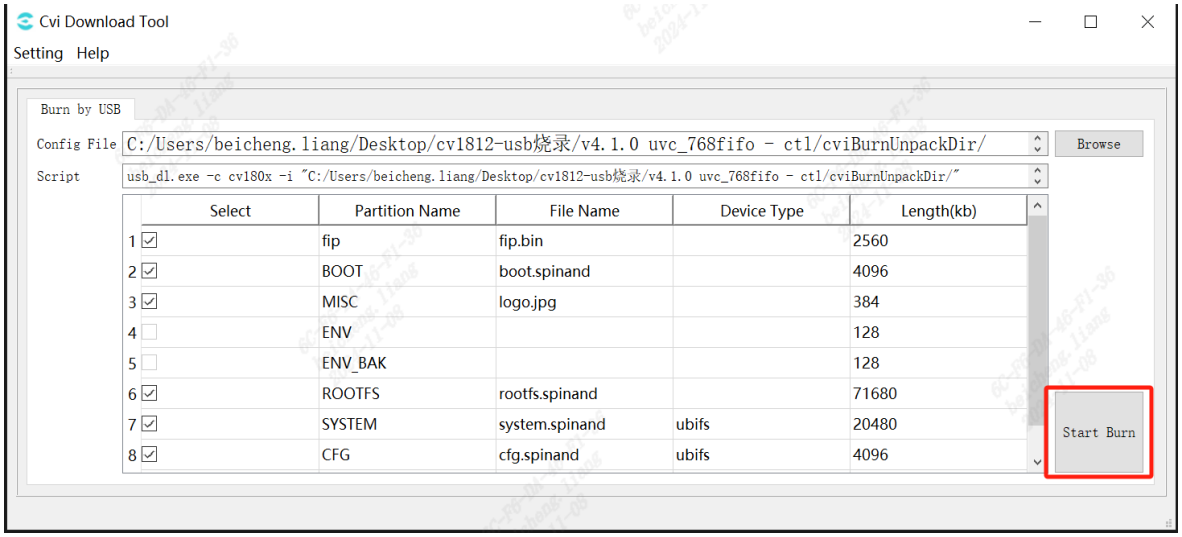


Fig. 3.10: Click the Start Burn button

You can change the current state of the burning tool using the buttons below.

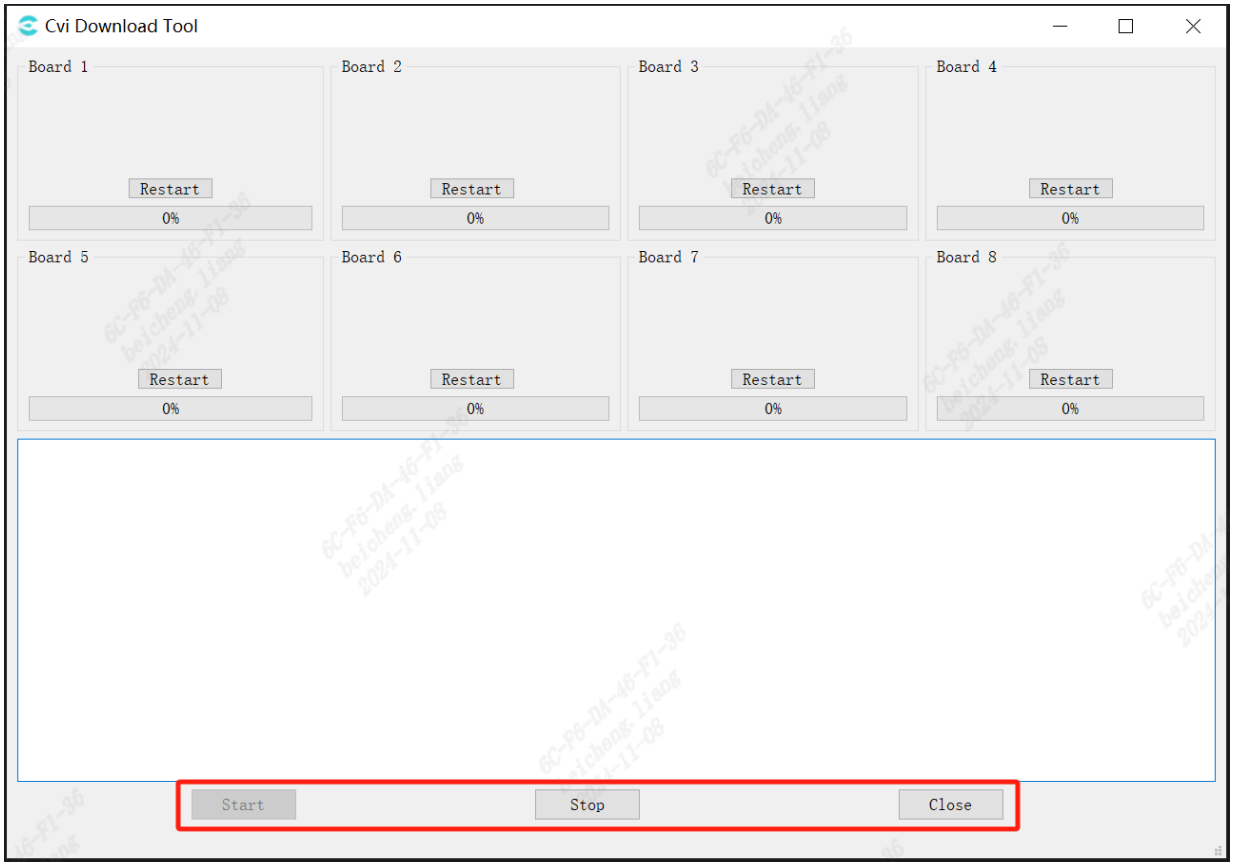


Fig. 3.11: Click the Start button

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**Step1.7**

**After entering the ready state:**

- UART Programming: Insert into the UART port, and once the progress bar appears, power on the device to start programming.
- USB Programming: You can connect the device to a USB hub and power it on, the programming software will start automatically.

