Nations MCU Download tool User Manual

NATIONS CONFIDENTIAL

CONTENTS

1 The introduction 5

1.1 Writing purpose 5
1.2 The reader object 5
1.3 The term is commonly used 5
1.4 The resources 5

2 Overview 6

3 Systematic review 7

3.1 System Function Introduction 7
3.2 System performance 7

4 Runtime environment 8

4.1 Hardware Requirements 8
4.2 Software requirements 8

5 Installation and initialization 9

6 Select device Interface 12

6.1 USART interfaces 12
6.2 USB (DFU) port 12
6.3 SWD (J-link) interface 12
6.4 NS-Link-Pro Interface 12
6.5 SWD（CMSIS DAP) Interface 12
6.6 List of functions supported by each interface 13

7 Online download 14

7.1 USART program download 14
7.1.1 Select equipment 14
7.1.2 Connected devices 14
7.1.3 Select download file 15
7.1.4 Start the download 16
7.2 USB (DFU) program download 16
7.2.1 Select equipment 16
7.2.2 Connected devices 17
7.2.3 Select download file 17
7.2.4 Start the download 18
7.3 SWD(CMSIS-DAP) program download 19
7.3.1 Select equipment 19
7.3.2 Connected devices 19

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

7.3.3 Select download file 20
7.3.4 Start the download 20
7.4 Common Operation Instructions 21
7.4.1 Obtaining chip information 21
7.4.2 Configuration partition 22
7.4.3 Partition download configuration 23
7.4.4 All erased 25
7.4.5 Page to erase 25
7.4.6 Configuration option byte 26
7.4.7 Unread protection 27
7.4.8 Update the key 27
7.4.9 reset 28
7.4.10 jump 29

8 Offline project download 30

8.1 Common Operation Instructions 30
8.1.1 Parameter Settings 30
8.1.1.1 Machine control signal setting 31
8.1.1.2 Device Parameter Setting 33
8.1.2 Offline Project Configuration 33
8.1.3 Making an encrypted file 46
8.2 SWD mode download 47
8.2.1 Download the project configuration offline 47
8.2.2 Save the project to an offline downloader 50
8.3 UART(serial port) mode download configuration example 56
8.3.1 UART(serial port) download 56
8.3.1.1 Offline Project Configuration 56
8.3.1.2 Save the project to an offline downloader 59
8.3.2 Example of UART encryption authentication download configuration 59
8.3.2.1 Offline Project Configuration 59
8.3.2.2 Save the project to an offline downloader 63
8.3.3 UART(serial port) partition configuration 63
8.3.3.1 Offline Project Configuration 63
8.3.3.2 Save the project to an offline downloader 68
8.3.4 Configure encryption authentication for UART(serial port) partitions 68
8.3.4.1 Offline Project Configuration 68
8.3.4.2 Save the project to an offline downloader 73
8.4 Offline downloader external interface 73
8.5 Offline downloader sound and light status information 75
8.6 The machine controls the timing 75
8.7 Multipath download control 77

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

9 Common Errors and Solutions 78

9.1 Bad download of onboard NS_LINK serial port 78
9.2 Bad download of independent serial port 78
9.2.1 The serial port cannot be connected 78
9.2.2 When the chip is programmed for the first time, it indicates that it is in the state of level protection L1 79
9.2.3 Download bin file and hex file, the software behavior of the two is inconsistent 79
9.3 USB does not recognize the device 79
9.4 Bad SWD download 80
9.4.1 Unable to connect chip 80
9.5 The offline downloader is poorly programmed 80
9.5.1 NS_LINK cannot connect 80
9.5.2 Offline download project cannot be saved 80

10 Version history 81

11 Online upgrade tool 84

12 Online upgrade offline downloader firmware 85

13 Legal Notice 85

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

1 The introduction

1.1 Writing purpose

This helps r&d personnel and production testers understand how to download tools

1.2 The reader object

R&d personnel and production testing personnel.

1.3 The term is commonly used

The term	Instructions

1.4 The resources

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

2 Overview

This document is used to explain and standardize the operation and process of the chip download tool, and is suitable for managers and production operators.

Nations MCU Download Tool is a program download tool for N32G(WB)45x_FR, N32G(L)43x, N32L40x, N32G032, N32G030, N32G031, N32G430, N32A455 , N32G401, N32G003 series chips of National Technology. The tool provides chip program download and related configuration functions. UART, USB (DFU), SWD (CMSIS-DAP) communication mode download, support offline downloader project configuration, etc.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

3 Systematic review

3.1 System Function Introduction

The main interface of the download tool is shown in the following figure, which includes selecting devices, downloading operations, files, common operations, displaying test results, and help.

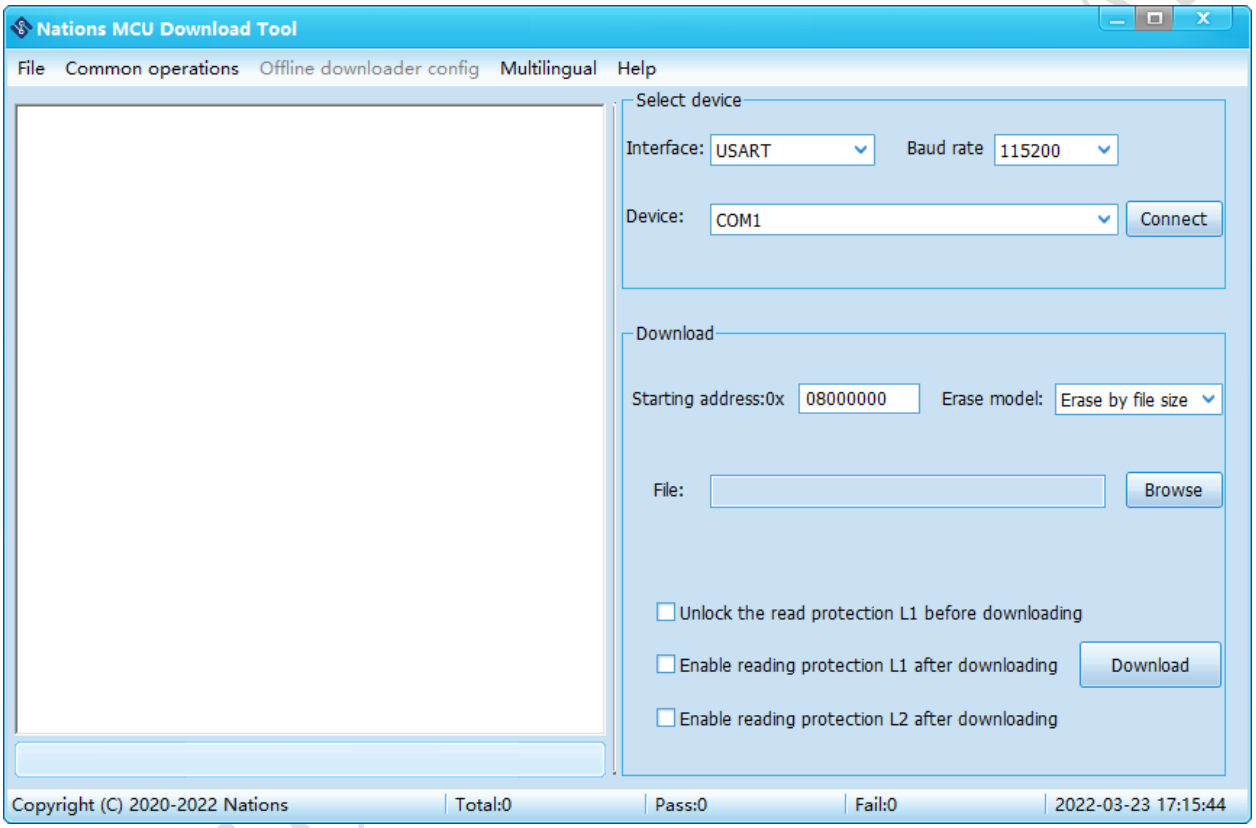


Figure 3-1 Main interface of download tool

3.2 System performance

The system resource footprint is very small when the program is running, with both CPU usage and memory footprint less than 1% when the program is running at full speed.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

4 Runtime environment

4.1 Hardware Requirements

The following list shows the minimum configuration of the PC hardware required by this software:

1. CPU Celeron 400MHz or Pentium 133MHz or above
2. The minimum memory size is 128 MB (256MB or more is recommended).
3. The hard disk has more than 100MB free space
4. Monitor with a resolution of 800*600 or above, 1024x768 or higher is recommended

4.2 Software requirements

The program can run on the 32-bit operating system Windows XP, and supports both 32-bit and 64-bit Windows7 and Windows 10.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

5 Installation and initialization

This system does not need to install, directly click to run.After the device is correctly connected, the interface after the program is started is as shown in the figure:

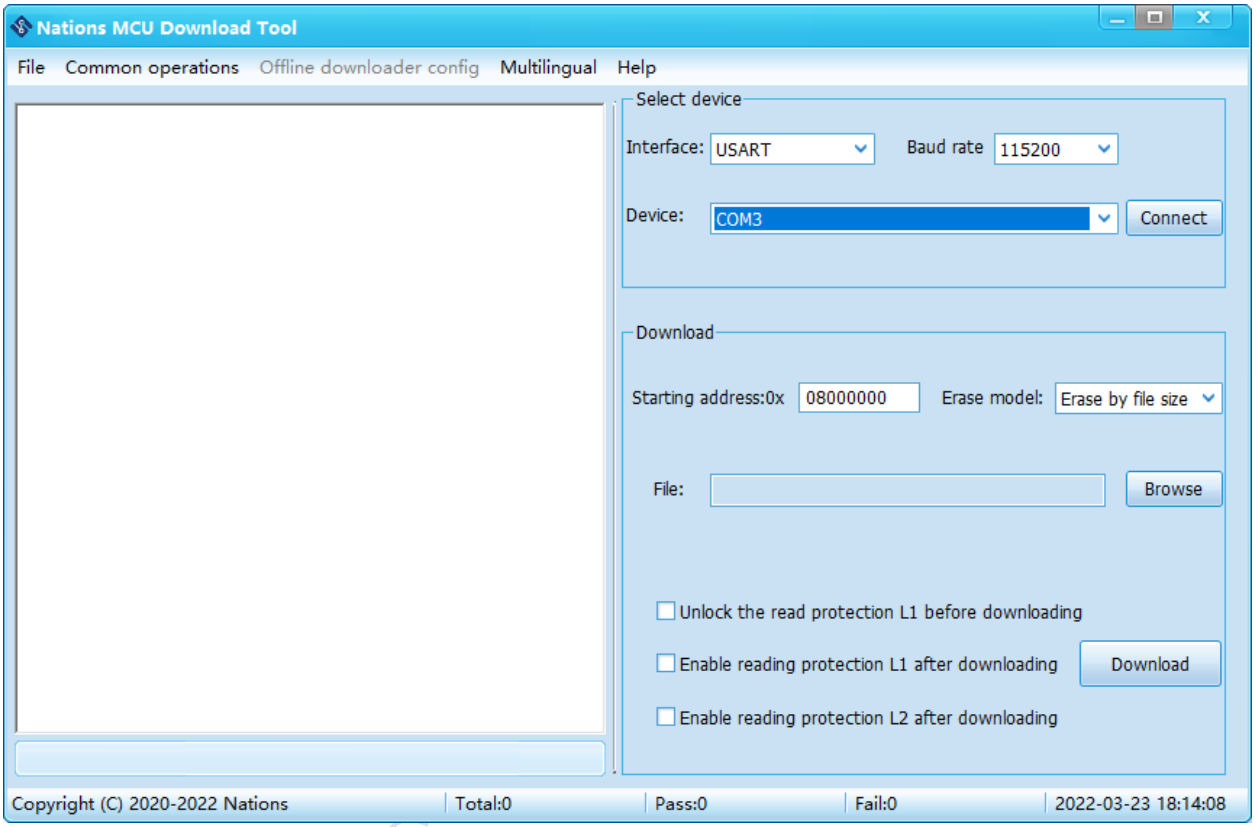


Figure 5-1 Program startup interface

After connecting to the device through the USB port through the UART communication port, you can view the serial port number in the device manager port. If no device is identified, you may need to install a serial port driver.Multiple serial ports are listed when you open the download tool. Select the corresponding device according to the serial port number of the device in device Manager.Correctly identify the equipment as shown in the picture below:

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

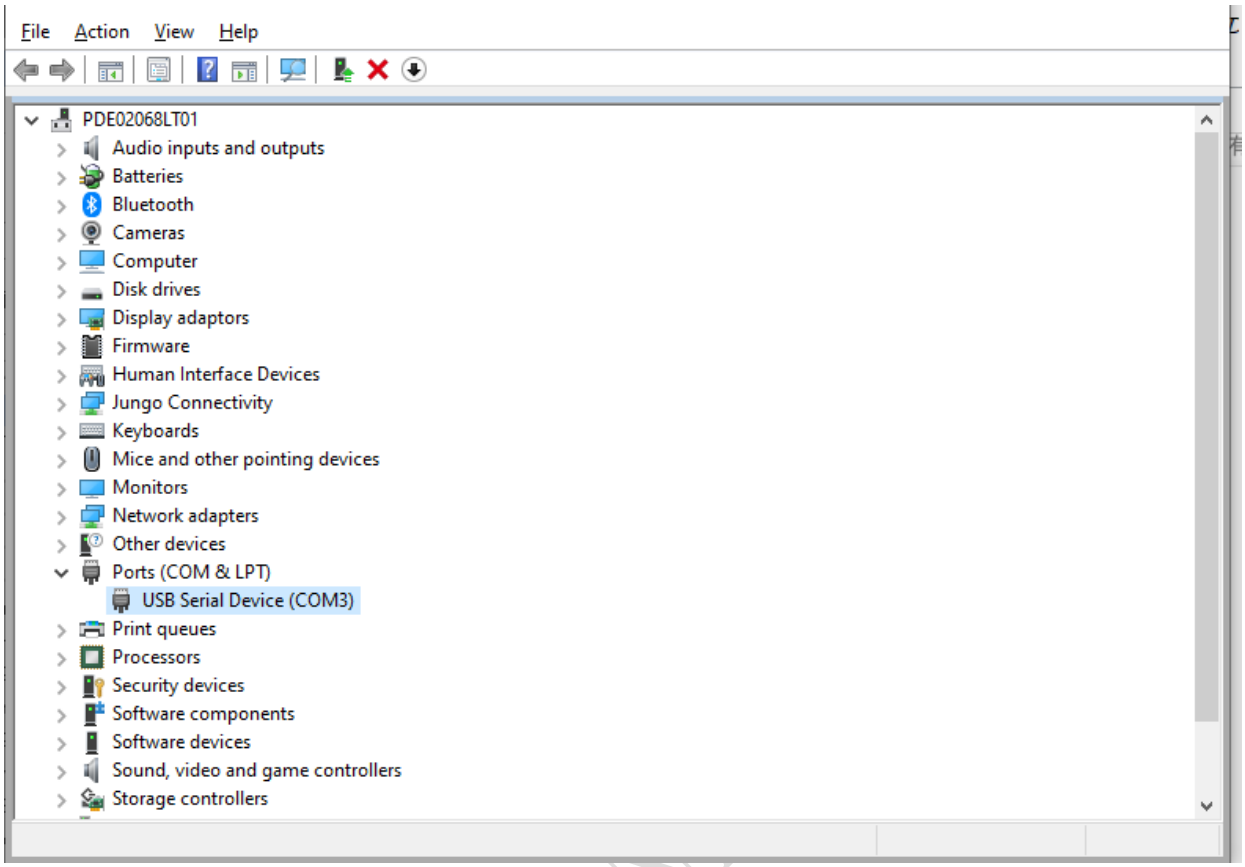


Figure 5-2 Confirm device through Device Manager (UART interface)

Connect to the device through the USB port through the DFU. You need to install the driver for initial connection. Check whether the device is detected by viewing the device manager.Correctly identify the equipment as shown in the picture below:

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

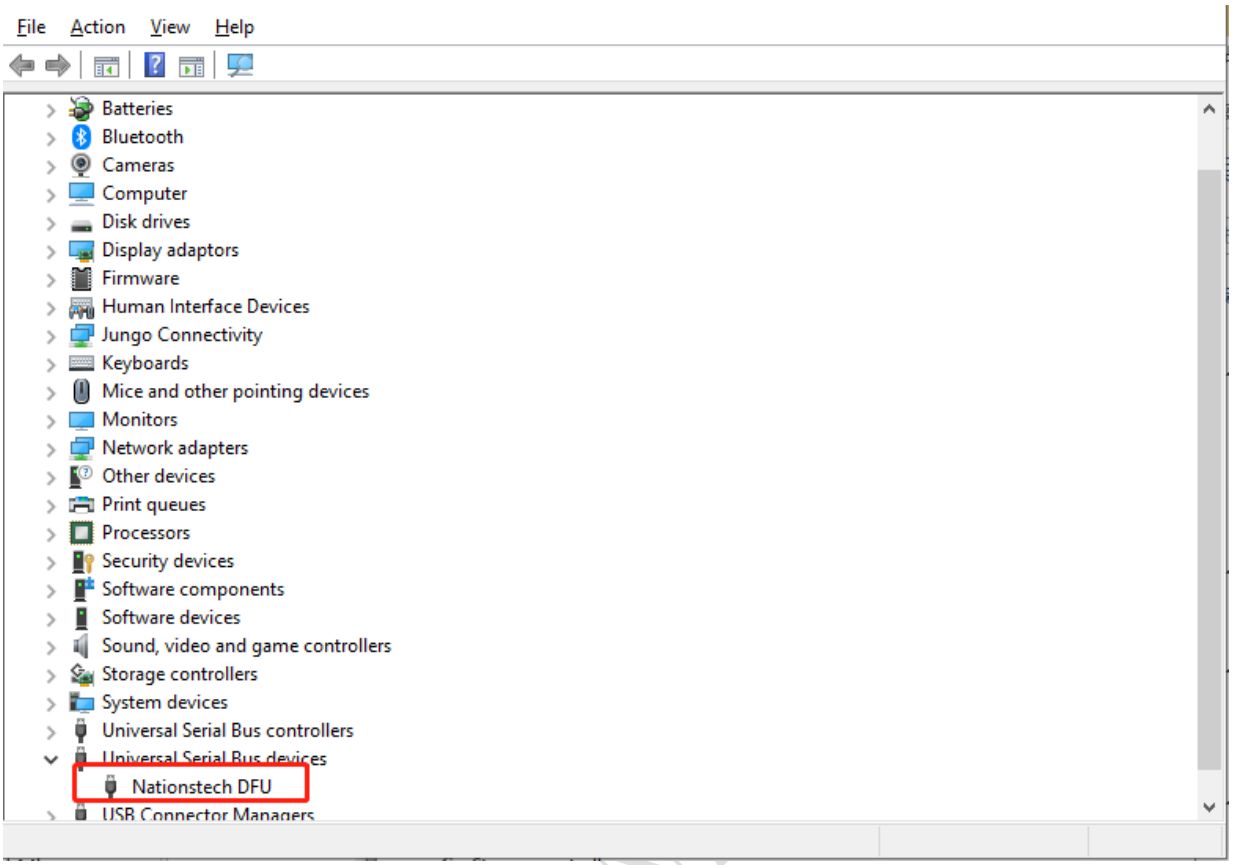


Figure 5-3 Confirming the device through device Manager (USB(DFU) interface)

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

51

6 Select device Interface

6.1 USART interfaces

Serial port download interface.When the target chip enters Boot, you can use the serial port to configure the target chip partition, modify the key, operation option bytes, program download and other functions.

6.2 USB (DFU) port

USB download interface: When the target chip enters the BOOT state, USB can be used to connect the target chip, and the target chip partition configuration, modify key, operation option bytes, program download and other functions.

Note: THE USB DFU interface is only available for chips with USB peripherals.

6.3 SWD (J-link) interface

Jlink connection interface.You can use this interface to connect to JLink and use the JLink downloader to perform option byte manipulation on the target chip.

Note: This interface can temporarily only operate on option bytes to enable read protection and remove read protection.

6.4 NS-Link-Pro Interface

This interface is used to connect the NS-Link-Pro offline downloader for communication between the offline downloader and the PC.