What is printed in the Log is the currently inserted USB device, and the USB Port corresponding to the plugged-in board will be displayed in the box title above.

After burning starts, the progress bar will display the burning progress of the current device.

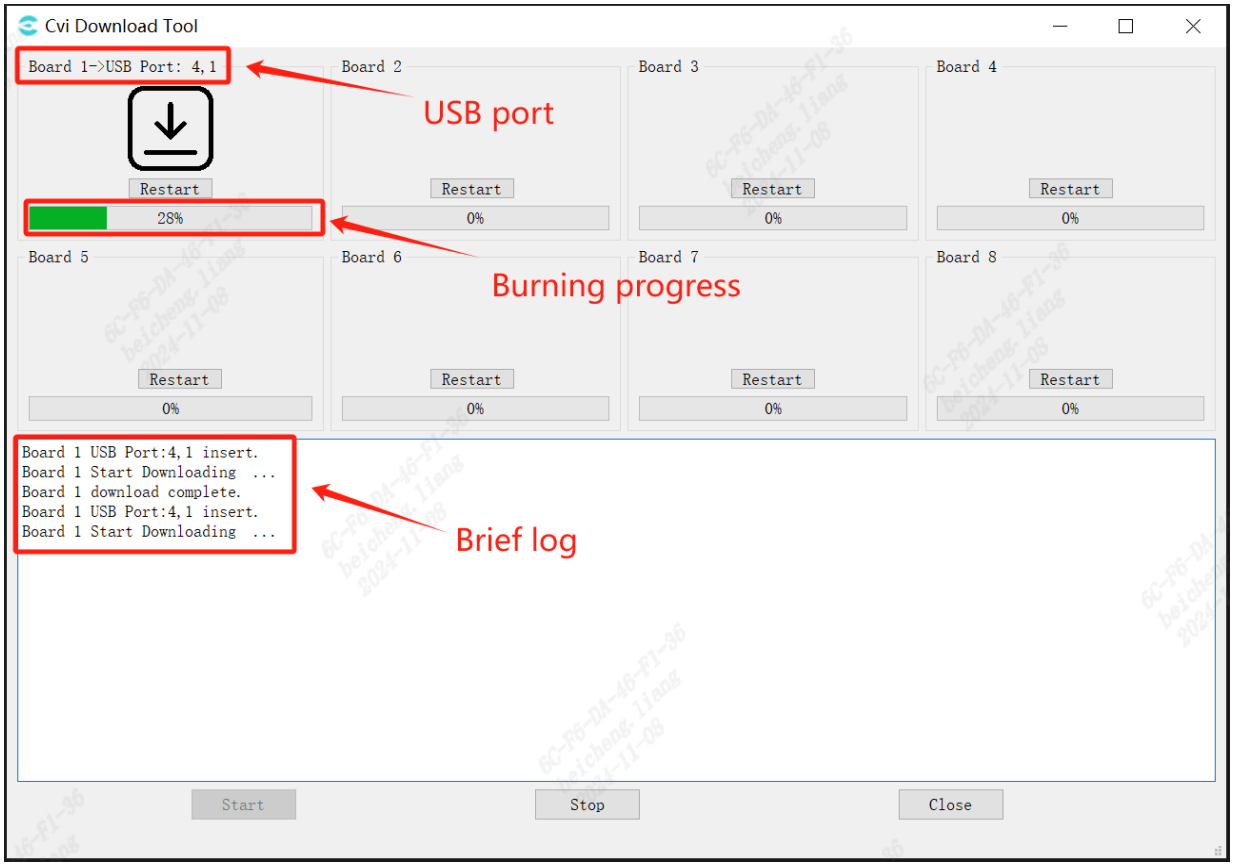



Fig. 3.12: Plug in the usb device and start burning

Attached: USB Port correspondence:

After plugging the USB interface into the computer, the software will automatically identify the inserted USB device and number it, without user settings.

After the computer establishes a connection with the board, its Port number will be displayed in the corresponding Board window.

According to the order of insertion, they are arranged on the software interface from left to right and from top to bottom.

USB Port consists of two parts, such as USB Port: 4,1,

4 represents the number of the current HUB,

1 represents the USB number on the HUB

(The number marked on the physical HUB may be different from the number identified by the computer. The HUB number marked on the computer is the main one here).

It is recommended that users mark the USB after inserting it to avoid confusion.

In this way, during mass production, the USB Port displayed by the software can correspond to the actual board one-to-one, making it easy to check the status of each board.

**Note:** In order to enable the USB Port to read correctly in sequence, please insert the USB

HUB into the computer first and then insert the board in sequence.

Do not insert the board into the USB HUB first and then insert the HUB into the computer all at once. This operation may cause the USB Port to be unable to be read correctly.

**Step1.8**

Burning completed:

Once the burning is complete, the status bar will show a message: "Board x download completed. The icon frame will also display the following icons."

After the burning is successful, simply unplug the device and insert a new one to proceed with the next round of burning.

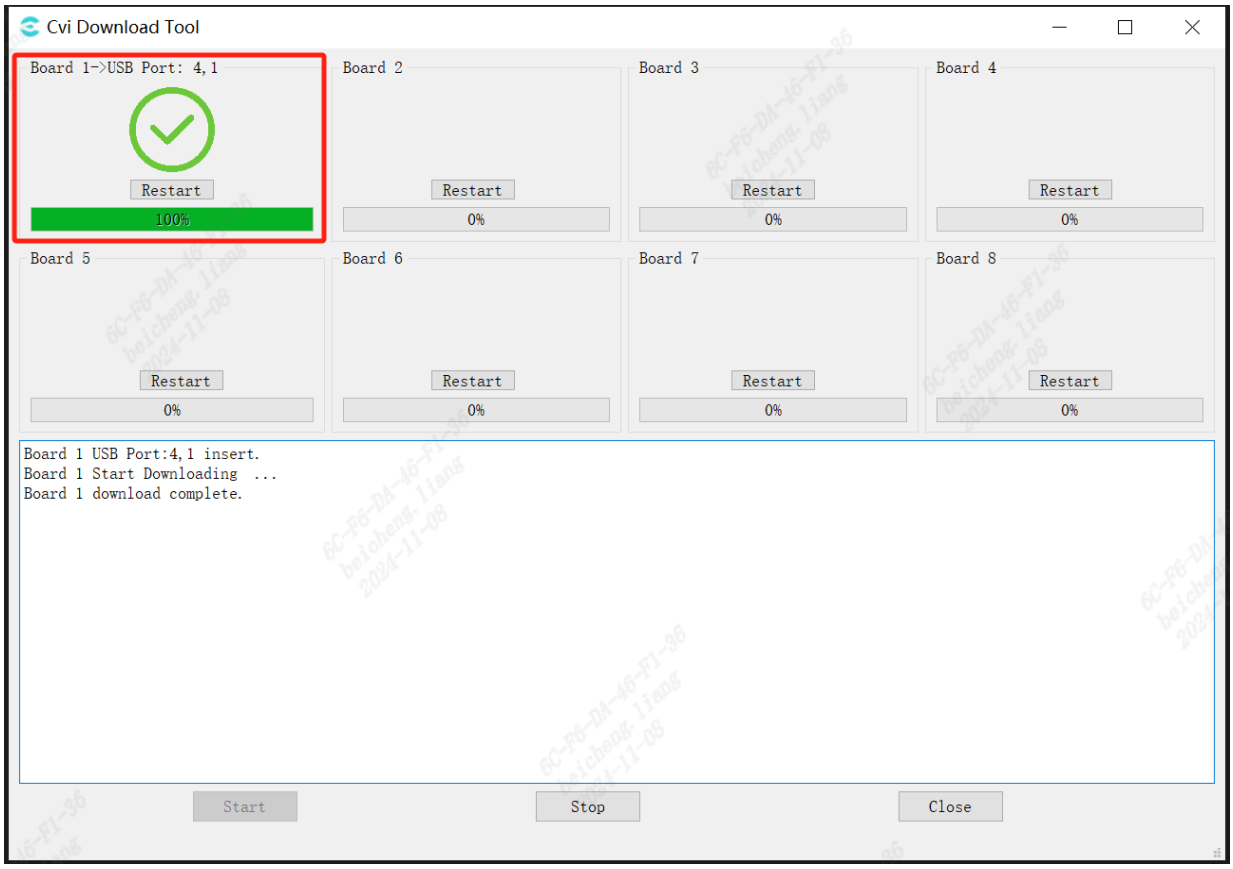



Fig. 3.13: Burning completed

Burning failed:

If the programming fails due to various reasons during the programming process, the icon in the Board box corresponding to the programming failure will display " ", and the brief log will prompt "Board x download failed. Please check your usb and restart."

Such as Fig. 3.14. At this time, you can click the "Restart" button to restart the burning program for a single board.