6.5 SWD（CMSIS DAP) Interface

This interface can be used to obtain chip information, erase operation option bytes, operation read-write protection, program download, read flash and other functions for the target chip.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

6.6 List of functions supported by each interface

functions \ interface	USART	USB(DFU)	SWD(J-link)	SWD(CMSIS-DAP)	NS-Link-Pro
download	√	√	x	√	x
Make encrypted files	√	√	x	x	x
Get chip information	√	√	x	√	x
Configure partitions	√	√	x	x	x
Partition download	√	√	x	x	x
All Erase	√	√	x	√	x
Page Erase	√	√	x	√	x
Configuration option bytes	√	√	x	√	x
Enable read protection level L1	√	√	√	√	x
Enable read protection level L2	√	√	√	√	x
Release read protection level L1	√	√	√	√	x
Configure write protection	√	√	√	√	x
update key	√	√	x	x	x
reset	√	√	√	√	x
jump	√	√	x	x	x
Read FLASH data	x	x	√	√	x
The entire FLASH checksum during download	x	x	√	√	x
Offline Downloader Configuration	x	x	x	x	√

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

7 Online download

For online program download, the target chip must enter Boot state and download in USART (serial port) or USB (DFU) mode.

7.1 USART program download

7.1.1 Select equipment

Take the USART interface as an example, connect the development board and PC correctly through the USB-to-serial cable, pull the target chip BOOT0 pin high, reset or re-power the target chip, and make the target chip enter the BOOT state.Open the tool and check whether the current device can be enumerated (take N32G457 series chips as an example), as shown in the figure:

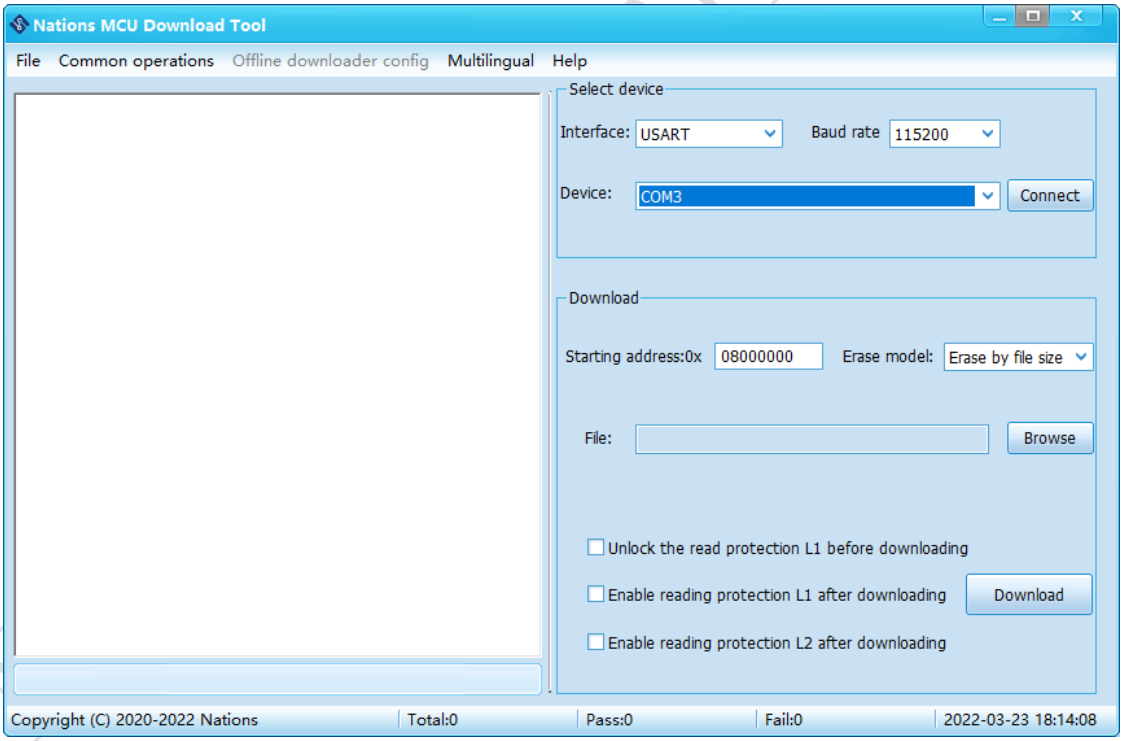


Figure 7-1 Selecting a device

7.1.2 Connected devices

Users can select baud rate as required (the default value is 9600), such as 115200, and then click "Connect Device" button. After the device is successfully connected, "Connect Device" turns

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

to "Disconnect Device" and the status displays the chip model, BOOT version number, FLASH capacity and other information of the current chip, as shown in the following figure:

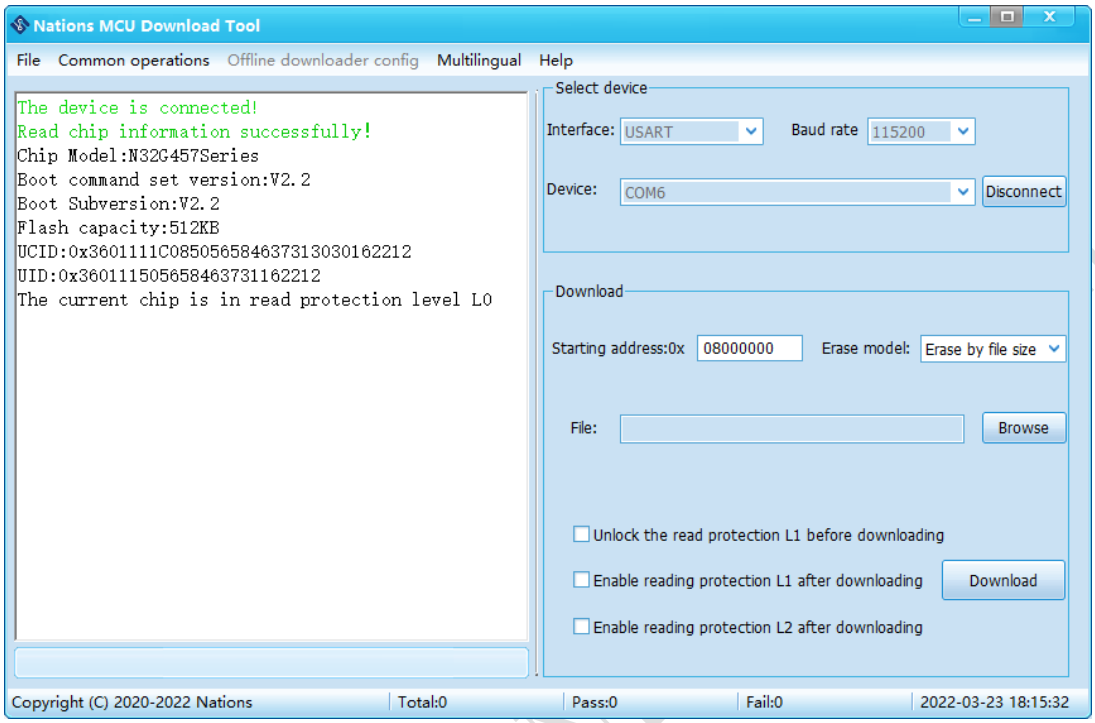


Figure 7-2 Device connection succeeded

7.1.3 Select download file

Click "Browse", select the file to download in the pop-up dialog box, double click the file, or click "Open", as shown below:

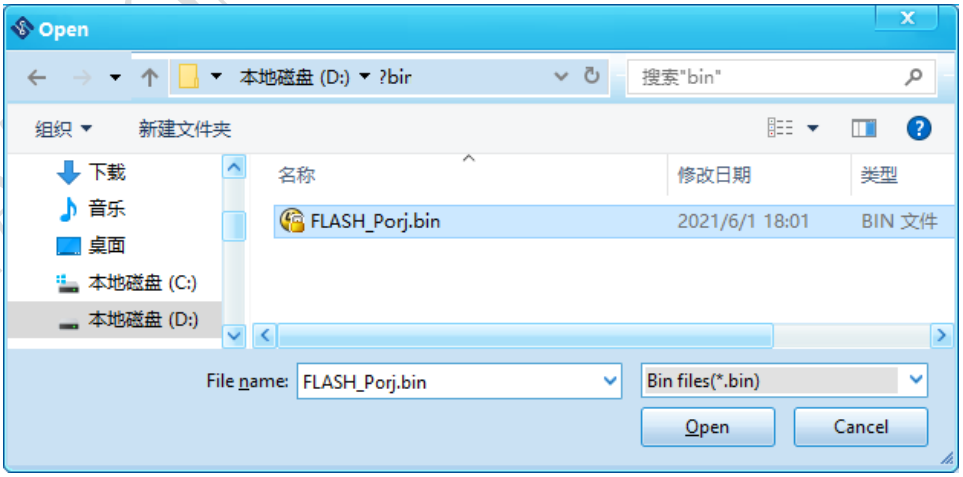


Figure 7-3 Selecting the download file

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

7.1.4 Start the download

Users should confirm the starting address and erasing mode of download according to the actual situation. Erasing must be performed before downloading. If a partition is configured, full erasing cannot be selected.

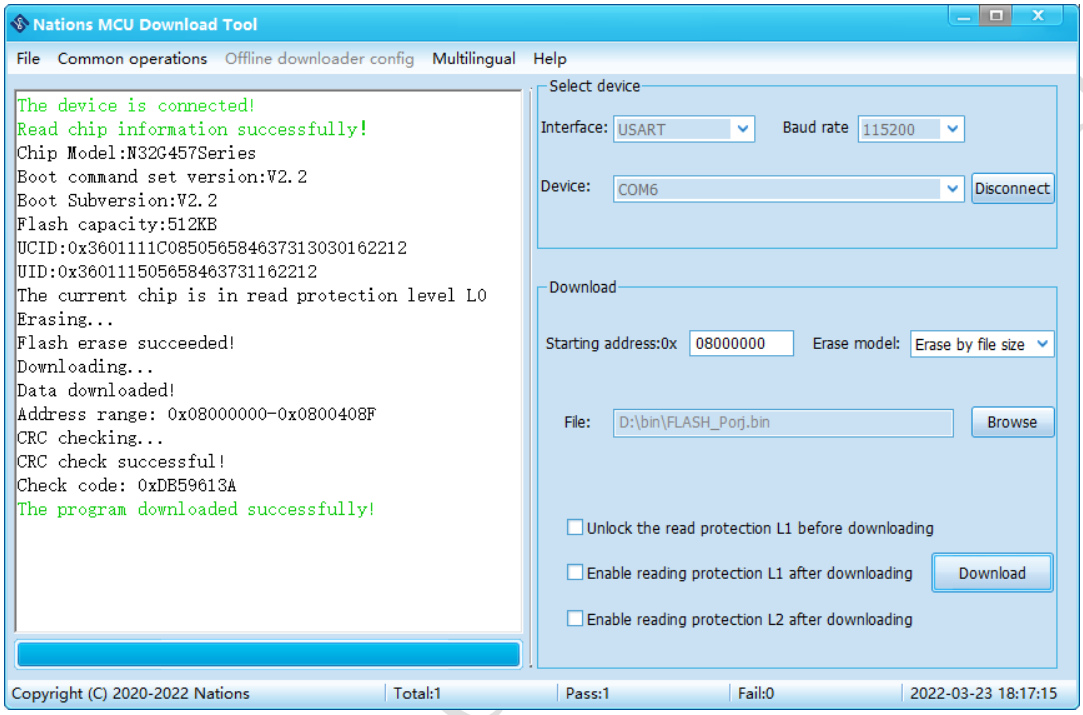


Figure 7-4 Program downloaded successfully

7.2 USB (DFU) program download

7.2.1 Select equipment

Connect the target chip and PC through USB cable, pull the target chip BOOT0 pin high, reset or power on the target chip, and then the target chip enters BOOT.Open the tool and check whether the current device can be enumerated (take N32G457 series chips as an example), as shown in the figure:

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

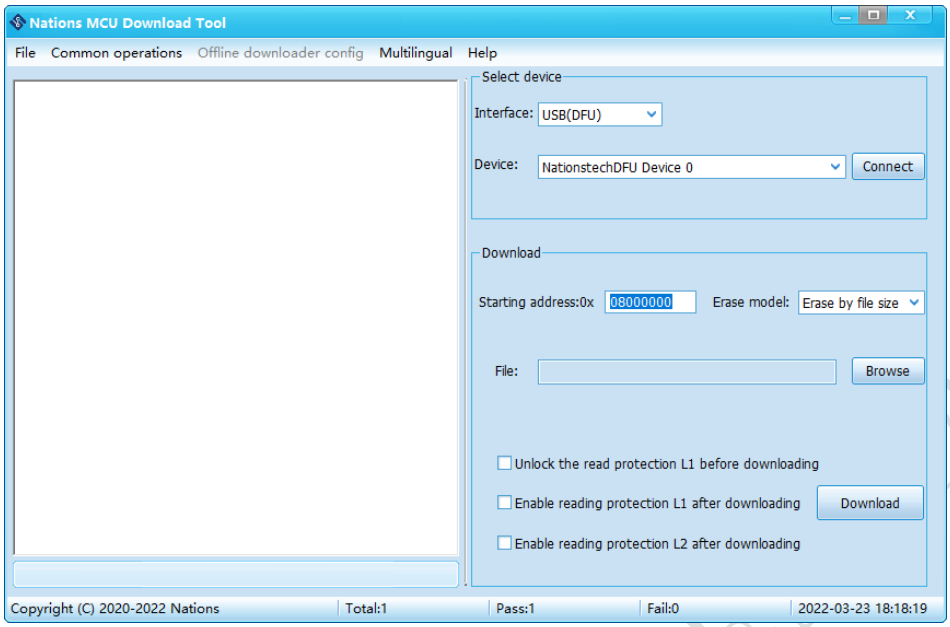


Figure 7-5 Selecting a device

7.2.2 Connected devices

Click "Connect Device", the target chip information will be printed.

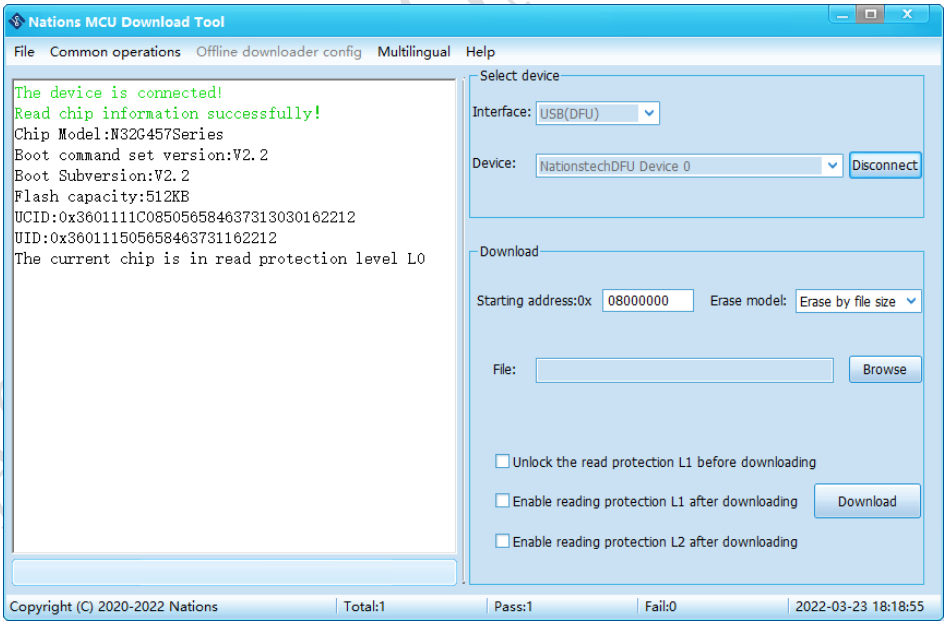


Figure 7-6 Connecting devices

7.2.3 Select download file

Click browse, select download file, and then click Open.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

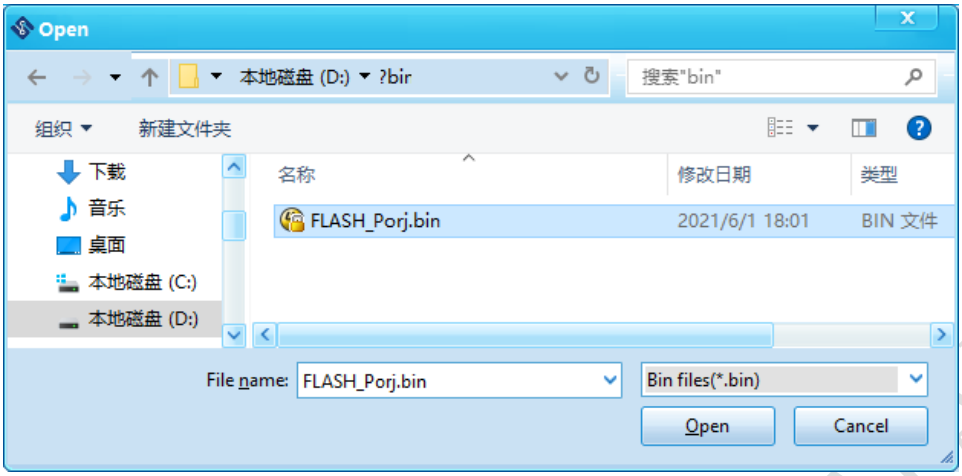


Figure 7-7 Selecting a file

7.2.4 Start the download

Users should confirm the starting address and erasing mode of download according to the actual situation. Erasing must be performed before downloading. If a partition is configured, full erasing cannot be selected.

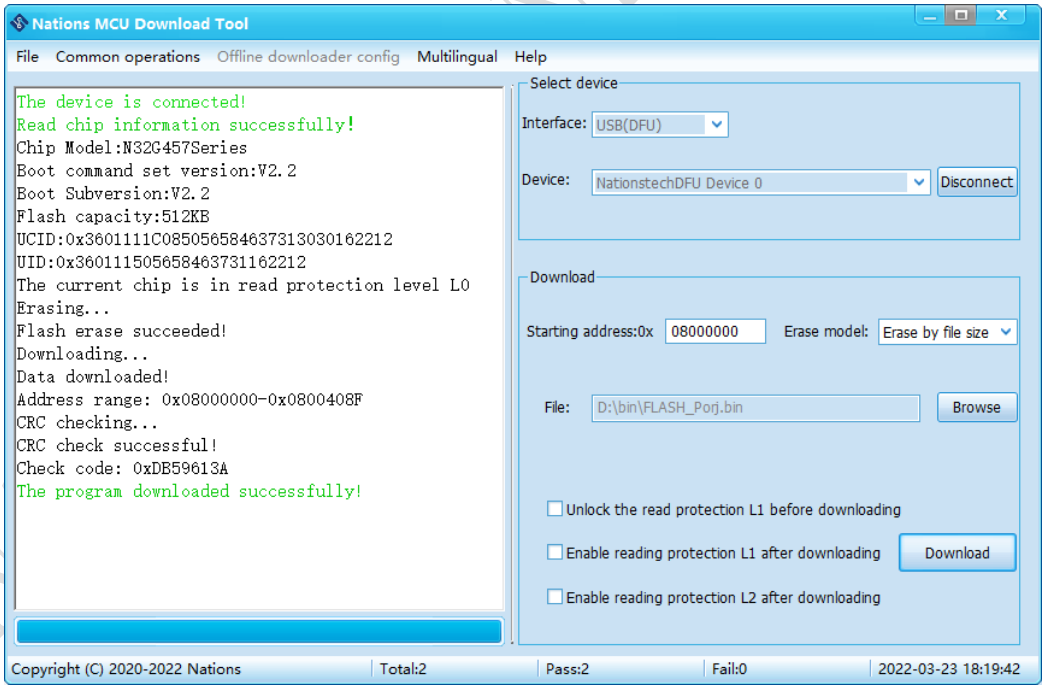


Figure 7-8 Downloading the file successfully

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

7.3 SWD(CMSIS-DAP) program download

7.3.1 Select equipment

Connect the target chip and PC through USB cable, and the target chip does not need to enter the boot. Open the tool and confirm whether the current device can be enumerated (take n32g457 series chip as an example), as shown in the figure:

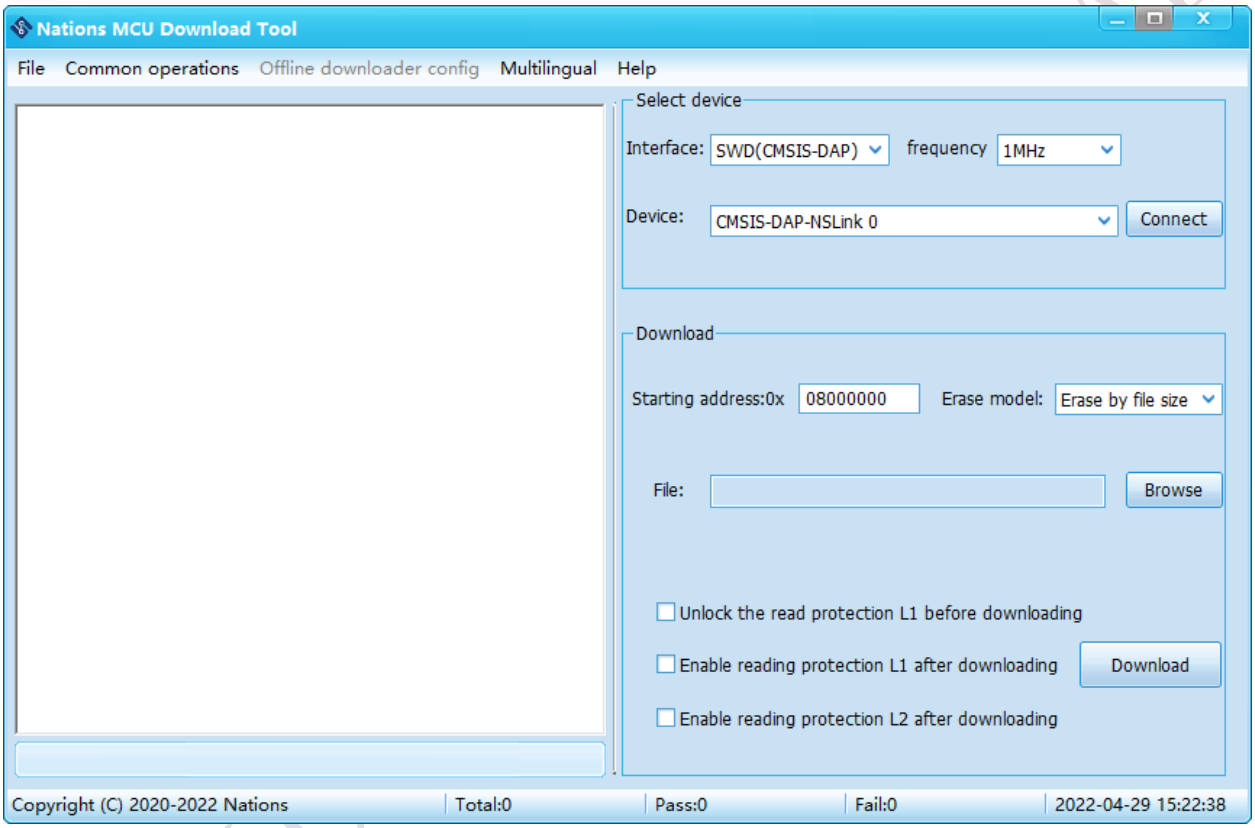


Figure 7-9 Selecting a device

7.3.2 Connected devices

After selecting the appropriate frequency, click "connect device", and the target chip information will be printed if the connection is successful.

Note: at present, NS Link Pro equipment only supports frequencies of 200kHz, 500KHz, 1MHz, 2MHz and 5MHz. If the target chip is at the read protection level L1 or L2, the connection may fail or the acquisition of chip information may fail. You can try to interpret the protection and then connect the device

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

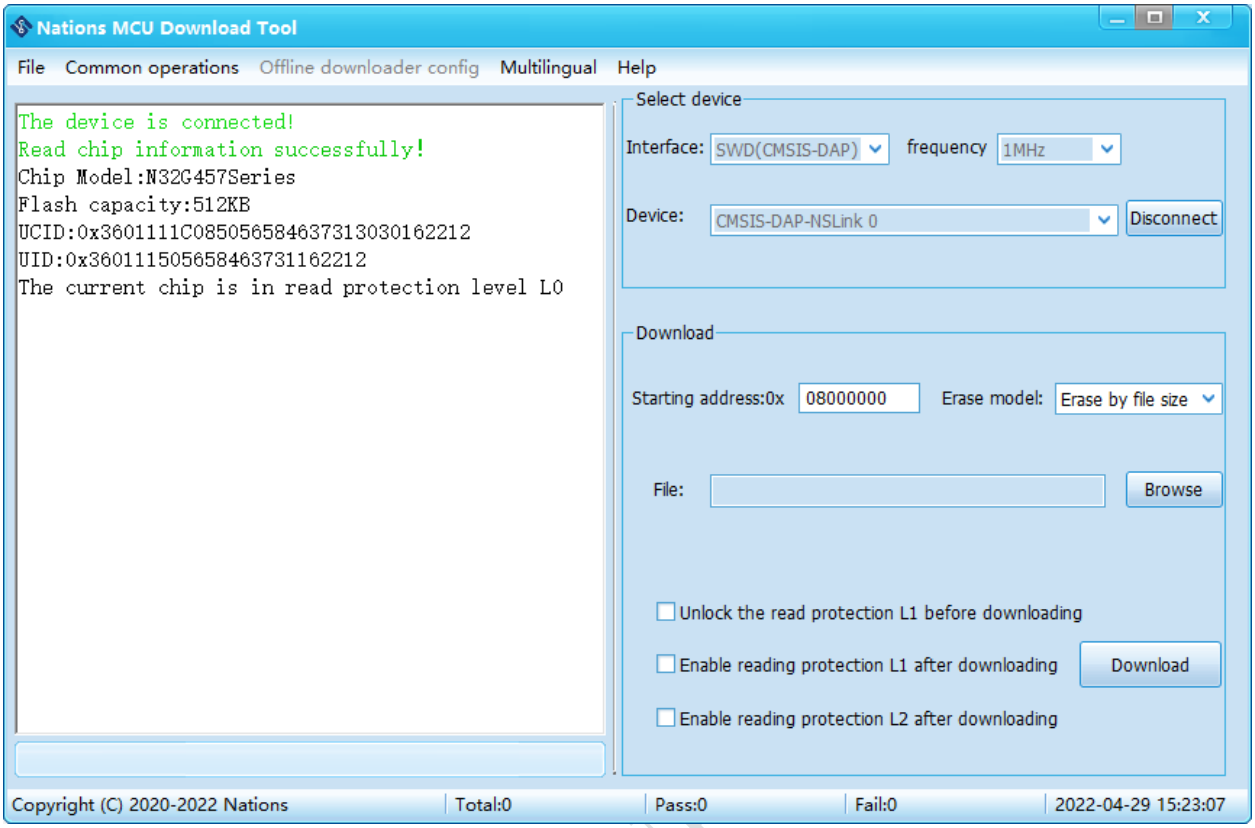


Figure 7-10 Connecting devices

7.3.3 Select download file

Click browse, select download file, and then click Open.

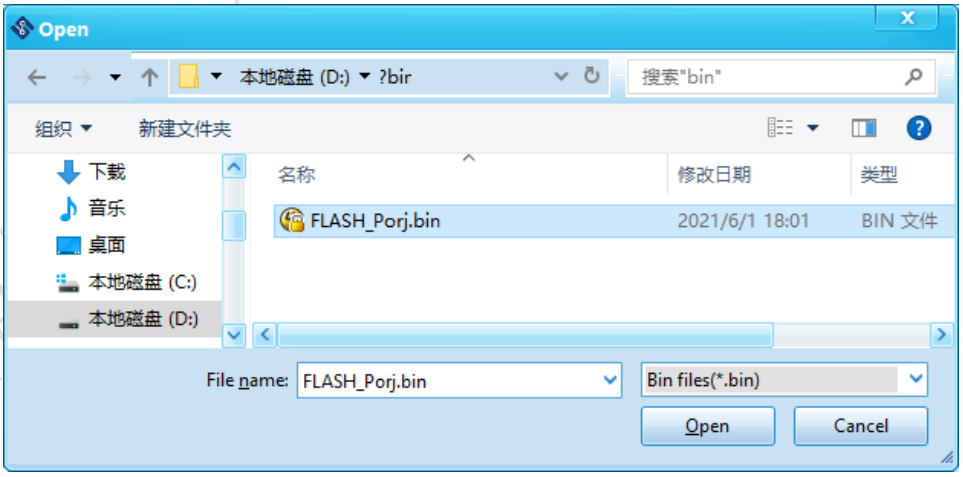


Figure 7-11 Selecting a file

7.3.4 Start the download

According to the actual situation, the user confirms the starting address and erasure method of

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

the download, and whether the read protection is enabled before and after the download according to the demand. After completing the above process, you can click the "download" button below to download the program. After the program is downloaded successfully, it is shown in the following figure:

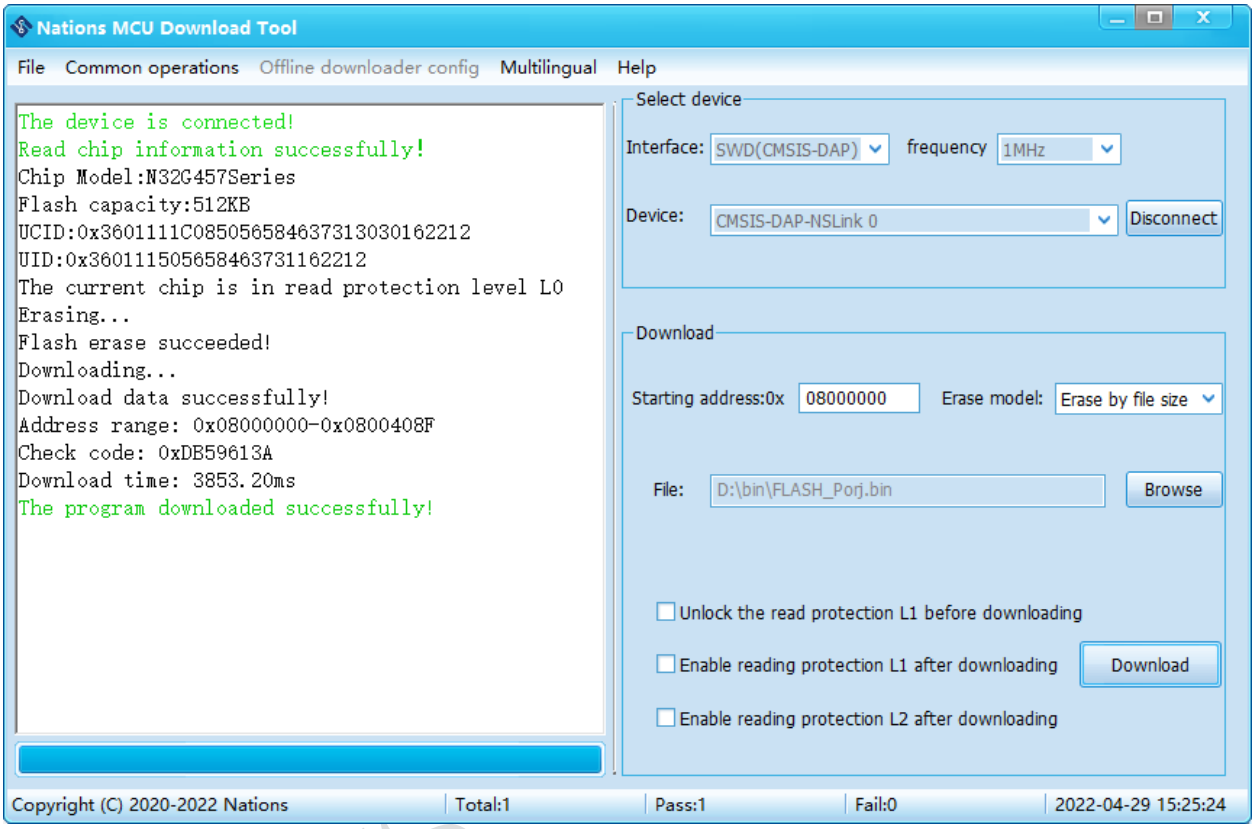


Figure 7-12 Downloading the file successfully

7.4 Common Operation Instructions

7.4.1 Obtaining chip information

This operation enables you to read the chip model, BOOT version, FLASH capacity, UCID, and UID.When the device is connected, you can click the "Get chip information" button in other operations, as shown in the picture below after the correct execution:

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

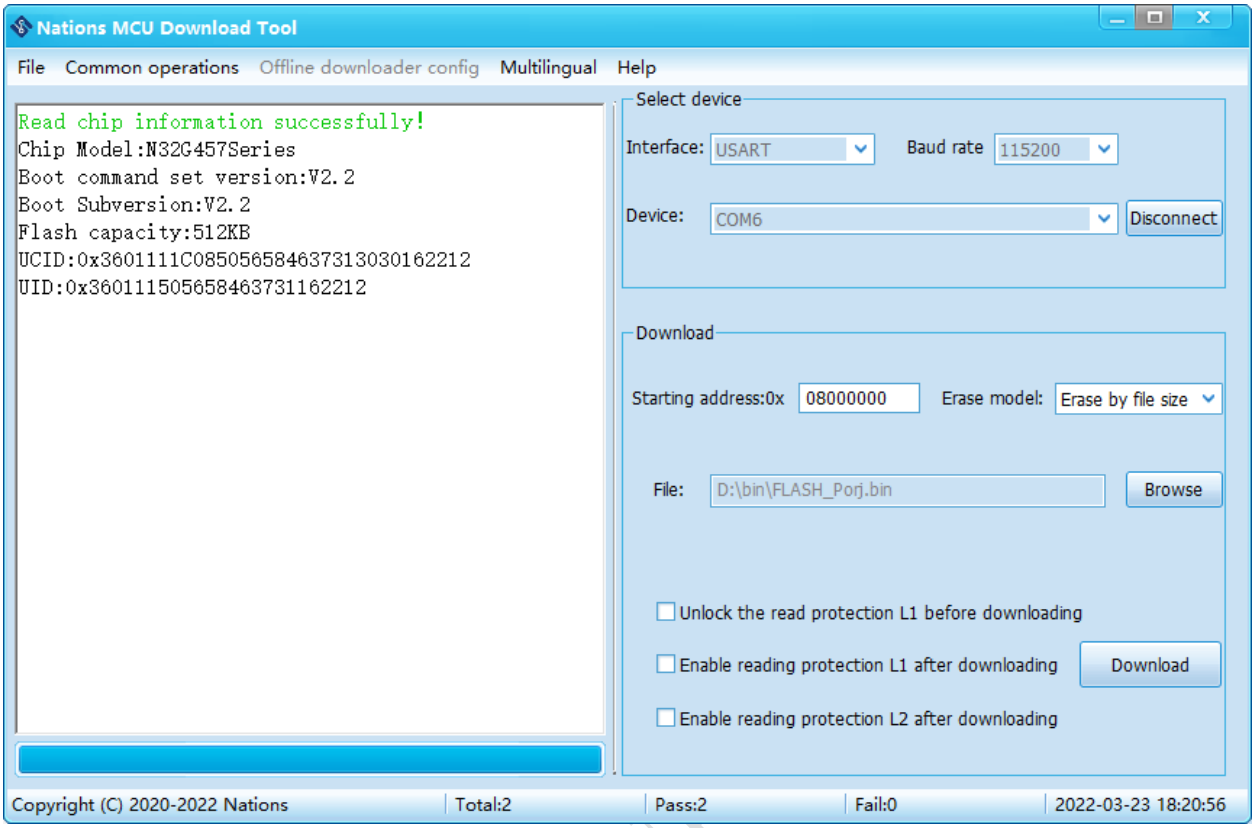


Figure 7-13 Obtaining chip information

7.4.2 Configuration partition

This operation is used to read or configure the size of the user1/2/3 partition. After the partition is configured, the partition is automatically sealed.The user1/2/3 partition can be configured only once. The software determines whether the NVR MMU partition has been configured (process variables or random delay are added to determine the NVR value).

The recommended configuration process is as follows:

1. If you need to divide two areas, configure USER3 (automatic sealing is complete).If you want to also seal USER1, configure USER1 again.The size of USER1 + USER3 must be the size of the entire FLASH;

2. To divide three zones, configure USER3 (automatic sealing is configured) and then USER2 (automatic sealing is configured).If you want to also seal USER1, configure USER1 again.The size of USER1 + USER2 + USER3 must be the size of the entire FLASH.

Click the menu of "Configure Partition" in advanced configuration at the upper left corner. In the

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

pop-up dialog box, users can set the size, key ID(0-31), enable partition authentication and enable encrypted download as required, as shown below:

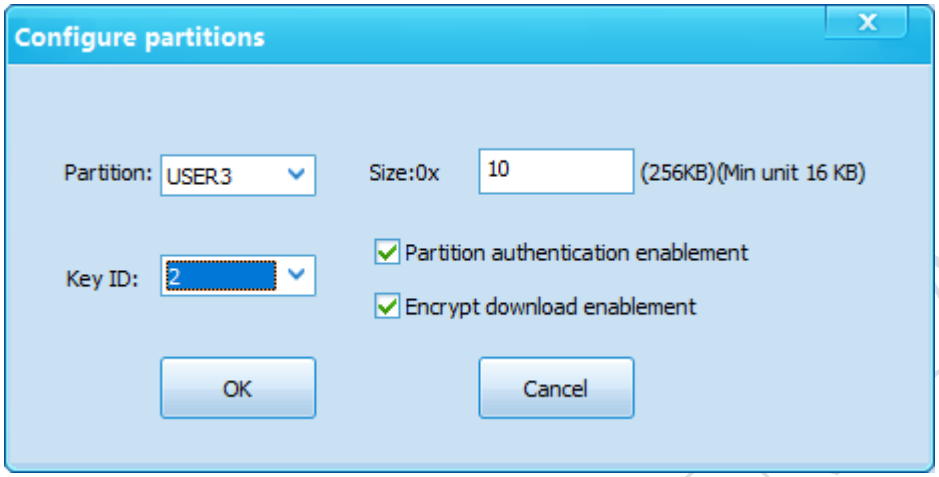


Figure 7-14 Configuring partitions

7.4.3 Partition download configuration

If the user has configured the partition, it needs to download the partition. Click the "Partition Download Configuration" menu bar of common operations in the upper left corner, and select the parameter configuration of the corresponding partition in the pop-up dialog box, as shown below:

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

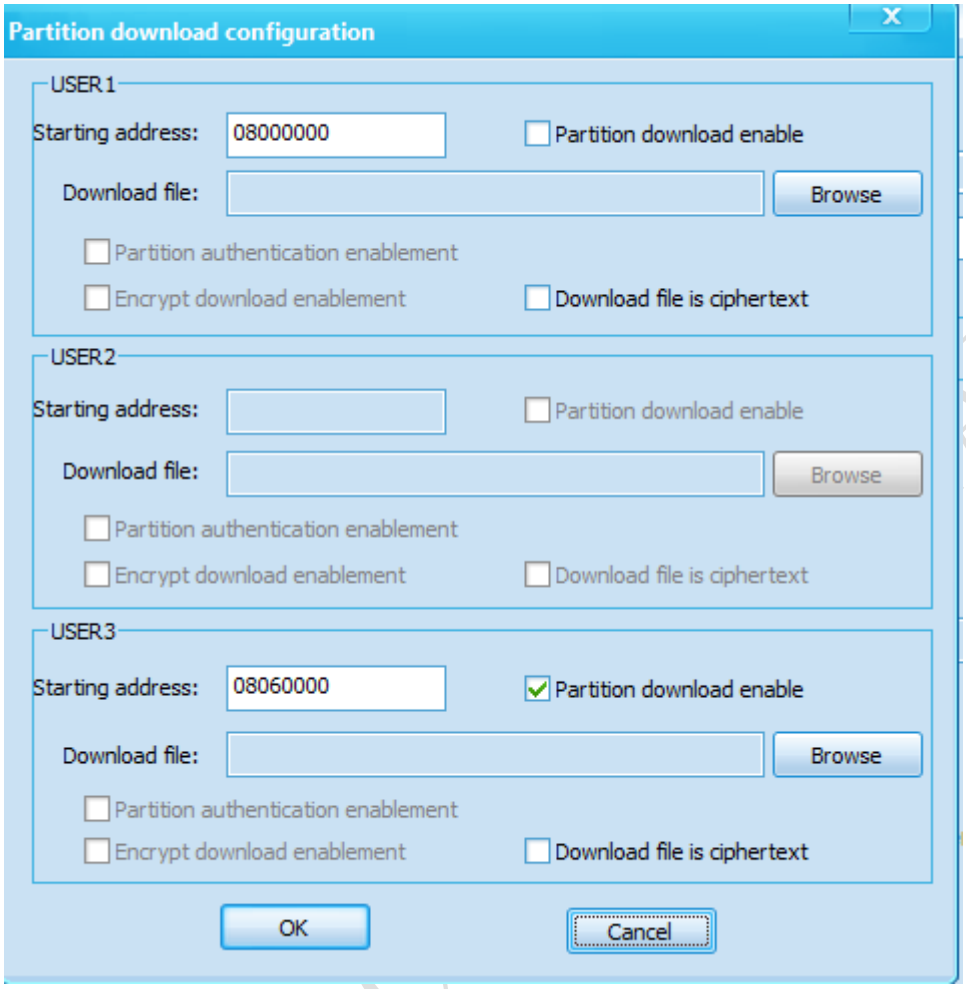


Figure 7-15 Partition download configuration

Start address: start address for downloading

Download files: Files that need to be downloaded

Zone authentication and encrypted download: If zone authentication and encrypted download have been enabled for the corresponding zone, the check box is automatically displayed.