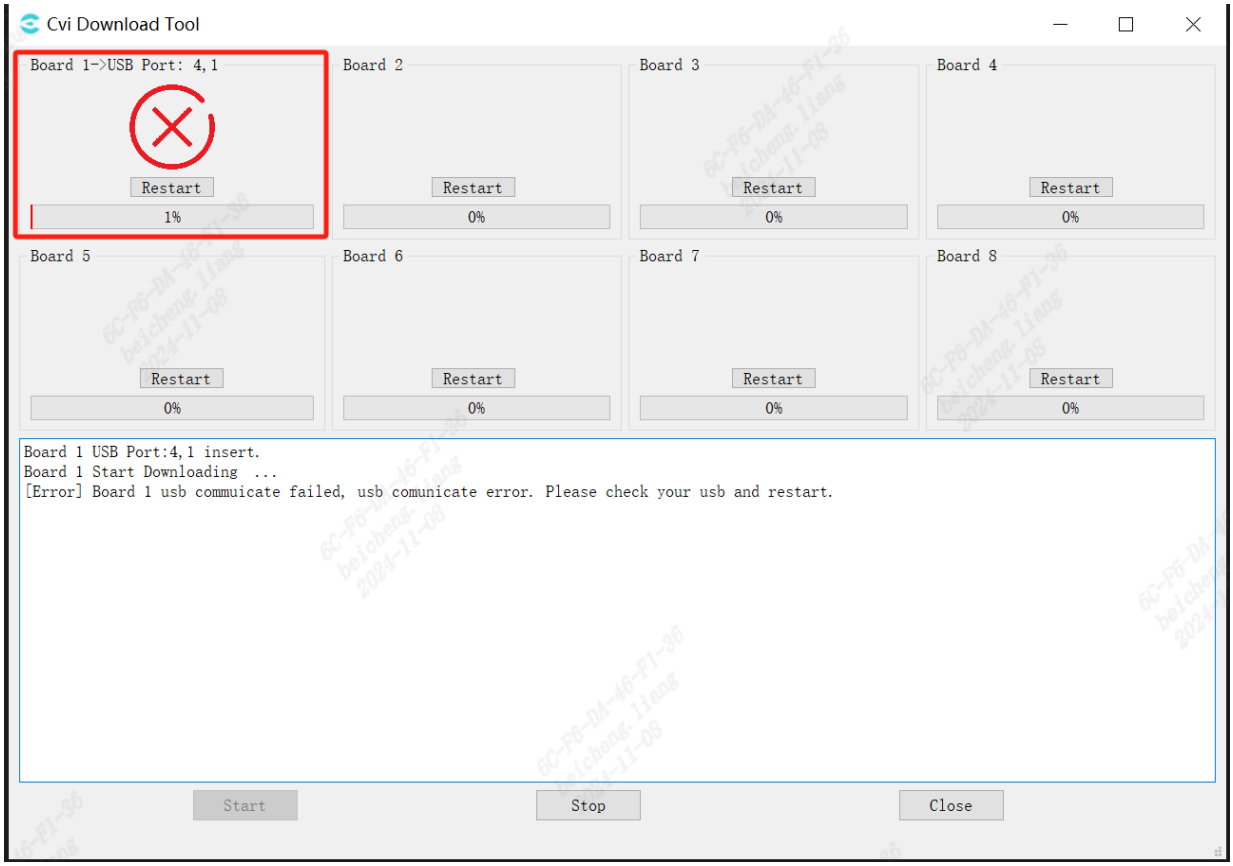



Fig. 3.14: Burning failed

Restart:

There is a restart button in the corresponding box of each board.

Click the restart button to reset the corresponding burning program.

Re-enter the ready state.

At this time, the board that has not been successfully burned needs to unplug the device, shut down, re-insert and turn on.

The burning program will restart to burn the board.

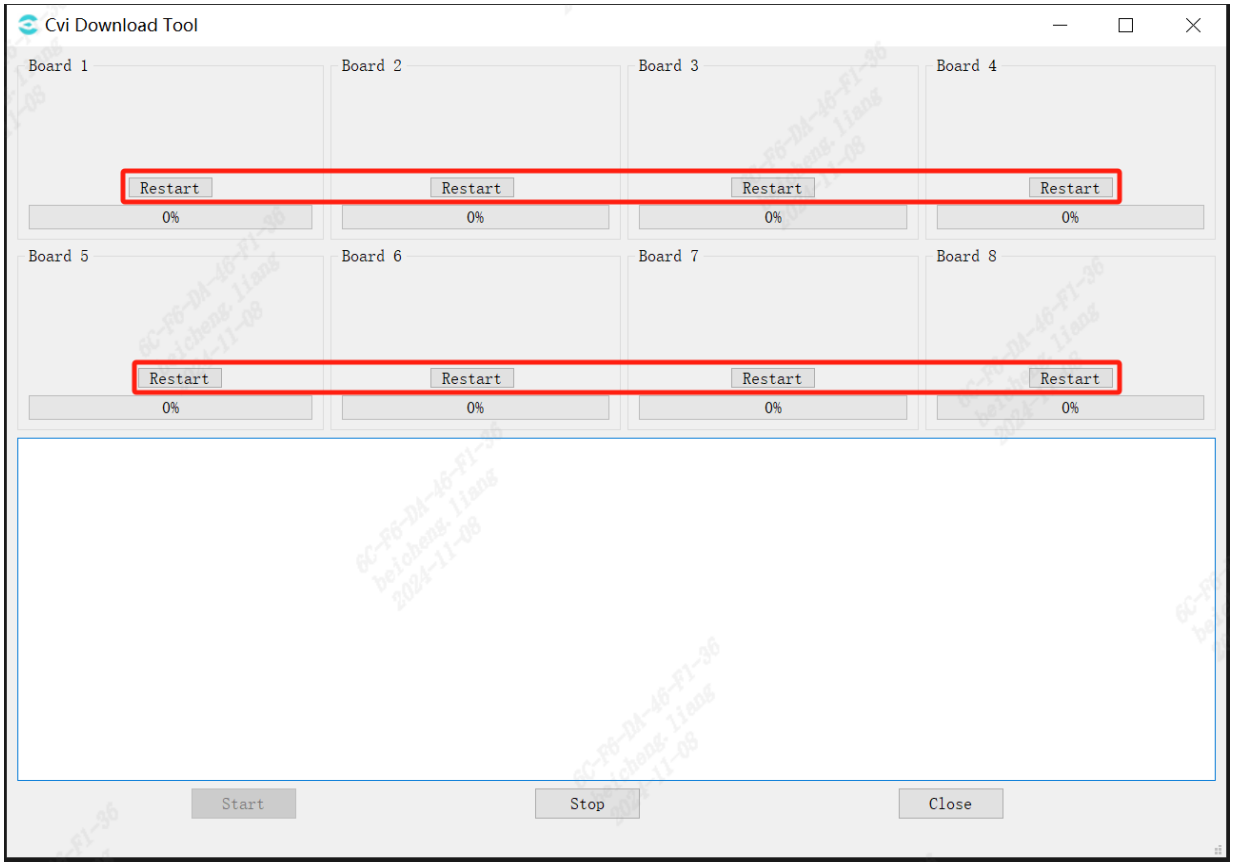



Fig. 3.15: Restart button

# 4 SD Card Burning

## 4.1 Overview

### 4.1.1 Introduction

This chapter introduces how to use a burner to burn the entire system files of a single board,