Enable partition download: indicates whether to download the partition. If check box is displayed, download the partition. If check box is displayed, download the partition will not be downloaded.

The downloaded file is ciphertext: Check box indicates that the downloaded file is encrypted. Otherwise, the downloaded file is not encrypted.If encrypted download is enabled and the downloaded file is not encrypted, the host encrypts the file before downloading it.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

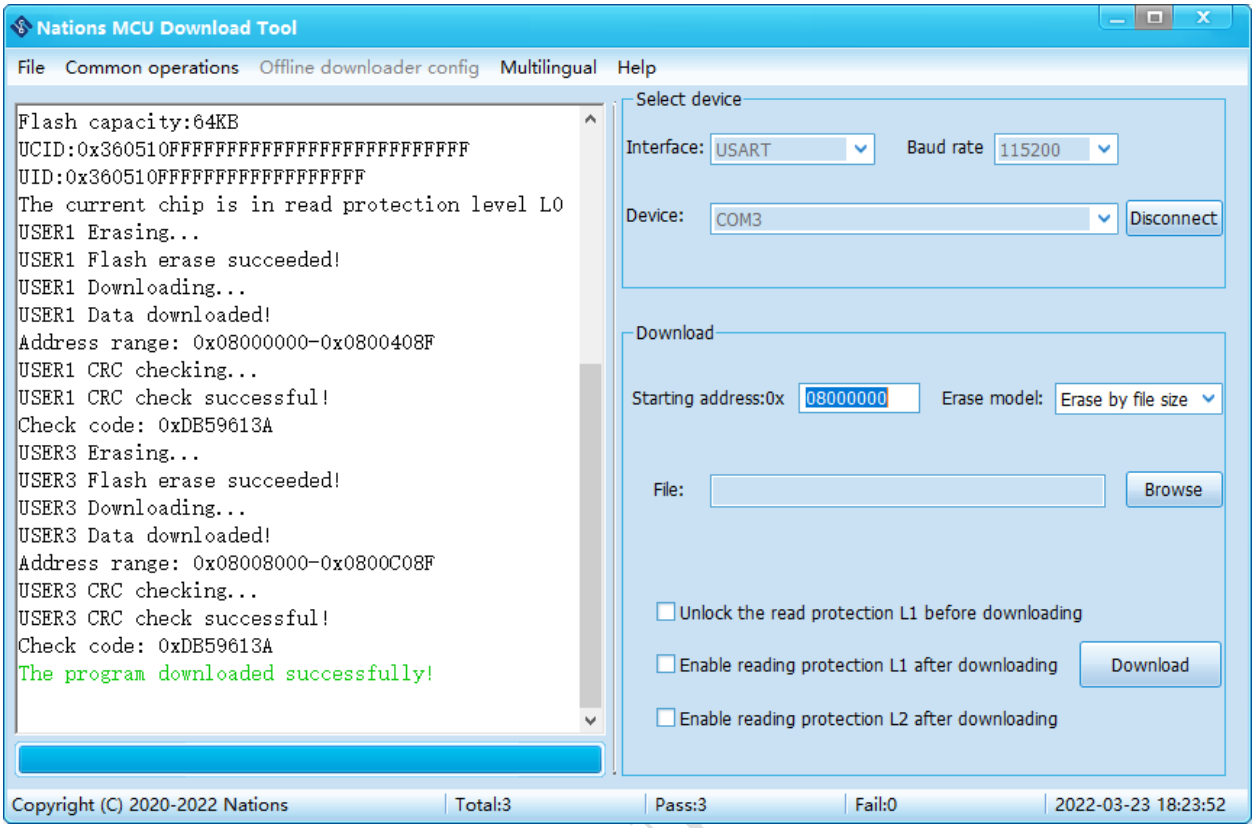


Figure 7-16 Partition downloaded successfully

7.4.4 All erased

Erase the entire FLASH.

7.4.5 Page to erase

BOOT allows you to erase the FLASH on a page basis. The space that can be erased cannot exceed the entire FLASH space and at least one page can be erased.Click the "Erase" button in other operations. In the FLASH erase dialog box that pops up, the user fills in the page address number and page number to be erased according to the address range of the partition.As shown below:

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

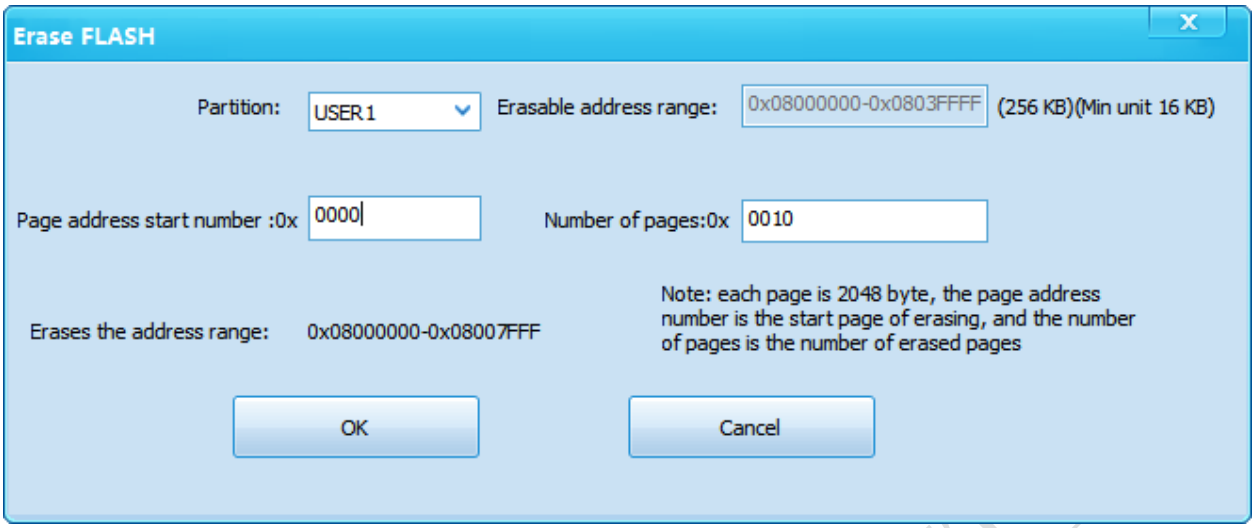


Figure 7-17 Erasing FLASH

7.4.6 Configuration option byte

This operation is used for option byte read and write (including read protection level, FLASH page write protection, datA0/1 configuration, and USER configuration).When a partition is configured, BOOT does not allow you to change the read protection level from L1 to L0 because mass erase!Click the button of "Configuration Option Byte" in other operations, and in the pop-up dialog, the user can set the corresponding byte data as required, as shown in the picture below:

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

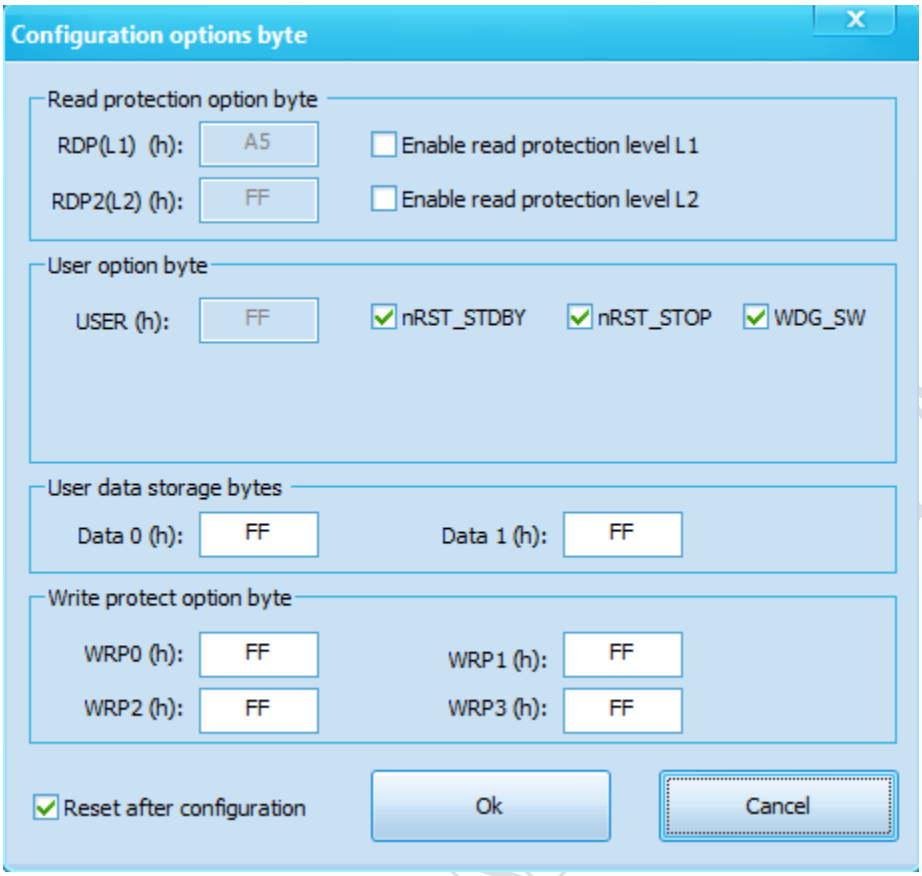


Figure 7-18 Configuration option bytes

7.4.7 Unread protection

If the read protection level L1 is enabled, you can lower the read protection level to L0.

If the read protection level L2 is enabled, the read protection level cannot be lowered to L0.

If partitions have been configured, the read protection level cannot be changed from L1 to L0

7.4.8 Update the key

This operation is used to update the encryption download key and partition authentication key. To update the key, enter the old key first, as shown in the following figure:

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

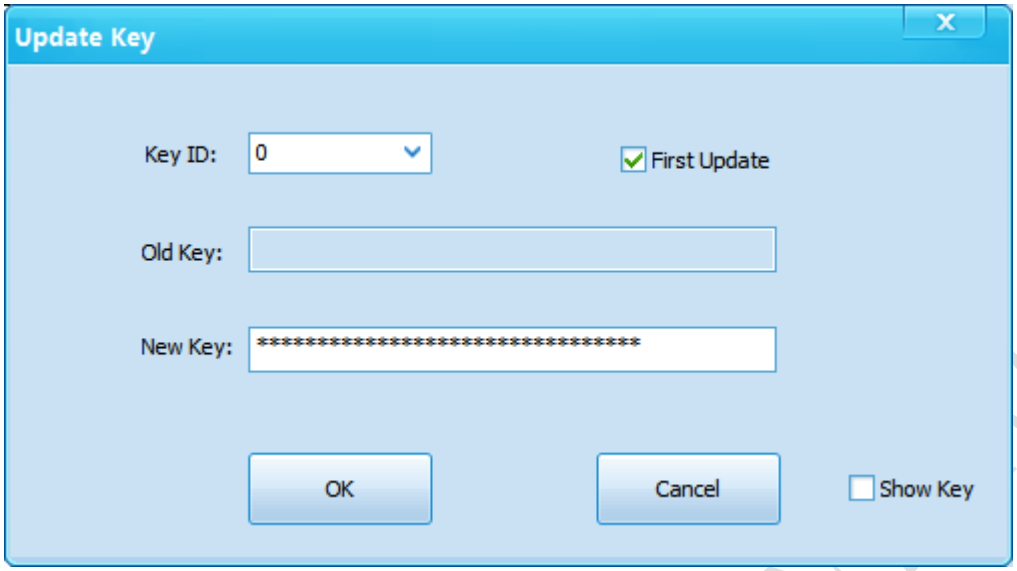


Figure 7-19Updating a key

7.4.9 reset

This operation is used to reset the BOOT program. After the reset is successful, the tool will automatically reconnect, as shown in the following figure:

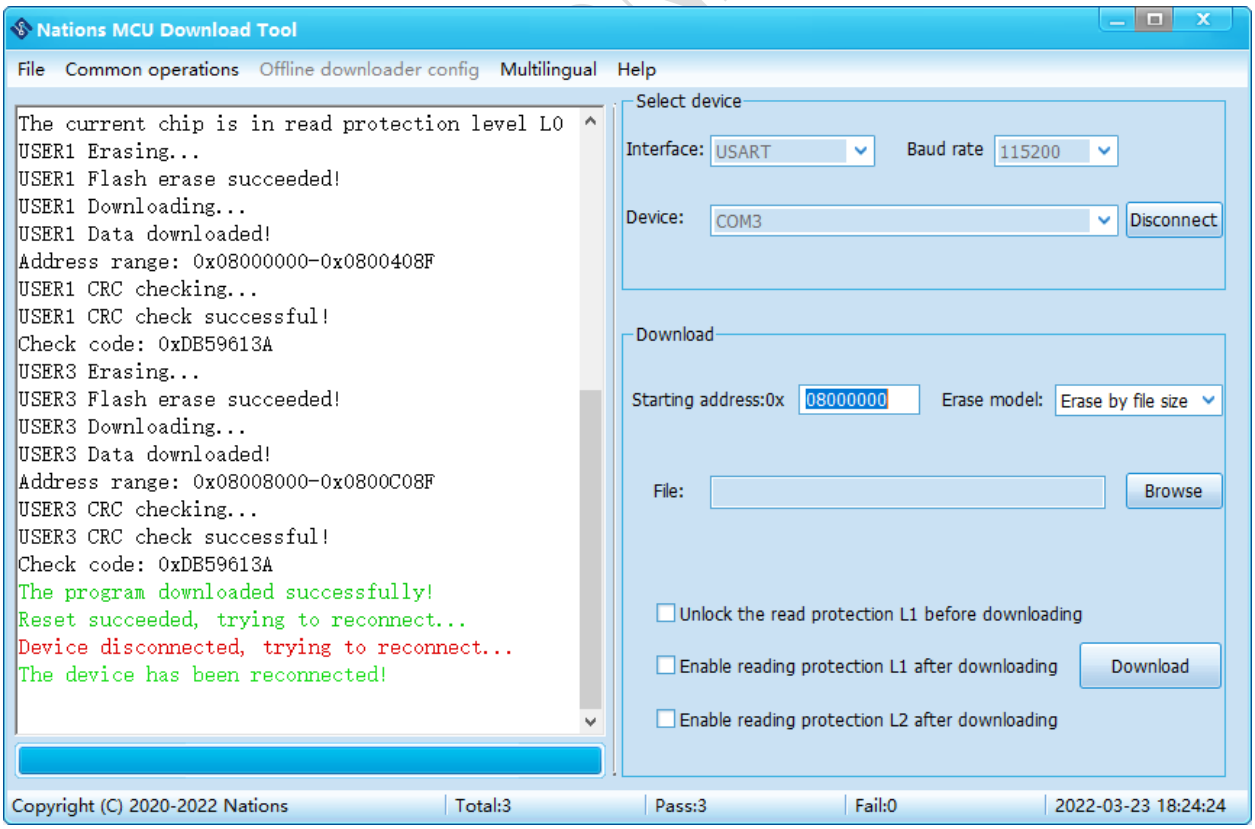


Figure 7-20 reset

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

7.4.10 jump

This operation is used to jump to the FLASH after BOOT downloads the application program. USER1 Reset the address of the program entrance (0x0800_0000). (After the user partition is enabled, the jump command is not recommended.Because the interrupt direction table start address may not be set again, the user program cannot handle interrupts properly.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

8 Offline project download

Offline Download Files can be downloaded through an offline download device. SWD and USART(serial port) are supported.Users can set up offline project files through the upper computer and choose the communication interface to download according to their own needs.After the user loads the project file to the offline downloader through the upper computer, the offline downloader can be detached from the PC for offline download.

8.1 Common Operation Instructions

8.1.1 Parameter Settings

This page is mainly to set the control parameters of the downloader itself and the machine. Click the "Save parameter" button, and the parameters will be saved to the offline downloader, as shown in the picture:

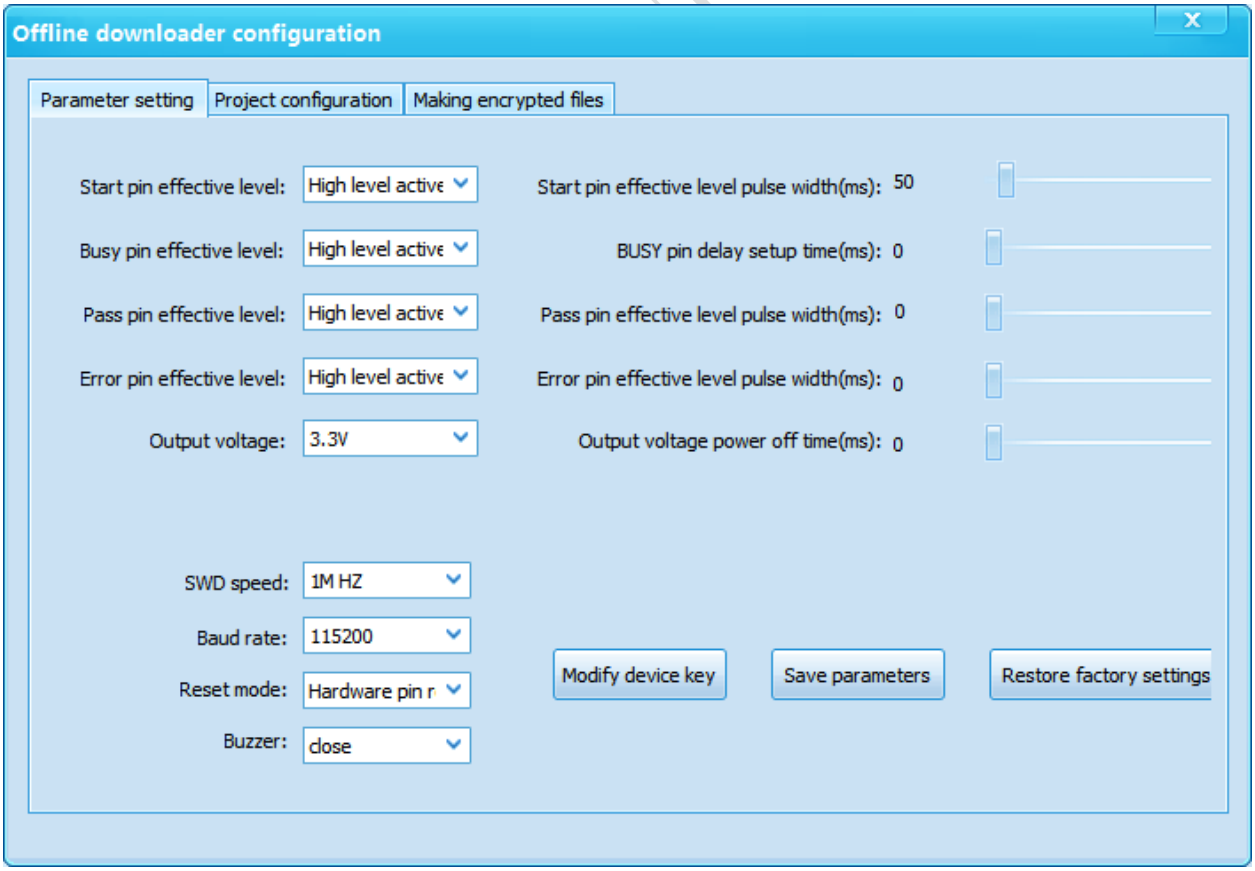


Figure 8-1 Parameter Settings

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

8.1.1.1 Machine control signal setting

Note: Refer to section 8.6 for detailed timing requirements

- **START signal (machine burning START signal) :**
  - **START Pin effective level:**
    a) When set to high level effective, the downloader waits to receive high level pulse signal as the start signal.
    b) When set to low level effective, the downloader waits to receive low level pulse signal as the start signal.
  - **START pin effective level pulse width:** 50~1000ms
- **BUSY signal (machine burning BUSY signal) :**
  - **BUSY pin effective level:**
    a) When set to high active, the downloader is at high level during the download.
    b) When set to low active, the downloader is at high level during the download.
  - **BUSY pin chattering time:** 0-1000ms, refers to the time between the download receives the start signal and sets the BUSY pin as the effective level chattering time.
- **PASS signal (machine burning success signal) :**
  - **PASS pin effective level:**
    a) When it is set to high level effective and the pulse width of PASS effective level is equal to 0, the downloader outputs high level after downloading successfully.
    b) When set to high level effective, and the pulse width of PASS effective level is not 0, the downloader outputs high level pulse after downloading successfully.
    c) When it is set to low level effective and the pulse width of PASS effective level is equal to 0, the downloader outputs low level after downloading successfully.
    d) When it is set to low level effective and the pulse width of PASS effective level is not 0, the downloader outputs low level pulse after downloading successfully.
  - **Pulse width of effective level of PASS pin:** 0-1000ms. When it is 0, it continuously outputs effective level; when it is not 0, it outputs effective level pulse.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

- **ERROR signal (burning failure signal of machine) :**
  - **ERROR pin effective level:**
    e) When set to high level effective and ERROR effective level pulse width is equal to 0, the downloader outputs high level after downloading successfully.
    f) When set to high level effective and ERROR effective level pulse width is not 0, the downloader outputs high level pulse after downloading successfully.
    g) When set to low level effective and ERROR effective level pulse width is equal to 0, the downloader outputs low level after downloading successfully.
    h) When set to low level effective and ERROR effective level pulse width is not 0, the downloader outputs low level pulse after downloading successfully.
  - **ERROR pin effective level pulse width:** 0-1000ms, when 0, continuously output effective level, when not 0, output effective level pulse.
- **VT output voltage:**
  - **VT output voltage:** when the downloader receives the start signal, VT turns on the voltage output and turns off after downloading
    a) No output.
    b) 3.3 V output.
    c) 5 v output.
  - **Hold time of output voltage after downloading:**
    a) 0: turns off the VT power output immediately after the device is successfully downloaded to prevent power-on chip downloading.
    b) Non-0: Indicates that the VT voltage output is disabled after a period of time.
    c) Unlimited: Indicates that the VT output voltage remains after the download is complete and the VT power output is not turned off.