### 4.1.2 Preparation work before burning

The preparations before burning are as follows:

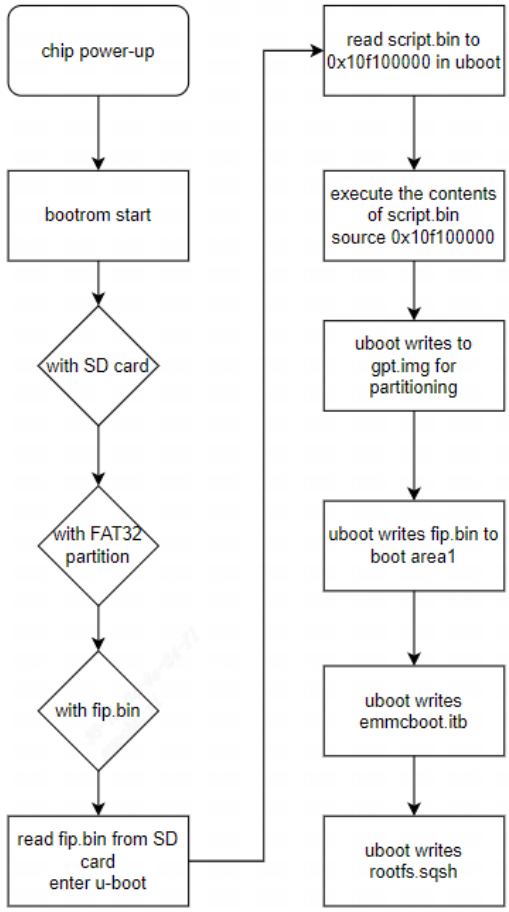
- File system image file.
- One SD card.

## 4.2 Use SD Card for Bare Burn

### 4.2.1 Preparations Before Use

1. Refer to [Linux development environment user guide] [1.2 how to compile BSP] to compile the following files:
   - fip.bin - bootloader + uboot
   - boot.emmc/boot.spinand/boot.spinor- minimal Linux image(Optional)
   - rootfs.emmc/rootfs.spinand/rootfs.spinor - rootFS(Optional)
   - system.emmc/system.spinand/system.spinor – rw zoning(Optional)
   - cfg.emmc/cfg.spinand/cfg.spinor - config rw zoning(Optional)
2. A FAT32 format TF Card(micro SD)

### 4.2.2 Explanation of Bare Burning Process




### 4.2.3 Operation Process

a. Put fip.bin,*.emmc/*.spinand/*.spinor in the SD card

b. Insert the SD card into the SD card slot of Cvitek EVB

c. Boot Cvitek EVB platform

### 4.2.4 Operation Example

Confirm files before use

SPINAND

| 名稱 | 修改日期 | 類型 | 大小 |
|---|---|---|---|
| boot.spinand | 2021/6/2 上午 04:13 | SPINAND 檔案 | 7,213 KB |
| cfg.spinand | 2021/6/2 上午 04:13 | SPINAND 檔案 | 2,049 KB |
| fip.bin | 2021/6/2 上午 04:10 | BIN 檔案 | 374 KB |
| rootfs.spinand | 2021/6/2 上午 04:13 | SPINAND 檔案 | 28,929 KB |
| system.spinand | 2021/6/2 上午 04:13 | SPINAND 檔案 | 1,921 KB |

Insert the SD card, connect the cv180x/cv181x platform to the power supply, and start the burning program automatically

When the platform is finished burning, you can see the following message on UART port.

Power off the platform and restart it to finish burning

```
## Resetting to default environment
Start SD downloading...
switch to partitions #0, OK
mmc0 is current device
403968 bytes read in 19 ms (20.3 MiB/s)
spinor id = C2 20 18
SF: Detected MX25L12835F with page size 256 Bytes, erase size 4 KiB, total 16 MiB
device 0 offset 0x0, size 0x62a00
403968 bytes written, 0 bytes skipped in 3.73s, speed 134480 B/s
sf update speed 0.131 MB/s
64 bytes read in 2 ms (31.3 KiB/s)
Header Version:1
2999536 bytes read in 135 ms (21.2 MiB/s)
device 0 offset 0x100000, size 0x2dc4b0
2999472 bytes written, 0 bytes skipped in 22.529s, speed 136315 B/s
sf update speed 0.133 MB/s
64 bytes read in 2 ms (31.3 KiB/s)
Header Version:1
3100736 bytes read in 139 ms (21.3 MiB/s)
SF: 10485760 bytes @ 0x420000 Erased: OK
device 0 offset 0x420000, size 0x2f5000
SF: 3100672 bytes @ 0x420000 Written: OK
sf write speed 0.649 MB/s
64 bytes read in 1 ms (62.5 KiB/s)
Header Version:1
228 bytes read in 2 ms (111.3 KiB/s)
SF: 524288 bytes @ 0xe20000 Erased: OK
device 0 offset 0xe20000, size 0xa4
SF: 164 bytes @ 0xe20000 Written: OK
sf write speed 0.23 MB/s
Saving Environment to SPIFlash... Erasing SPI flash...Writing to SPI flash...done
Valid environment: 2
OK
cv181x_c906#
```