    In particular, when the downloader receives the START signal to START the download, the power will be off immediately after the download is complete. This configuration is invalid.This configuration is invalid when the downloader is in continuous download mode (dip switch is in continuous download mode).

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

8.1.1.2 Device Parameter Setting

- Download speed Settings
  - SWD speed:

    The SWD transmission speed of the download can be selected as 100KHz, 200K, 500KHz, 1MHz, 2MHz and 5MHz
  - Baud rate:

    Set the baud rate for UART downloading
- **Reset mode:** it is used to reset and start after the download is complete.
  - Software reset
  - Hardware pins reset
- **Buzzer:** Buzzer enable option
- **Modify device key:** Modify the key of the downloader
- **Restore factory Settings:** Clear all offline download parameters and storage data to restore the factory default values**.**
- **Save parameters:** Save the parameters configured above to the downloader

8.1.2 Offline Project Configuration

This page is mainly used to display and make offline project files, as shown in the figure below:

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

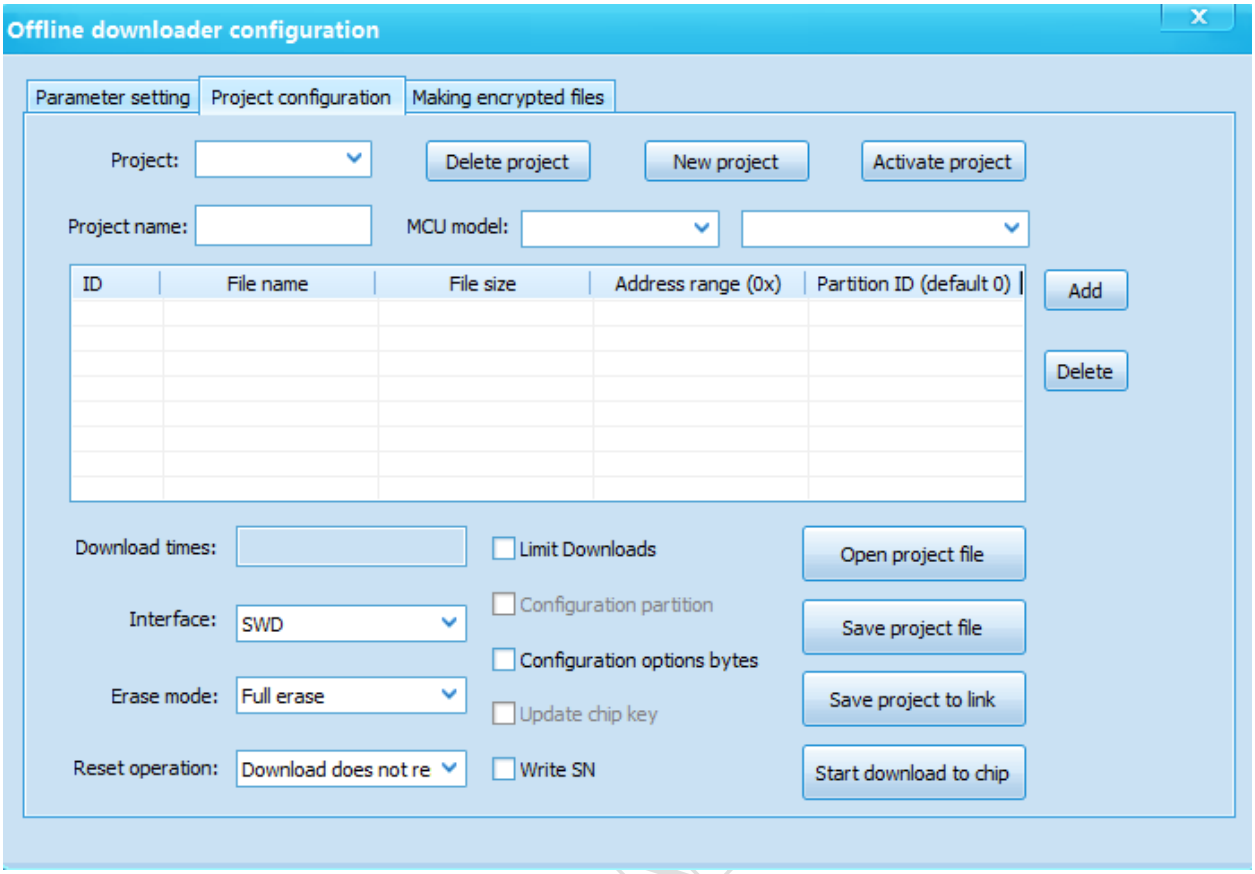


Figure 8-2 Project configuration

- **Project name:** User-defined project name when creating a project. The value can contain a maximum of 32 bytes.
- **MCU model:** When a new project is created, only the current series of MCU target boards are allowed to download when the option byte configuration is selected.
- **Add or Delete files:** When creating a project, add or delete files to be downloaded. The file format can be bin, HEX, or ENC. A maximum of eight files can be downloaded.The total size of the files to be added cannot be larger than the Flash size of the selected chip.If the configuration partition is selected, select the partition to download the file.
- **Limit download times/Download times:** Sets the maximum number of downloads supported by the download device
- **Communication interface:** Select the interface used for downloading
  - SWD
  - UART interface

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

- **Erase mode:**
  - SWD interface download
    a) It's erased
    b) Erase according to file
  - Download the UART interface
    a) Partition erase
    b) Erase according to file
- **Reset operation:** You can choose whether to reset after the download
- **Partition configuration:** Currently, only UART communication interfaces are supported, including partition size, partition download enablement, key ID, partition authentication enablement, and encrypted download enablement, as shown in the figure:

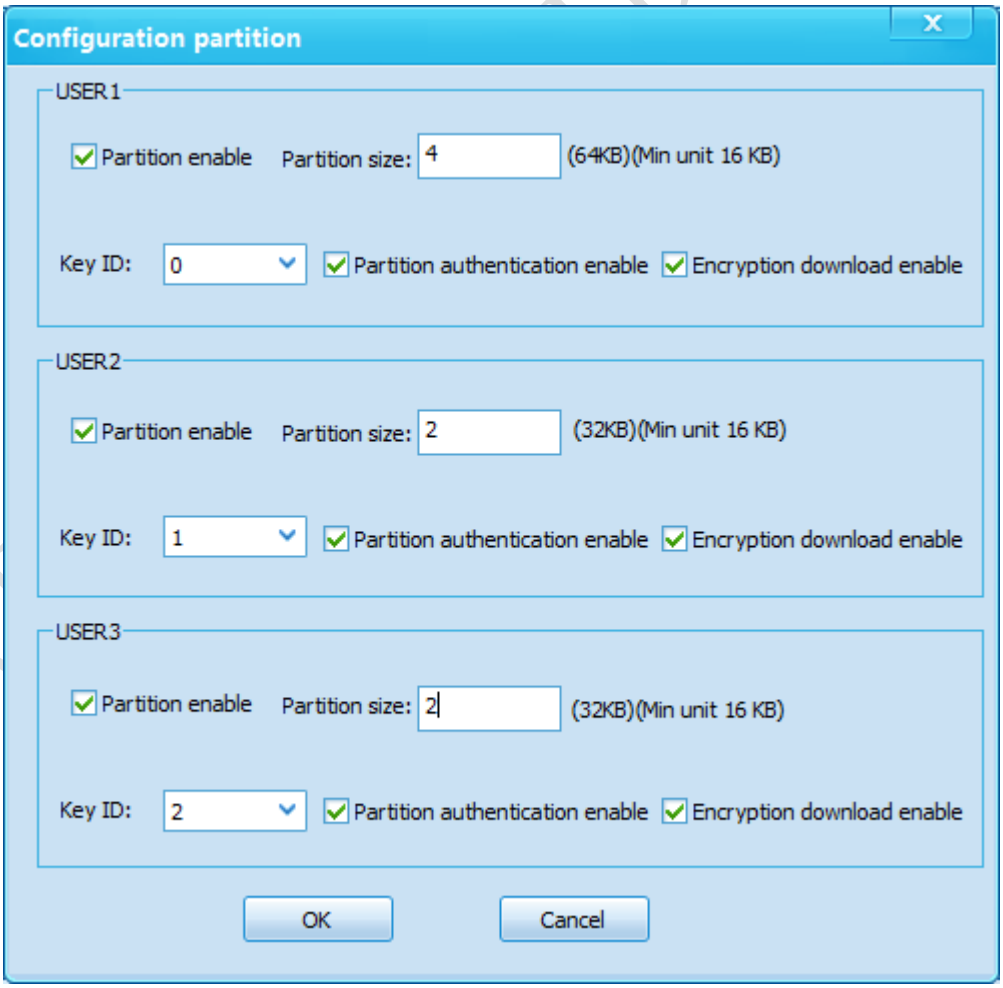


Figure 8-3 Configuring partitions

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

- **Enable partition download:** Indicates whether to configure the current partition
- **Partition size:** indicates the size of the configuration partition.

  Note:

  For the N32G(WB)45x_FR series, N32G(L) 43X and N32L40X series, USER1 of the chip can be set to a size of 0x00. Select the encryption or authentication mode, indicating that USER1 does not seal and only uses the encryption or authentication function.
- **Key ID:** 0x00-0x1F ID of the encryption download/Partition authentication key index
- **Zone authentication Enable:** Indicates whether to enable zone authentication. Once zone authentication is enabled for the target chip, it cannot be undone and is an irreversible operation.
- **Encrypted download enable:** indicates whether to enable encrypted download. Once partition authentication is enabled on the target chip, the subsequent operations cannot be undone. Therefore, only the key value of the target chip can be changed.

Recommended partition configuration process:

1. If you need to divide two areas, configure USER3 (automatic sealing is complete).If you want to also seal USER1, configure USER1 again.The size of USER1 + USER3 must be the size of the entire FLASH;

2. To divide three zones, configure USER3 (automatic sealing is configured) and then USER2 (automatic sealing is configured).If you want to also seal USER1, configure USER1 again.The size of USER1 + USER2 + USER3 must be the size of the entire FLASH.

It is recommended that users perform encryption authentication operations according to the following:

Encrypted Authentication Operation				
	No partition	**No partition**	**The partition**	**Partition**

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

	authentication operation is performed during download, and data is not encrypted	**authentication operation is performed during download, and data is encrypted**	**authentication operation is performed during download, and the data is not encrypted**	**authentication operation and data encryption during download**
Key not updated after factory (default key)	1. Uncheck the partition authentication enable 2. Uncheck Encrypted Download Enable	1. Uncheck the partition authentication enable 2. Check the encrypted download enable	1. Check the partition authentication enable 2. Uncheck Encrypted Download Enable	1. Check the partition authentication enable 2. Check encryption and then enable
The key has been updated since the factory	1. Uncheck the partition authentication enable 2. Uncheck Encrypted Download Enable	1. Uncheck the partition authentication enable 2. Check the encrypted download enable 3. Check the update key	1. Check the partition authentication enable 2. Uncheck Encrypted Download Enable 3. Check the update key	1. Check the partition authentication enable 2. Check the encryption and then enable it 3. Check the update key

- **Update chip key:** The chip key can be updated only for UART communication interfaces.This configuration indicates that the key of the corresponding partition of the target chip is updated before the download is performed using the new key.After checking, a dialog box will pop up as shown in the figure:

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

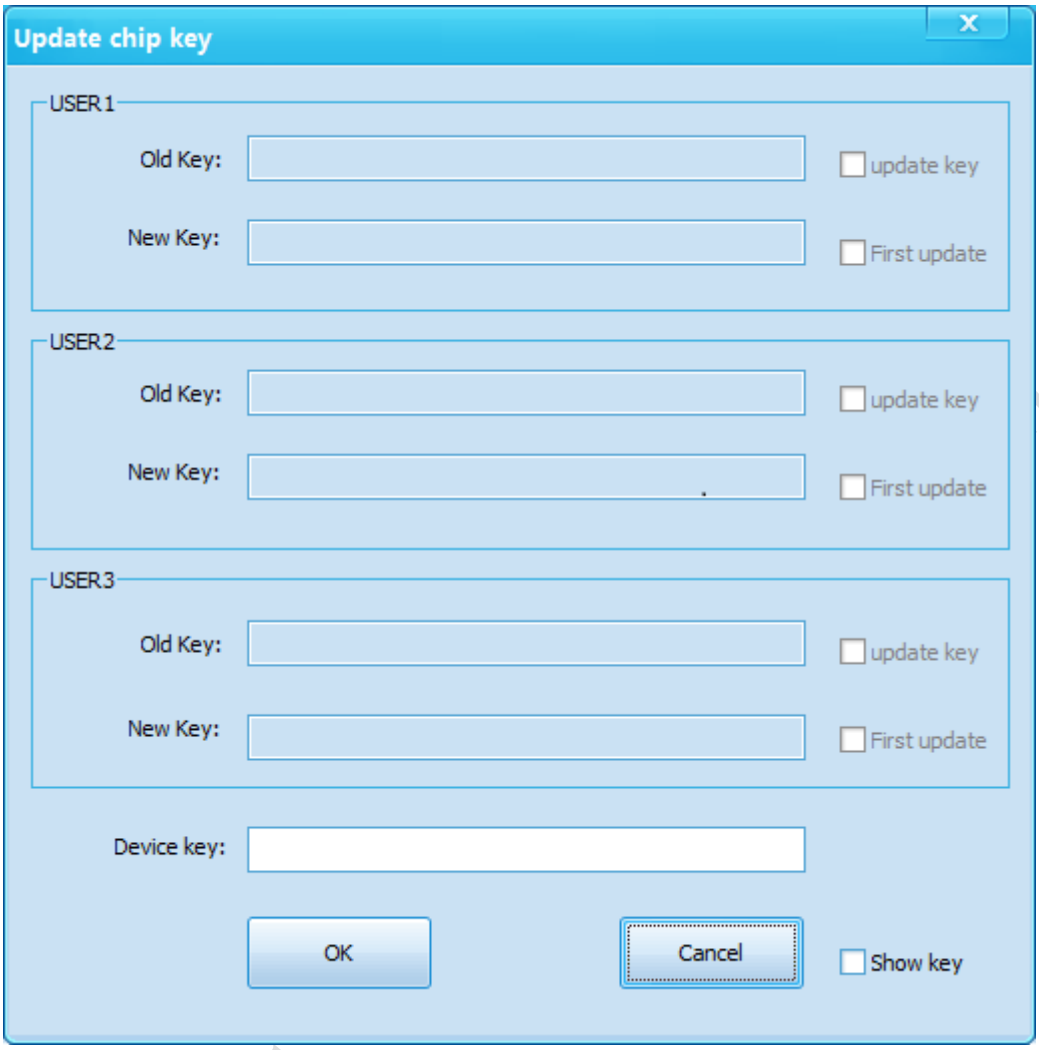


Figure 8-4 Update chip key

- **Partition:** indicates the partition user1/2/3
- **Update key**: Check to indicate whether to update the new chip key to the target chip, and use the new key to download when downloading, unchecked means to download only with the new key when downloading, but the new key will not be used. configured into the target chip.
- **First update:** It means that the chip has not been updated after leaving the factory. The user updates the chip key for the first time. After checking this, the user does not need to enter the old chip key, and only checks the chip with the unmodified key at the factory.
- **Old chip key:** If it is the first time to update the key, it defaults to one of the 32 sets of passwords from the factory, which does not need to be filled in by the user. Otherwise, the user's last updated key value

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

- ✧ **New Chip Key:** Indicates the current key to be updated.
- ✧ **Device key:** indicates the key of the current downloader, the default is the SN serial number of the downloader

  Note: If the target chip needs to create a new project for program download after it has updated the key of the excessive zone, cancel "Initial update", fill in the current key value of the target chip in both "old chip key" and "new chip key", and fill in "device key".Click the ok button.

  There are several operations to update the target chip:

update key		
	Key not updated after factory (default key)	**The key has been updated since the factory**
Requires current chip key for download (encrypted or authenticated)	No action required	1. Fill in the old key (the current key of the chip) 2. Fill in the new key, which is the same as the old key 3. Fill in the downloader device key
You need to modify the current key and then use the new key to download (encryption or authentication)	1. Check Update Key 2. Check the first update 3. Fill in the new chip key 4. Fill in the downloader device key	1. Check Update Key 2. Fill in the old key (the current key of the chip) 3. Fill in the new key 4. Fill in the downloader device key

- ■ **Configuration option byte:** This operation indicates the configuration option byte (including read protection level, FLASH page write protection, datA0/1 configuration, and USER configuration).N32G(WB)45x_FR series is selected because of the different option bytes of each series of chips. Click configure Option bytes and the dialog box will pop up as shown in the figure:

  For details about option bytes, refer to the corresponding chip user manual based on the chip model.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

NATIONS CONFIDENTIAL

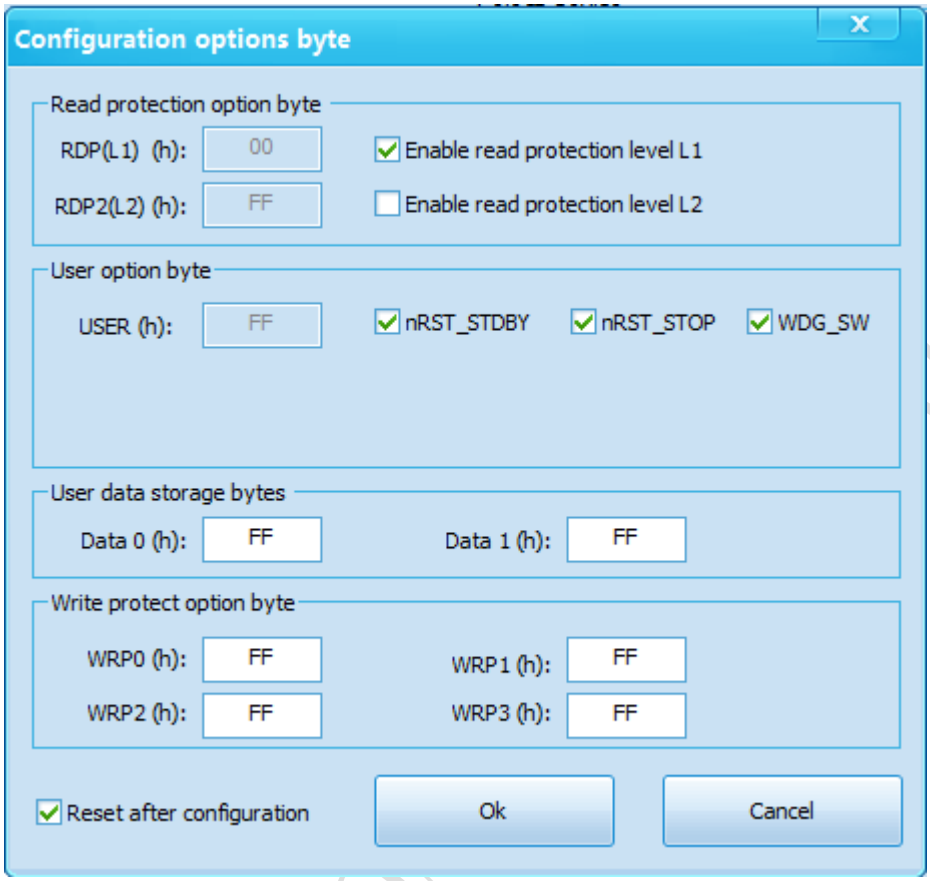


Figure 8-5 Configuration option bytes

After selecting N32G(L) 43X series and N32L40X, click configuration Option byte and the dialog box will pop up as shown in the picture:

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

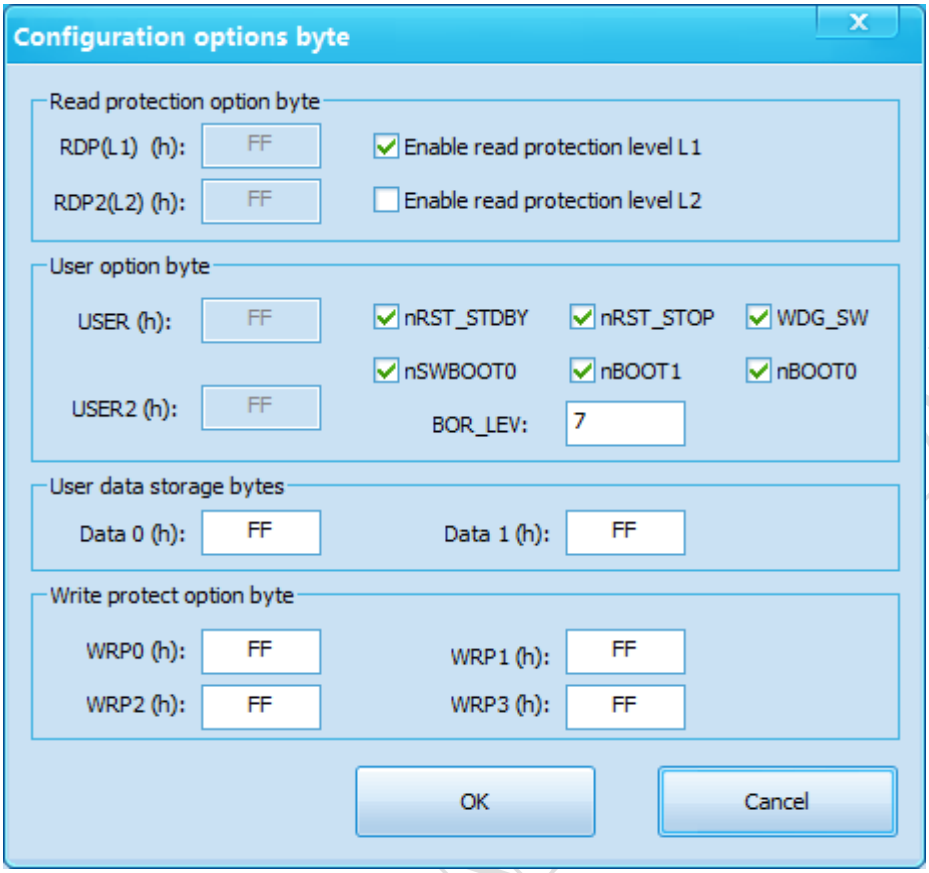


Figure 8-6 Configuration option bytes

After selecting N32G032 / N32G031/N32G030 series, click configuration option byte and the dialog box will pop up as shown in the picture:

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

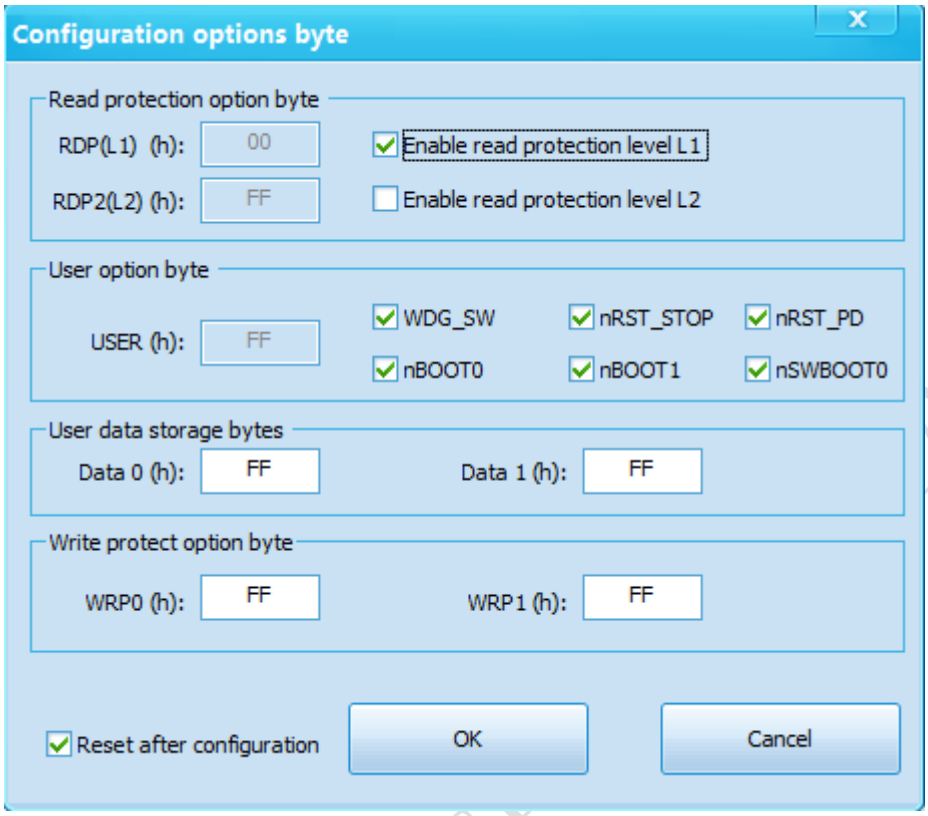


Figure 8-7 Configuration option bytes

Read protection option byte: User code in Flash can be set to read protection to prevent unauthorized reading.Read protection mainly protects the access operation of the main memory area and option byte block after the chip is sealed.Read protection is set by RDP bytes in the configuration option byte block. Three different read protection levels can be configured, as listed below:

Read protected state	RDP1	nRDP1	nRDP2	RDP2
L1 level	0xFF	0xFF	RDP2! = 0xCC || nRDP2! = 0x33	
Does not protect	0xA5	0x5A	RDP2! = 0xCC || nRDP2! = 0x33	
L2 level	0xXX	0xXX	0x33	0xCC
L1 level	None of the preceding three configurations			

Read protection configuration list

- Level of L0:
  - In the unprotected state, corresponding to (RDP1== 0xA5&NRDP1 ==0x5A) && (RDP2!=0xCC | nRDP2!= 0 x33);
  - Main storage and option byte blocks can be read arbitrarily;

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

NATIONS CONFIDENTIAL

- You can configure the write protection properties of each Page for programming and erasure.

- L1 levels:
  - The corresponding ~((RDP1== 0xa5&nrDP1 ==0x5A) && (RDP2!=0xCC | nRDP2!= 0 x33) | | (RDP2 = = 0 XCC & nRDP2 x33 = = 0));
  - Read operations to the main storage area are allowed only from user code, that is, if the program is launched from the main flash memory in a non-debugging manner;
  - Pages 0~1 are automatically write protected;
  - Other pages can be programmed with code executed in the main flash memory (for things like IAP or data storage);
  - All pages are not allowed to be written or erased (except for whole wipe) in debug mode or after booting from internal SRAM;
  - All functions of loading and executing code into the built-in SRAM via JTAG/SWD are still valid, and can also be enabled from the built-in SRAM via JTAG/SWD. This function can be used to remove read protection.
  - When the read protected option byte is overwritten to the unprotected L0 level, the entire main storage area is automatically erased as follows :(erasing option byte blocks does not result in an automatic whole erase operation, as the result of erasing is 0xFF, which is equivalent to still being protected at L1 level)
    - Write the correct sequence of keys to the OPTKEY unlock option byte area;
    - The bus initiates the command to erase the entire option byte area (Page erase);
    - Bus write read protection option byte 0xA5;
    - Internal automatic erasure of all main storage areas;
    - Internally write 0xA5 to read protection option bytes;

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

- System reset (such as software reset, etc.), option byte blocks (including the new RDP value 0xA5) will be reloaded into the system, and read protection will be removed;

◆ The following operations on the flash memory are prohibited:

- Access to primary flash memory by executing code from the built-in SRAM, including using DMA;
- Access the main flash memory through JTAG, SWV (serial line viewer), SWD (serial line debugging) and boundary scan;

◆ L2: this level is the same as L1 except that the debugging mode is disabled and the protection level cannot be changed (irreversible).The L2 level is achieved by configuring another option byte RDP2, regardless of the value of RDP1, as long as (RDP2==0xCC & nRDP2==0x33) the LEVEL is L2.

➢ **User option bytes:**

USER:

✧ The USER [and] : Reserved

✧ USER[2] : nRST_STDBY configuration option

0: A reset occurs when the standby mode is entered

1: The standby mode does not reset

✧ USER[1] : nRST_STOP configuration option

0: reset occurs when entering STOP mode

1: No reset occurs when entering the STOP mode

✧ USER[0] : WDG_SW configuration option

1: hardware watchdog

0: software watchdog

USER2:

✧ USER2 [7] : Reserved

✧ USER2[6:4] : BOR_LEV[3:0], default is 0

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

- ✧ USER2 [3] : Reserved
- ✧ USER2[2] : nSWBOOT0 configuration option, default is 1
- ✧ USER2[1] : nBOOT1 configuration option, default is 1
- ✧ USER2[0] : nBOOT0 configuration option, default is 1

Write protection option bytes:

- ✧ WRP0: write protection for pages 0 to 15
- ✧ WRP1: write protection for pages 16 to 31
- ✧ WRP2: write protection for pages 32 to 47
- ✧ WRP3: write protection for pages 48 to 255

■ **Write sequence number:** indicates the write sequence number, including the write address, start value, and step value.Formula for calculating the serial number: 4 bytes Serial number value = (start value + step value x number of successful downloads);

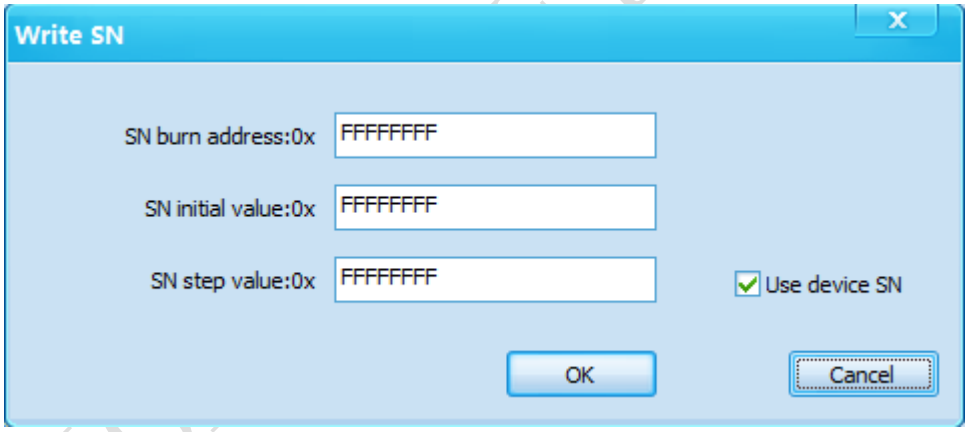


Figure 8-8 Writing the serial number

Note: Serial numbers start with "serial number (SN) burn address", take up 32 bytes of space, must be all 0xFF (no value).

a) If use downloader serial number is not selected, the sequence number will be written to the first 4 bytes of the 32 byte space and the last 28 bytes will be written to 0xFF.

32 bytes space	
4 bytes serial number value	28 bytes 0 XFF

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

b) Check if the "use downloader serial number", is in the download program, put downloader serial number sequence number value after each equipment serial number (the only), serial number of 20 bytes (16 bytes downloaded serial number + serial number 4 bytes), and to write serial number 20 bytes into 32 bytes before 20 bytes of the space, the remaining 12 bytes of 0 XFF.

32 bytes space		
16-byte download serial number	4 bytes serial number value	All 12 bytes are 0xFF

- **New project:** Create a new project and initialize the parameters of the project
- **Delete item:** Delete an existing item in the downloader
- **Active project:** sets the current project to the one currently used by the downloader
- **Open a project file:** Opens an existing project file (*.nspf). It can only be opened for viewing but cannot be modified
- **Save the project file:** Save the configured project to a local computer in a *. NSPF file
- **Save project to Downloader:** Save the currently configured or opened project to downloader
- **Start download to chip:** Downloads the current item from the downloader to the chip

8.1.3 Making an encrypted file

Making encrypted files encrypts downloaded files so that the downloaded files can be transmitted and saved in encryption.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

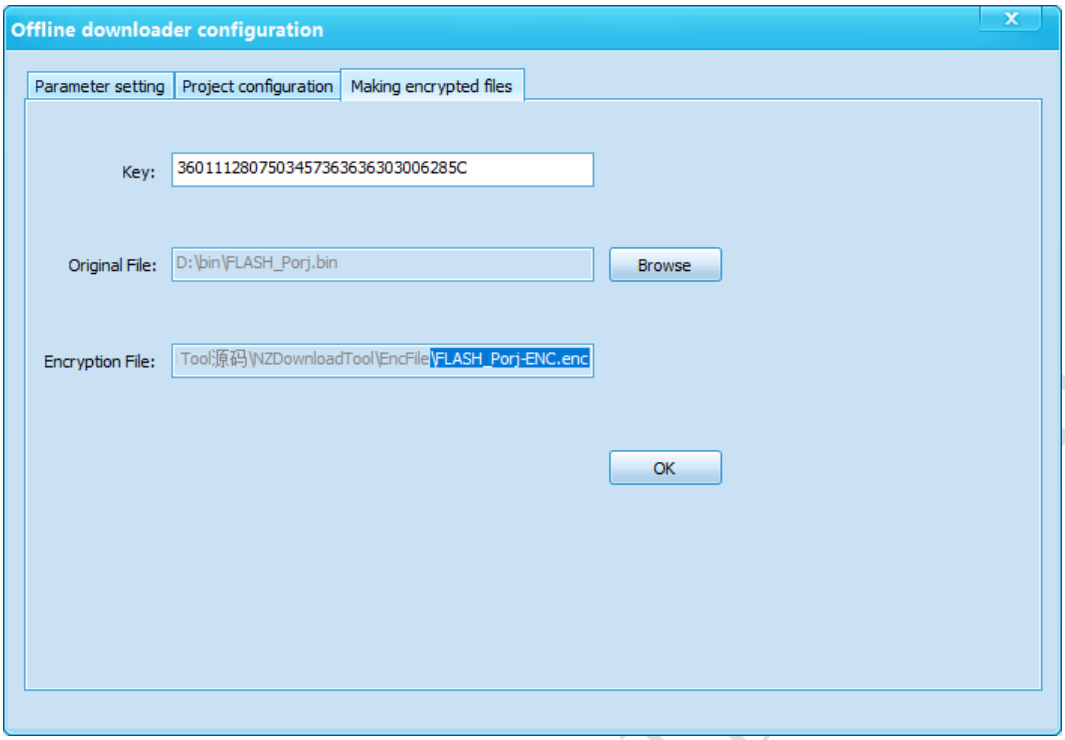


Figure 8-9 Making an encrypted file

- **Key:** serial number (SN),the key used to encrypt the original file. The length is 16 bytes.
- **Original file:** The original file to be encrypted. The file can be in *. Hex or *. Bin format
- **Encrypted file:** an encrypted file in *. Enc format

8.2 SWD mode download

SWD download is a common download interface. Users can configure the download interface of the download device as a four-line SWD interface through the upper computer.SWD mode download is suitable for hand-held download device for small batch program burning, also can be paired with machine for mass production burning. Note: offline download will release the original read-write protection in the chip by default.

8.2.1 Download the project configuration offline

1、 Click "Offline Downloader Configuration", the offline project configuration dialog box pops up.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

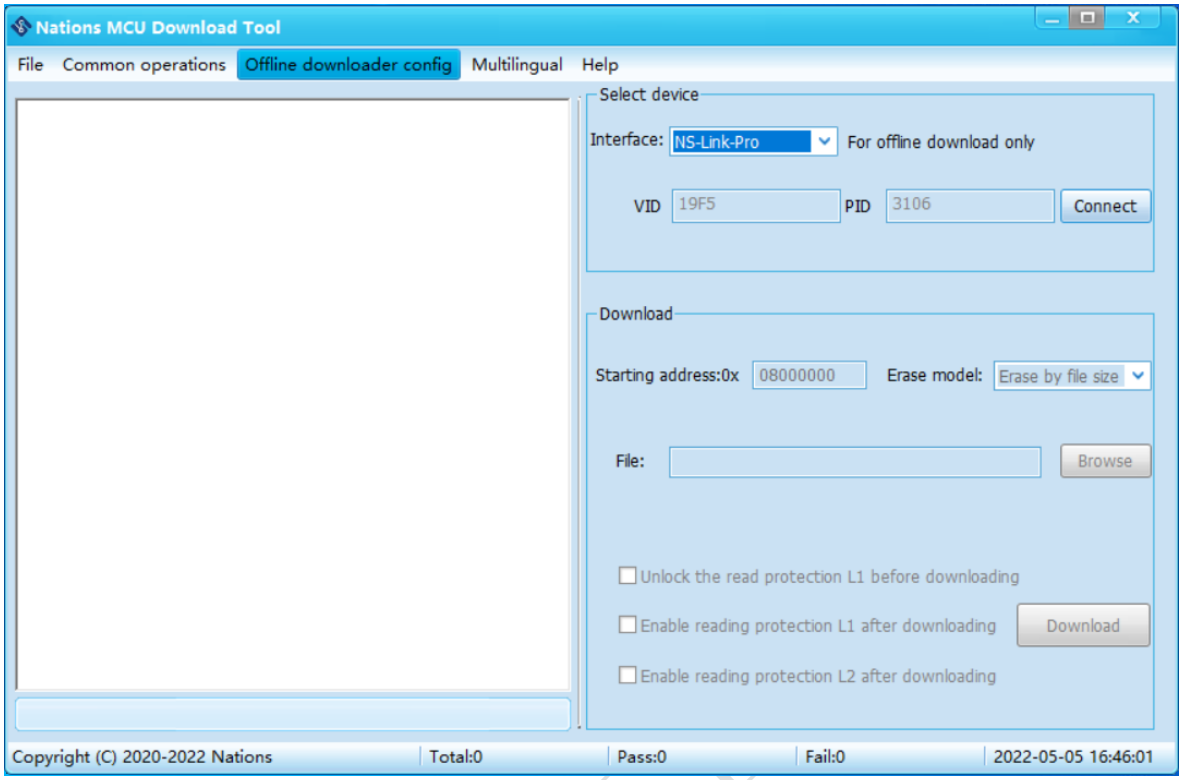


Figure 8-10 Click offline Downloader configuration

2、 Click New Project.

3、 Fill in the project name.

4、 Select a chip model from the drop-down list box.

5、 Select SWD as the communication interface.

6、 Erasing mode select full - slice erasing.

7、 Choose not to download.

8、 Click Add and select the file you want to download.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

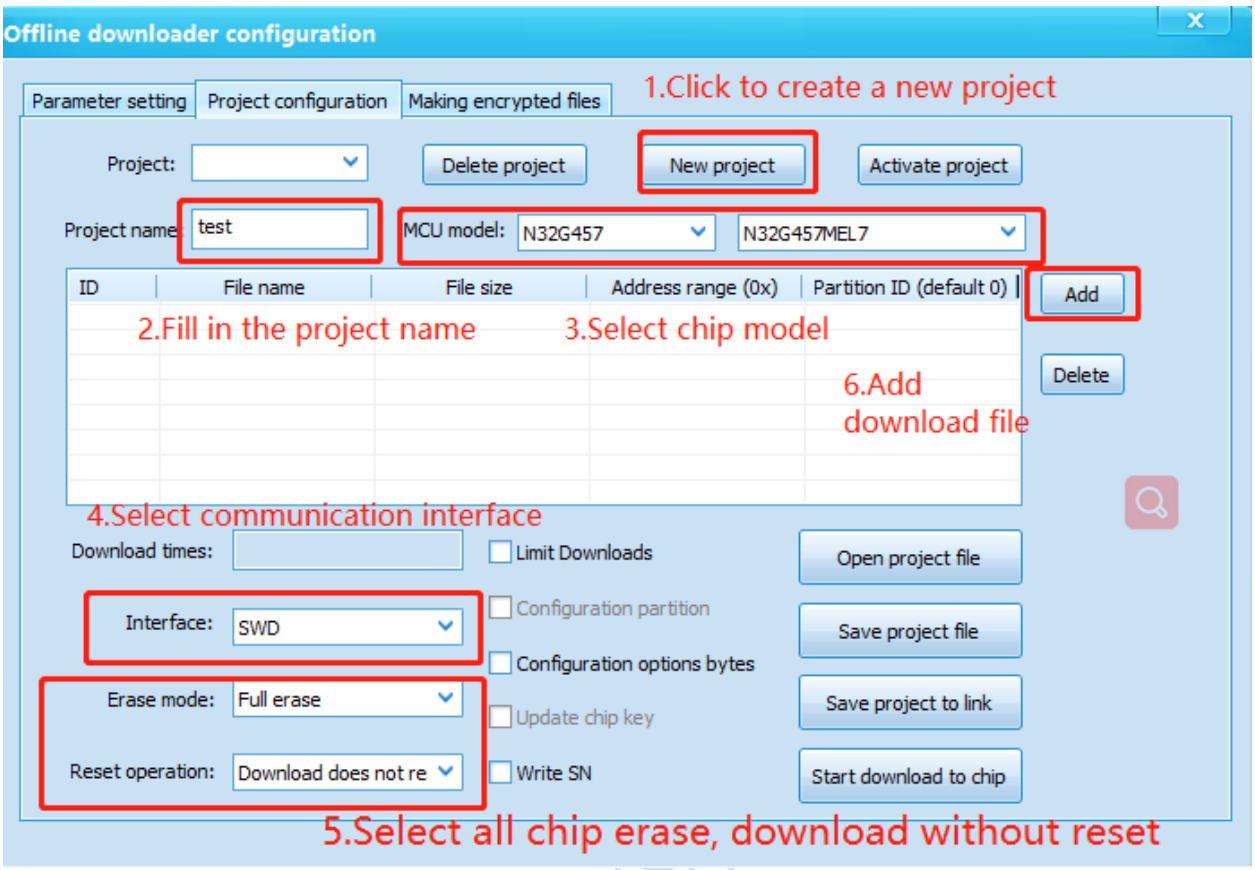


Figure 8-11 Configuring the offline downloader project

9、 In the dialog box that pops up, fill in the address 0x08000000 for downloading files to the target chip (0x08000000 address is the start flash address of the chip) and click "OK".