### 4.2.5 Use upgrade.zip to Upgrade

1. Refer to [Linux development environment user's Guide] [1.2 how to compile BSP] to compile upgrade.zip
2. Copy upgrade.zip to SD card
3. Decompress upgrade.zip (please unzip the file to the root directory of SD card)

### 4.2.6 Precautions

Please make sure SD card is correctly formatted as FAT32

### 4.2.7 Set eMMC ECSD Register

When SD card is used for bare burning, EMMC driver built in u-boot will be used to modify ECSD, mainly for ECSD [162], that is, n_ Rst function is turned on, and the specific burning mode is as follows:

1. Enter the following command under u-boot to start n_Rst function

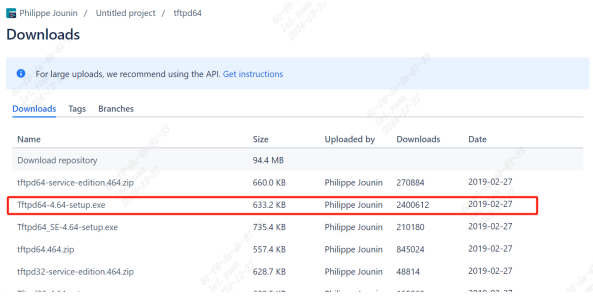
```
uboot # mmc fuse_rstn 0
```

# 5 TFTP Burning

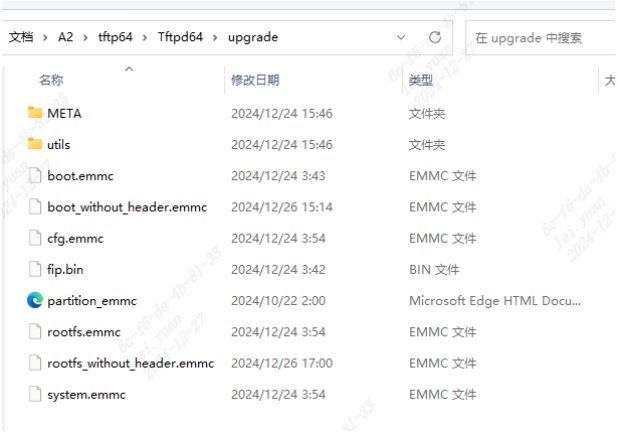
## 5.1 TFTP Burning (cv186ah/bm1688)

### 5.1.1 Preparations Before Use

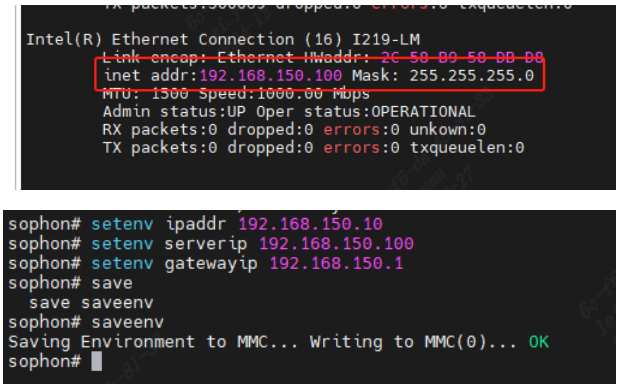
1. Download tdtp software:
   - https://bitbucket.org/phjounin/tftpd64/downloads/




2. Prepare to upgrade the firmware and directly extract the upgrade file to the tftp directory, as shown in the following figure:



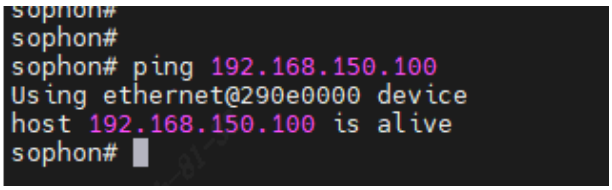

3. Configure PC and board in the same network segment:
   - Connect the PC network port and the board LAN port through Ethernet cable
   - Configure PC IP as 192.168.150.100
   - Configure board IP as 192.168.150.100
   - **Set the IP by typing the following command at the uboot command line,** and remember to execute saveenv to save the settings, as shown in the following figure:



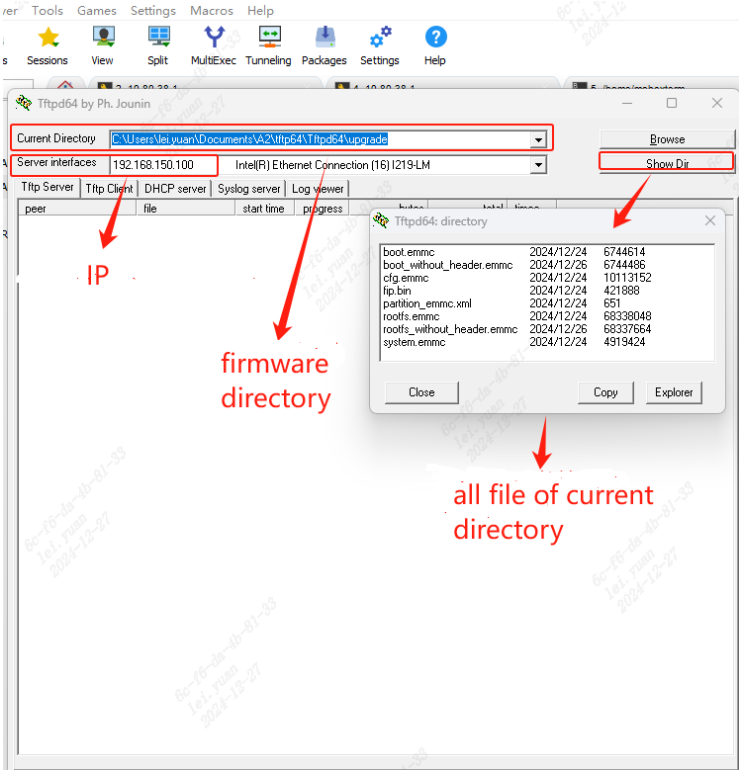




4. Test connectivity by directly ping the IP address of the PC under uboot, as shown in the following figure indicating normal communication

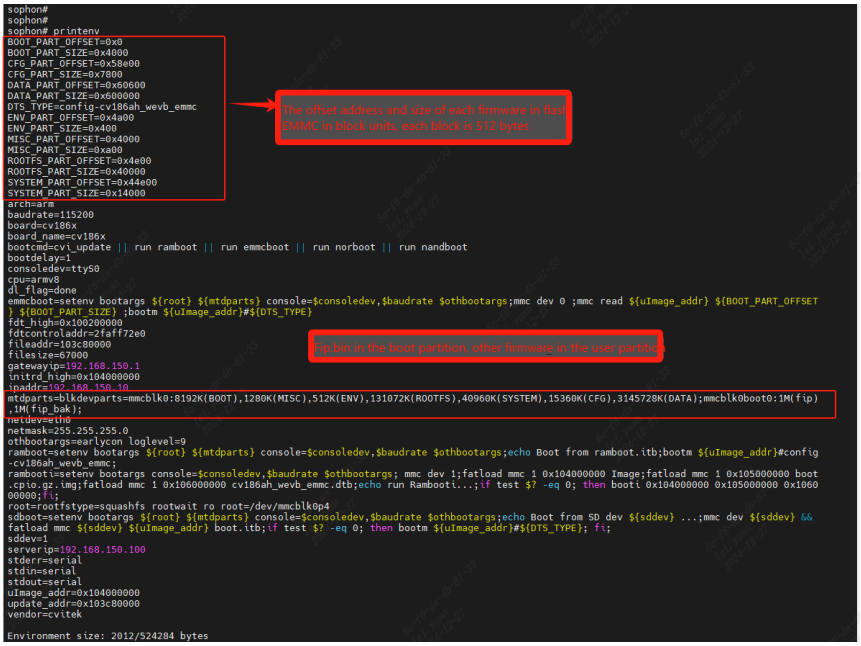



5. Config tftp software




## 5.1.2 Upgrade Firmware Process

1. View the offset address and size of each firmware in Flash




2. Download files from the TFTP server to the specified memory address
   - tftpboot 0x120000000 fip.bin
   - tftpboot 0x121000000 boot_without_header.emmc
   - tftpboot 0x123000000 rootfs_without_header.emmc

3. Load the firmware from the above memory address to the specified block location on EMMC
   - mmc dev 0 1 (# select emmc boot partition)
   - mmc write 0x120000000 0x0 0x800 (write fip.bin to emmc boot0 partition)
   - mmc dev 0 0 (# select emmc user partition)
   - mmc write 0x121000000 0x0 0x4000 (write boot.emmc to emmc user partition)
   - mmc write 0x123000000 0x4e00 0x40000 (write rootfs.emmc to emmc user partition)
4. File header processing
   - If using the firmware in the Upgrade compressed package, it is necessary to delete the first 128 bytes of the firmware header (boot. emc and rootfs. emc headers, and rootfs. emc has a 64 byte header every 16M except for the first 128 bytes).
   - By using the firmware in the rawimages folder, there is no need to delete the header, but the firmware in daily-build does not have the rawimages folder. If you compile it yourself, you will have this folder.

# 6 Burner Burning

## 6.1 Overview

### 6.1.1 Introduction

This chapter introduces how to use a burner to burn the entire system files of a single board,

### 6.1.2 Preparation work before burning

The preparations before burning are as follows:

- File system rawimage file.
- Burner.

## 6.2 Burn-in Procudure

### 6.2.1 Preparations Before Use

1. For details, see《CV181x Linux Development Environment User Guide》[1.2 How to Compile BSP]. Compile the following files:

```
fip.bin - bootloader + uboot
boot.spinand - Linux image
logo.jpg - boot logo (Optional)
rootfs.spinand  - root file system
system.spinand - system partition (Optional)
cfg.spinand - encrypted ISP PQ partition (Optional)
```

fip.bin is obatained from the install/<board name> directory:

```
$ ls -al  install/soc_cv1820_wevb_0005b_spinand
```

```
total 66588
drwxr-xr-x  8 alec alec     4096  八  16 22:28 ./
drwxr-xr-x 21 alec alec     4096  七  21 13:53 ../
-rw-rw-r--  1 alec alec  7134746  八  16 22:28 boot.spinand
-rw-rw-r--  1 alec alec  1966208  八  16 22:28 cfg.spinand
drwxrwxr-x  2 alec alec     4096  八  16 22:28 elf/
-rw-rw-r--  1 alec alec   385024  八  16 22:11 fip.bin
drwxr-xr-x  2 alec alec     4096  七  21 14:12 fip_pre/
-rw-r--r--  1 alec alec      660  八  16 22:28 partition_spinand.xml
drwxrwxr-x  2 alec alec     4096  八  16 22:28 rawimages/
drwxrwxr-x 18 alec alec     4096  八  16 22:28 rootfs/
-rw-rw-r--  1 alec alec 24510592  八  16 22:28 rootfs.spinand
drwxrwxr-x  2 alec alec     4096  八  16 22:28 system/
-rw-rw-r--  1 alec alec  1966208  八  16 22:28 system.spinand
drwxrwxr-x  3 alec alec     4096  八  16 22:28 tools/
-rw-rw-r--  1 alec alec 32172224  八  16 22:29 upgrade.zip
```