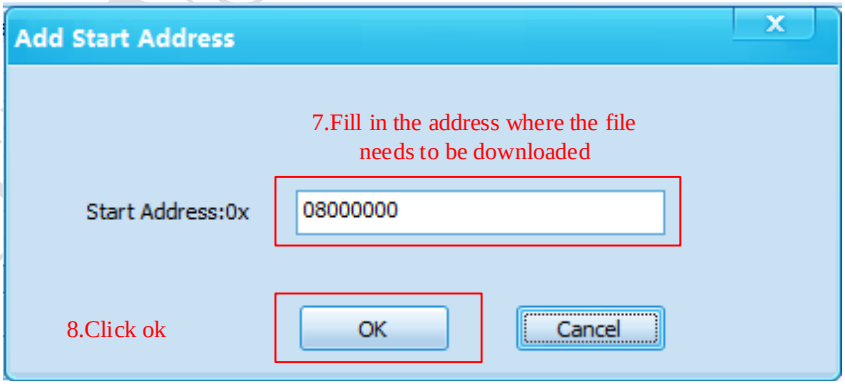


Figure 8-12 Adding a file

10、 Click "Save project file", the project setting dialog box pops up, uncheck the two selection boxes, and click "OK".

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

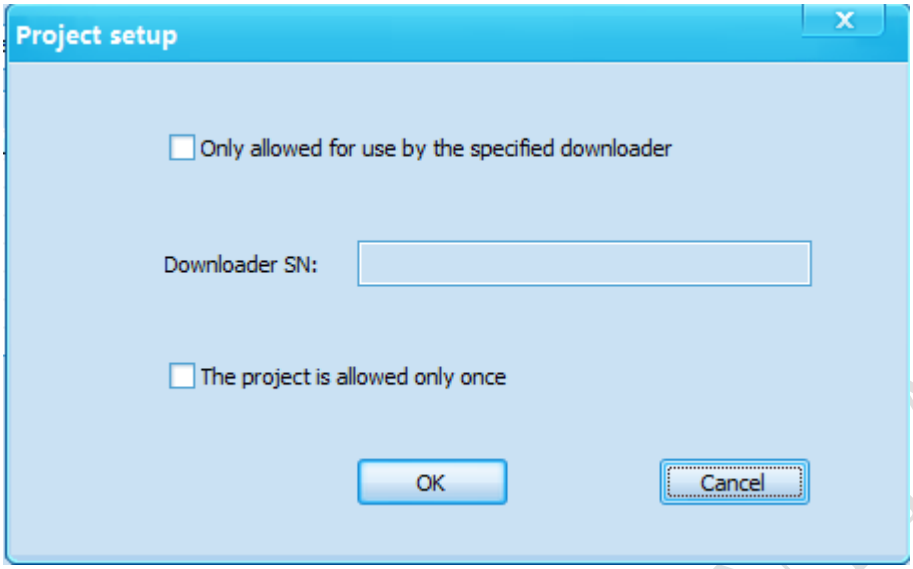


Figure 8-13 Project Settings dialog box

11、 In the dialog box that is displayed, select Yes.

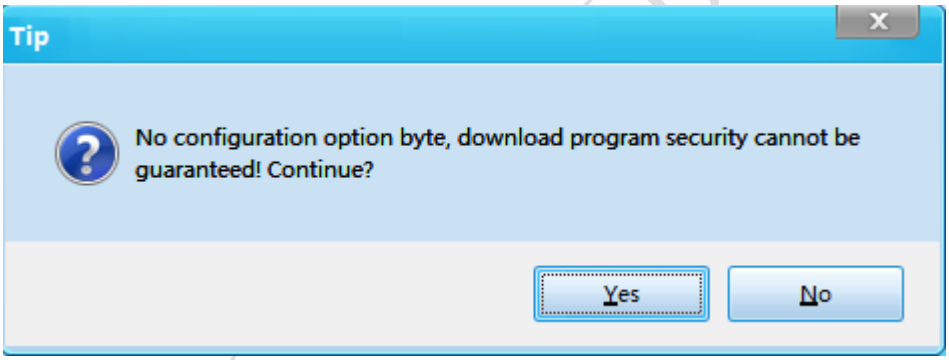


Figure 8-14 Click "Yes"

12、 Select a file storage path, enter a file name, and click Save.

8.2.2 Save the project to an offline downloader

1、 Select "NS-Link-Pro", click "Connect", connect the upper computer to the downloader, click "Offline Downloader configuration".

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

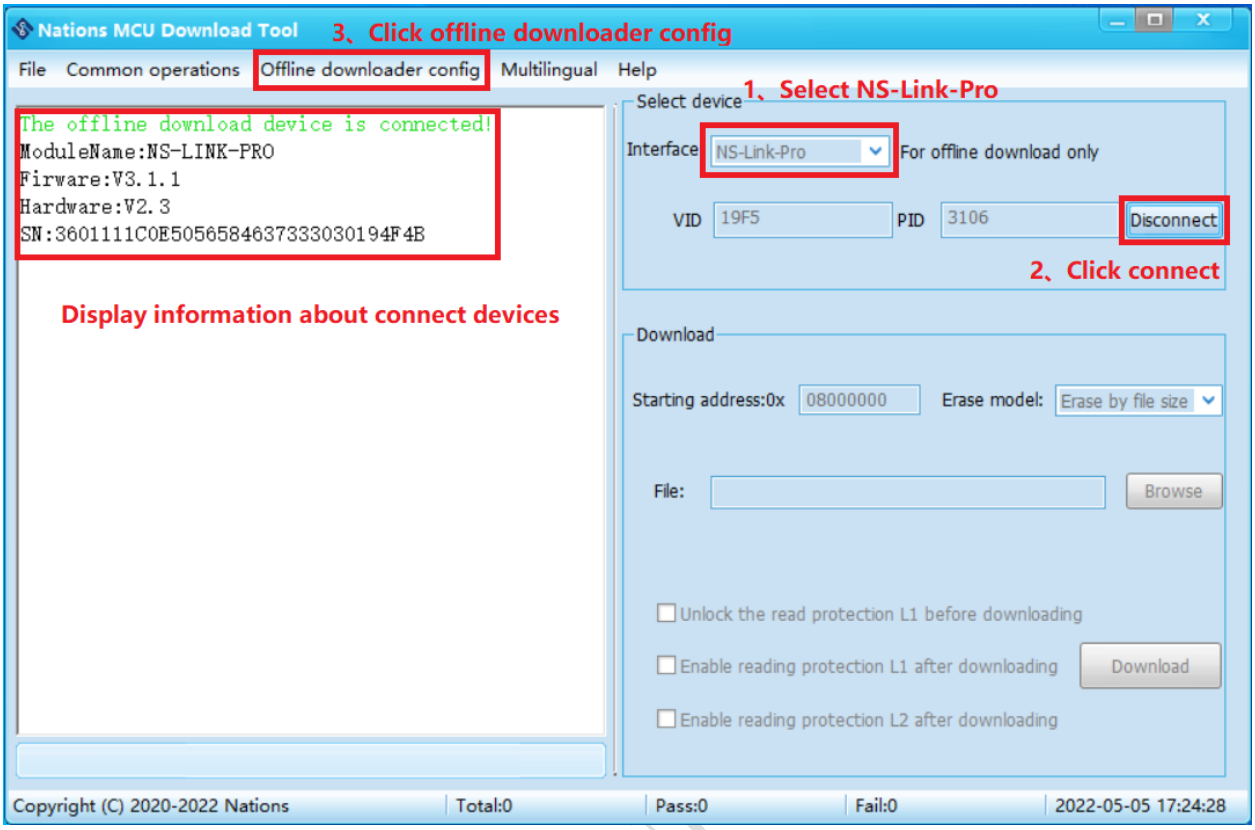
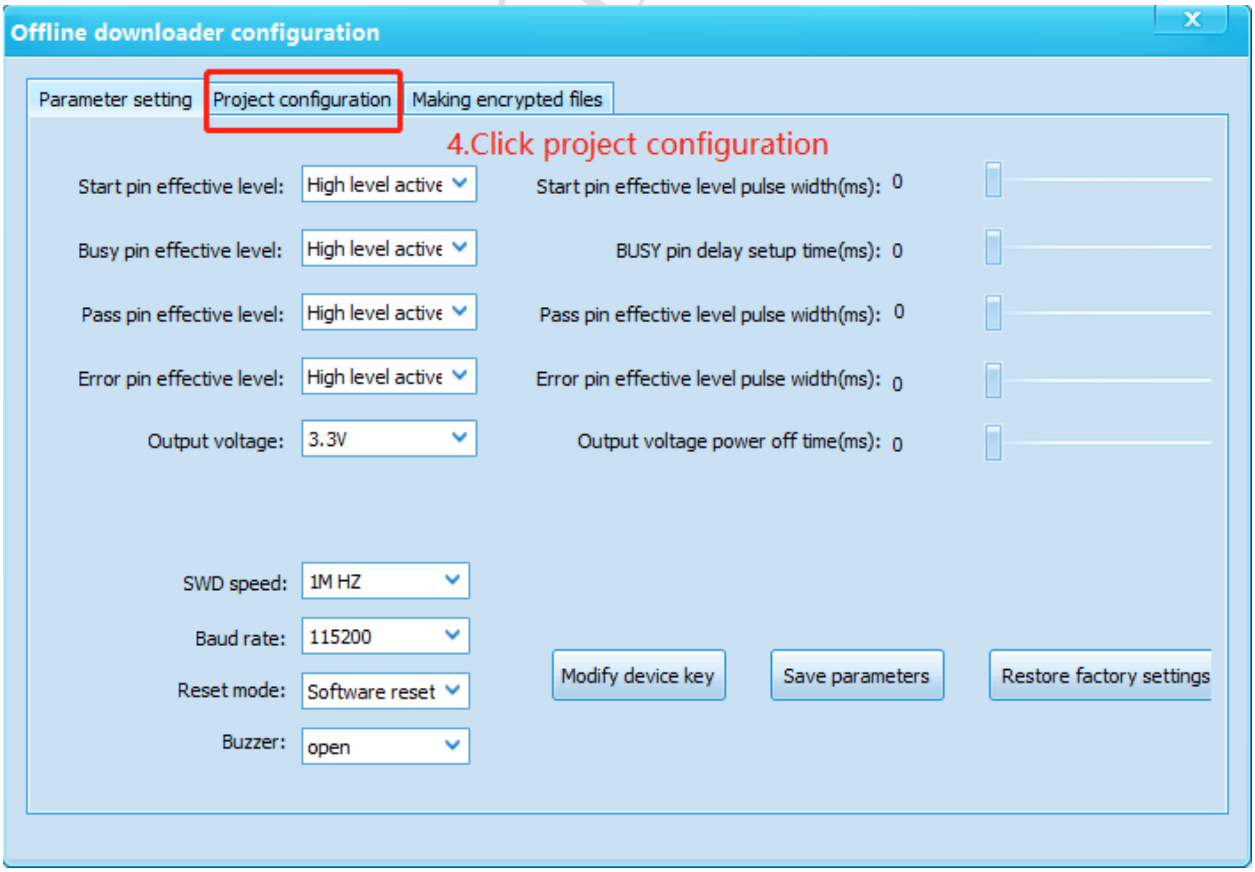


Figure 8-15 Connecting devices

2、 Click Project Configuration.



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

Figure 8-16 Click project Configuration

3、 Click "Open project File", select the project file in 5.5.1 Save to local, and click "Open".

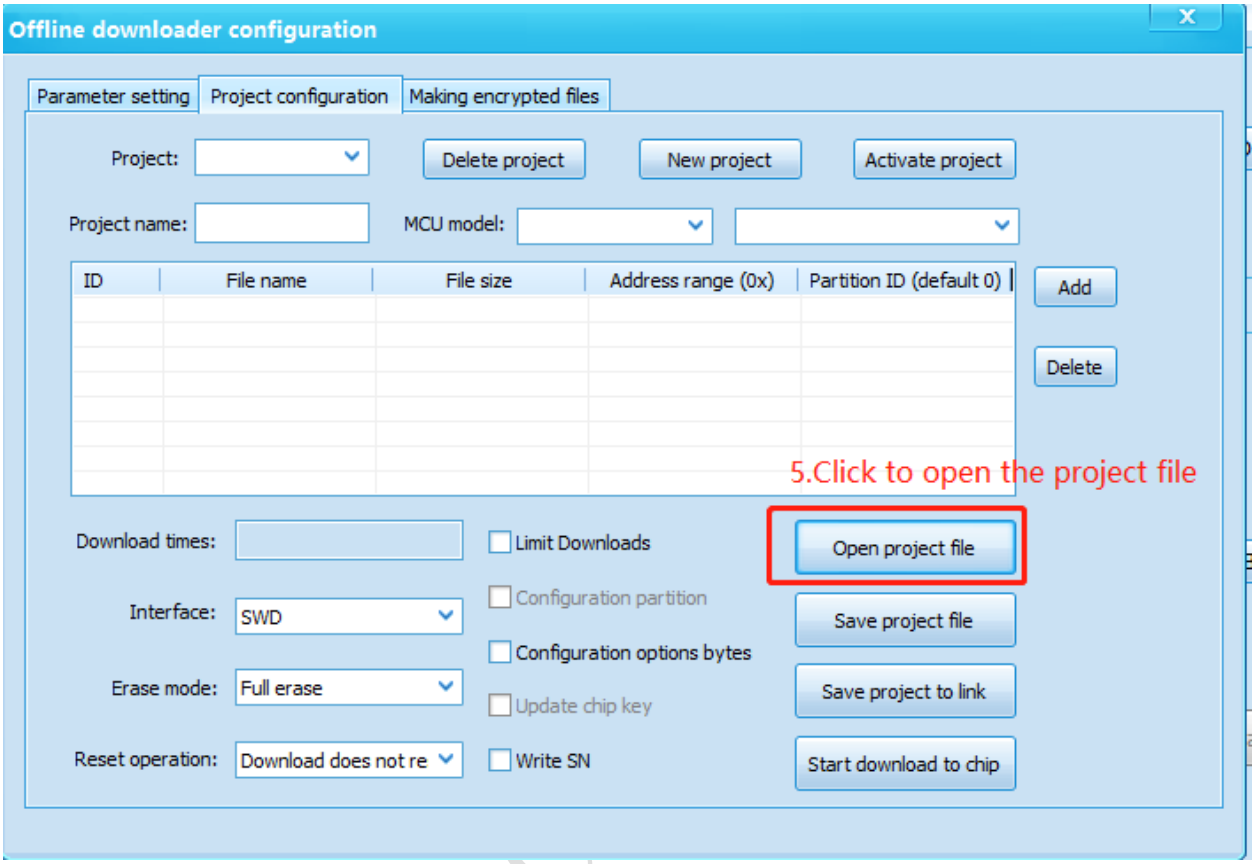


Figure 8-17 Opening the project file

NATIONS

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

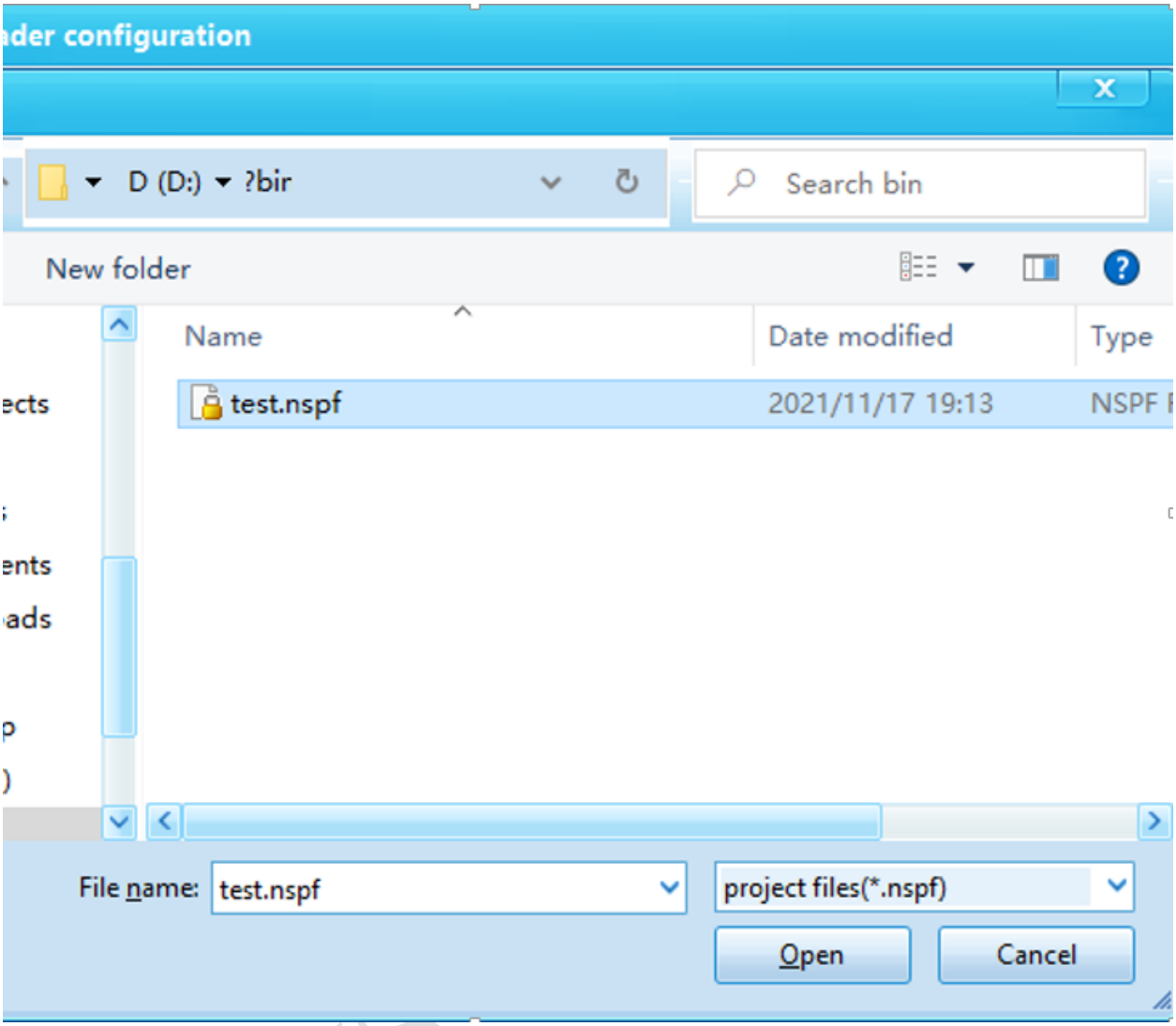


Figure 8-18 Selecting an existing project file

4、 Click OK.