*.spinand is obtained from install/<board name>/rawimages:

```
$ ls -al  install/soc_cv1820_wevb_0005b_spinand/rawimages
```

```
total 34748
drwxrwxr-x 2 alec alec     4096  八  16 22:28 ./
drwxr-xr-x 8 alec alec     4096  八  16 22:28 ../
-rw-rw-r-- 1 alec alec  7134618  八  16 22:28 boot.spinand
-rw-rw-r-- 1 alec alec  1966080  八  16 22:28 cfg.spinand
-rw-rw-r-- 1 alec alec 24510464  八  16 22:28 rootfs.spinand
-rw-rw-r-- 1 alec alec  1966080  八  16 22:28 system.spinand
```

**Attention:** Note: *.spinand in the rawimages subdirectory is the raw images used by the burner. The *.spinand in the directory on the upper level is a special format for the CVITEK SD card/USB update tool, and an additional 128 bytes header is added based on the bare image.

2. Enter the build/tools/common/spinand_tool/fip_maker, perform

```
make clean; make
```

3. Copy fip.bin to the directory. Run./fip_maker {pagesize} {DID/MID} {input_path} {output_path}, where {pagesize} and {DID/MID} parameter values refer to spi nand particle datasheet settings.

```
Example:
    ./fip_maker 2048 0x71e5 ./fip.bin ./fip_out.bin
```

4. If there is no error, fip_out.bin will be generated. This fip_out.bin is the fip.bin file required for pre-burning.

After preparing the binary file through the above three steps, the burner can be pre-burned.

### 6.2.2 Partition Table

The Flash partition table of the CVITEK solution is defined in xml format. For details, see the《Flash Partition Tool Usage Guide》.

Flash partition is defined in XML format. We use boards/default/partition/partition_spinand_page_2k. XML as an example:

```
<physical_partition type="spinand">
    <partition label="fip" size_in_kb="2560" file="fip.bin"/>
    <partition label="BOOT" size_in_kb="8192" file="boot.spinand"/>
    <partition label="MISC" size_in_kb="384" file="logo.jpg" />
    <partition label="ENV" size_in_kb="128" file="" />
    <partition label="ROOTFS" size_in_kb="71680" file="rootfs.spinand" />
    <partition label="SYSTEM" size_in_kb="20480" file="system.spinand"␣
↪mountpoint="" type="ubifs" />
    <partition label="CFG" size_in_kb="4096" file="cfg.spinand" mountpoint="/
↪mnt/cfg" type="ubifs" />
    <partition label="DATA" file="" mountpoint="/mnt/data" type="ubifs" />
</physical_partition>
```

Take NAND flash with 2KB page size 128KB blocksize as an example: Based on the data in the xml file, the size of each partition is converted into the size of the block (formula: Number of blocks = partition size/single blocksize), as shown below:

| Partition | Start block offset | Number of blocks | Binary files |
|---|---|---|---|
| FIP | 0 | 20 | fip.bin |
| BOOT | 24 | 64 | boot.spinand |
| MISC | Sequential (skip bad blocks)) | 3 | logo.jpg |
| ENV | Sequential (skip bad blocks) | 1 | Null |
| ENV_BAK | Sequential (skip bad blocks) | 1 | Null |
| ROOTFS | Sequential (skip bad blocks) | 560 | rootfs.spinand |
| SYSTEM | Sequential (skip bad blocks) | 160 | system.spinand |
| CFG | Sequential (skip bad blocks) | 32 | cfg.spinand |
| DATA | Sequential (skip bad blocks) | Don’ t Care | Null |

### 6.2.3 Burning Rule

#### FIP Partition

The FIP partition consists of two parts: one is the processor-related Bootloader (no open source), and the other is u-boot.

The CVITEK compilation process will automatically package the two into a fip.bin. fip.bin is from block 0 to 19 according to Select a block according to the sequence, and write two copies in total.

The first copy will be written in block 0~9, and the second copy will be written in block 10~19, which are mutual backup.

Burning fip.bin itself into spinand will probably use 3~4 blocks. However, due to the characteristics of spinand, blocks may be damaged, so the remaining unused blocks are reserved for the repair mechanism.

To illustrate with an example, fip.bin is 640KB, and the block size is 128KB, so 5 blocks are needed to write a fip.bin:

**Example 1:**

If there are no bad blocks, burn the first fip.bin to block 0, 1, 2, 3, 4; burn the second fip.bin to block 9, 10, 11, 12, 13.

**Example 2:**

If block 4 and 11 are both bad blocks, please burn the first fip.bin to block 0, 1, 2, 3, 5; and burn the second fip.bin to block 9, 10, 12, 13, 14 .

### Other Partition

According to the configuration of the partition table, burn in order, skip the bad block, skip to the next good block and then burn.