NATIONS

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

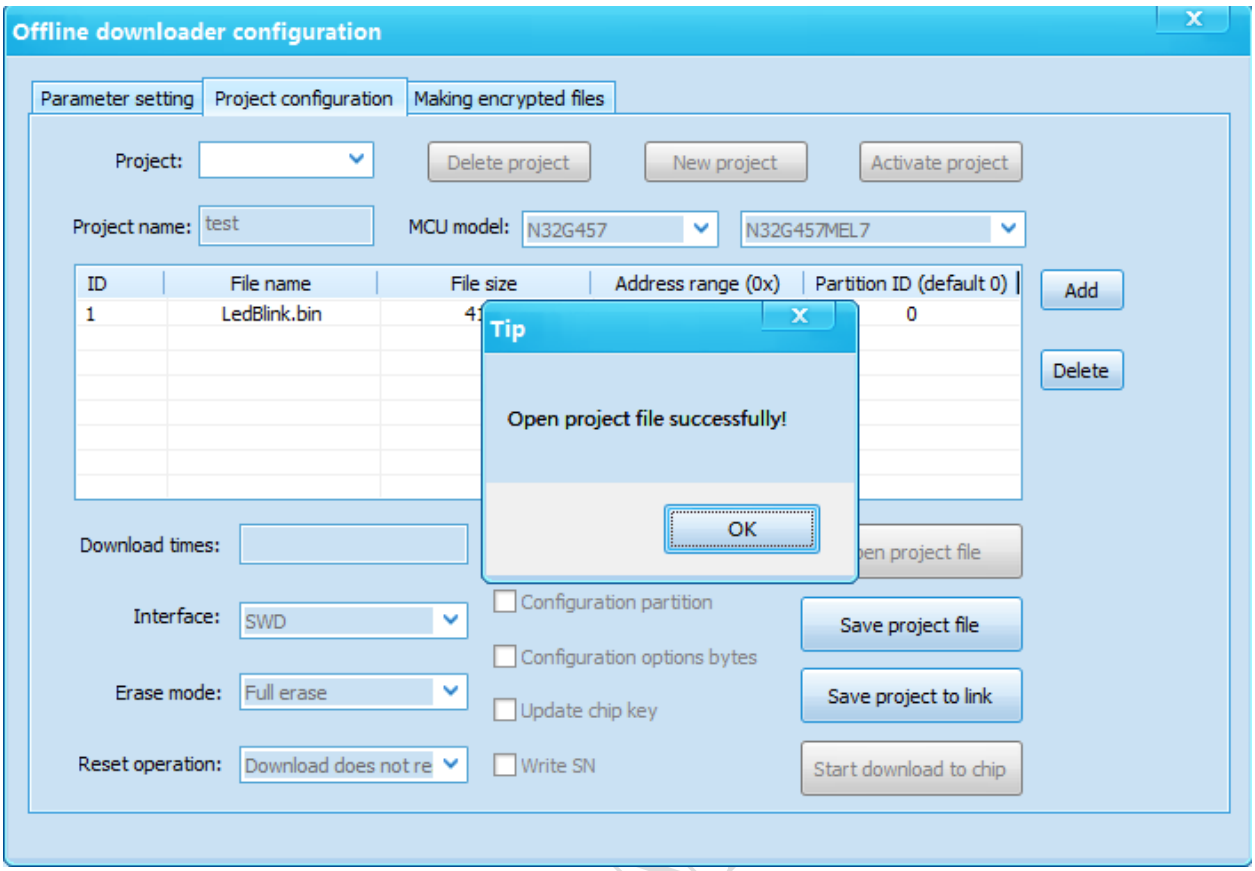


Figure 8-19 Opening the project

5、 Click "Save project to Downloader".

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

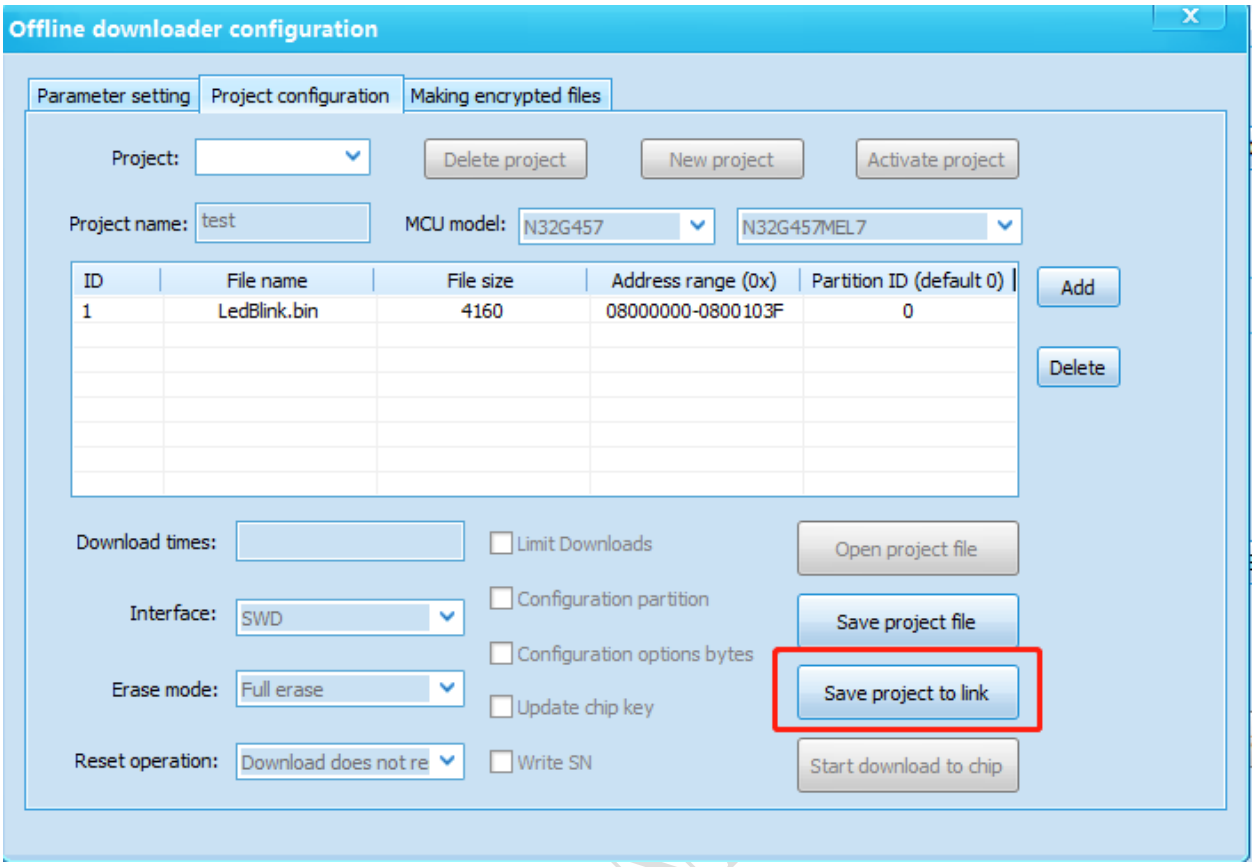
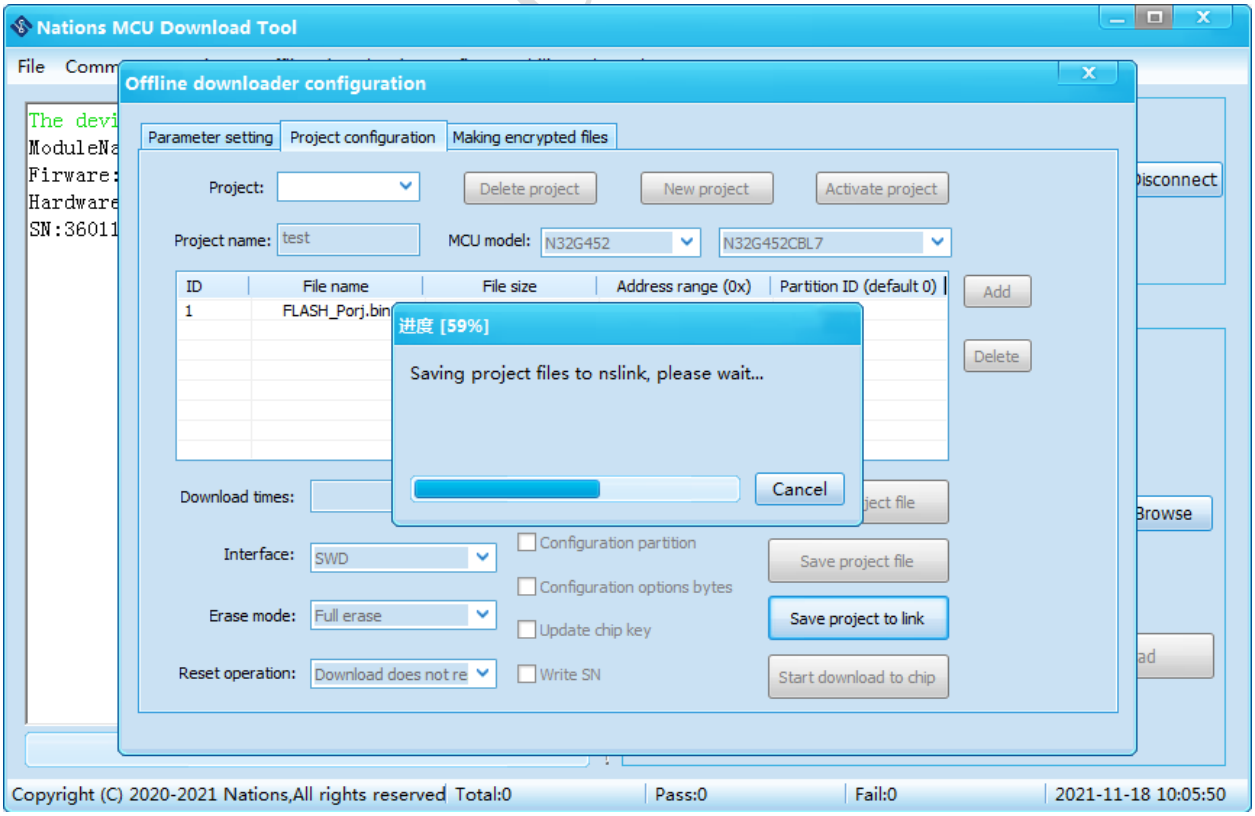


Figure 8-20 Saving the project to the downloader

6、 Wait for the project transfer to complete.



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

Figure 8-21 Project in transit

7、 When the project is transferred, click OK.

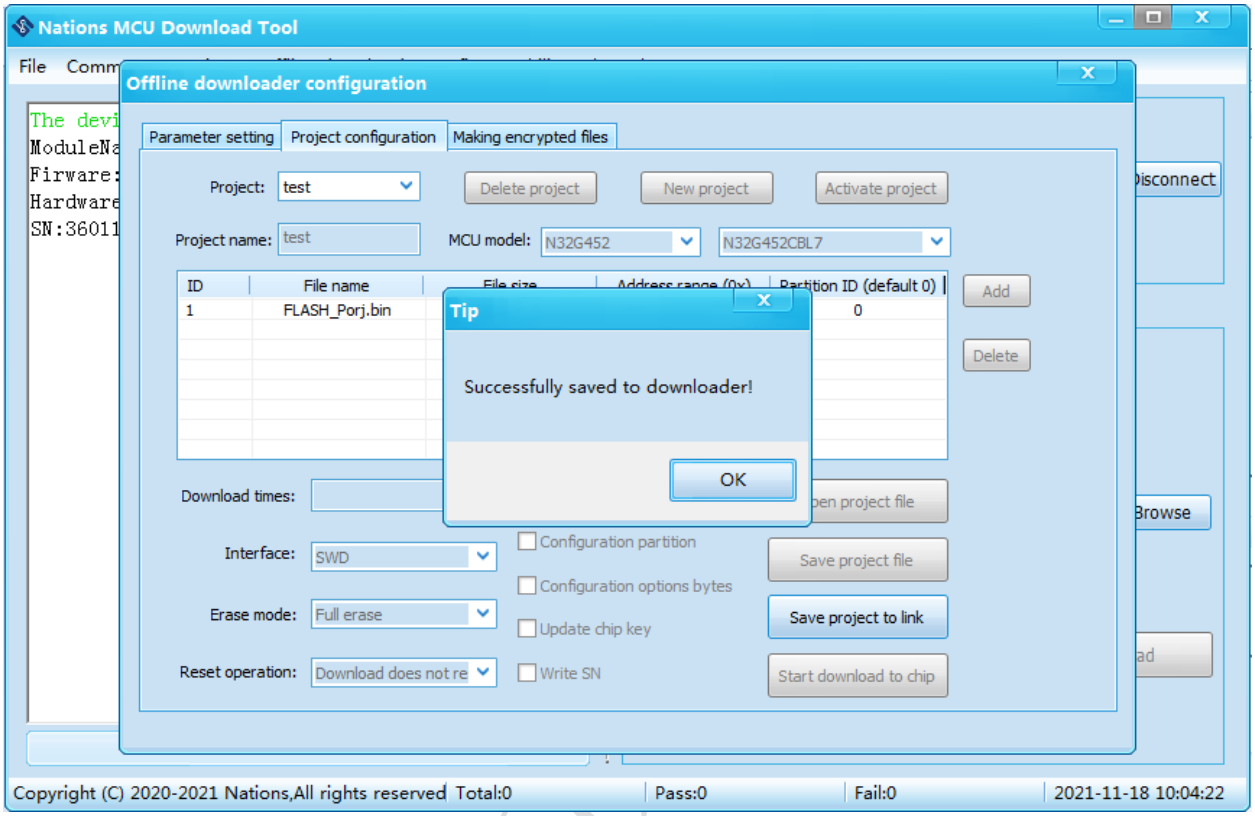


Figure 8-22 Project transfer completed

8.3 UART(serial port) mode download configuration example

Serial mode download is through the security BOOT program solidification in the MCU for code download, can support a variety of MCU security partition, security encryption and transmission, security authentication and other unique security features and download mode, so that the data between the download device and the chip can be safe and efficient transmission.

8.3.1 UART(serial port) download

The example describes how to create a non-partitioned download project.

8.3.1.1 Offline Project Configuration

1、 Click New Project.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

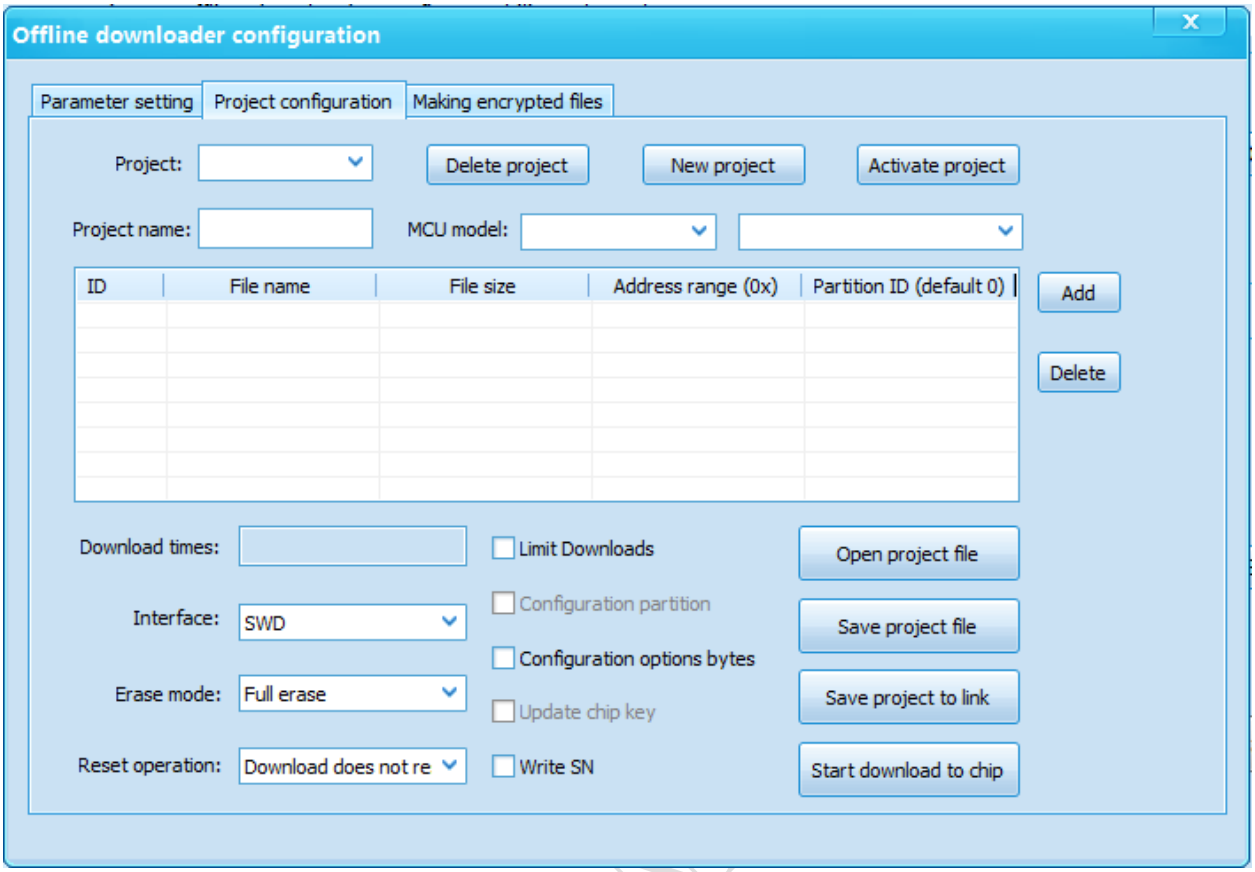


Figure 8-23 Click New Project

2、 Fill in the project name.

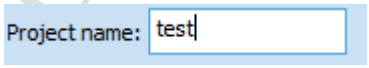
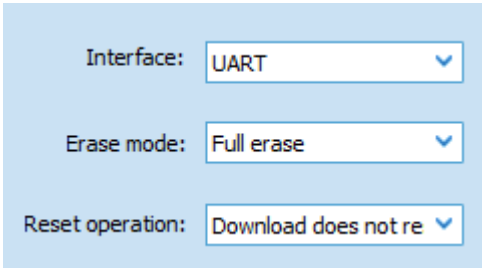


Figure 8-24 Fill in the project name

3、 Select the chip model from the drop-down list box.

Figure 8-25 Selecting the chip model

4、 Select communication interface as UART, erasing mode as full film erasing, and download as no more.



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

NATIONS CONFIDENTIAL

Figure 8-26 Selecting communication structure, erasing mode, and reset operation81

5、 Click Add.

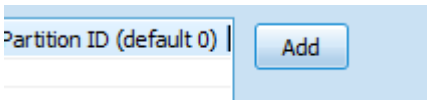


Figure 8-27 Click "Add"

6、 Select the file to be downloaded by partition 1 (USER1) and click "Open". In the dialog box that pops up for adding the start address, select USER1 and fill in the start address 0x08000000 (the start address of partition 1 is the start address of chip FLASH).

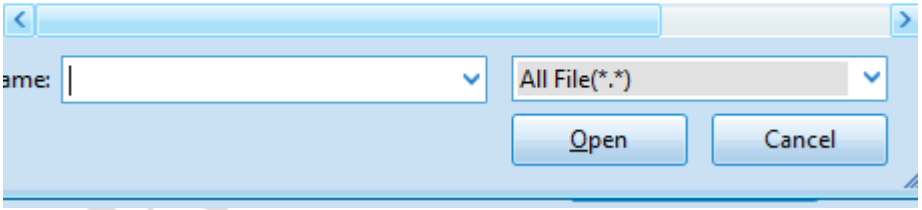


Figure 8-28 Selecting the file to be downloaded by USER1

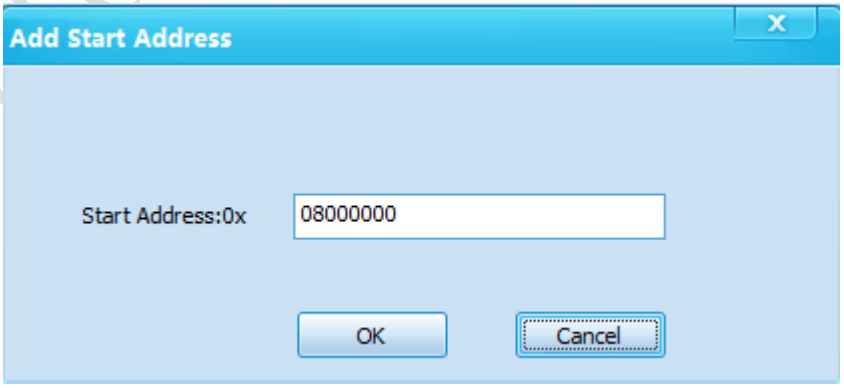


Figure 8-29 Fill in the start of download

7、 Click "Save project File" to save the project file locally.Or click "Save project to Downloader",

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

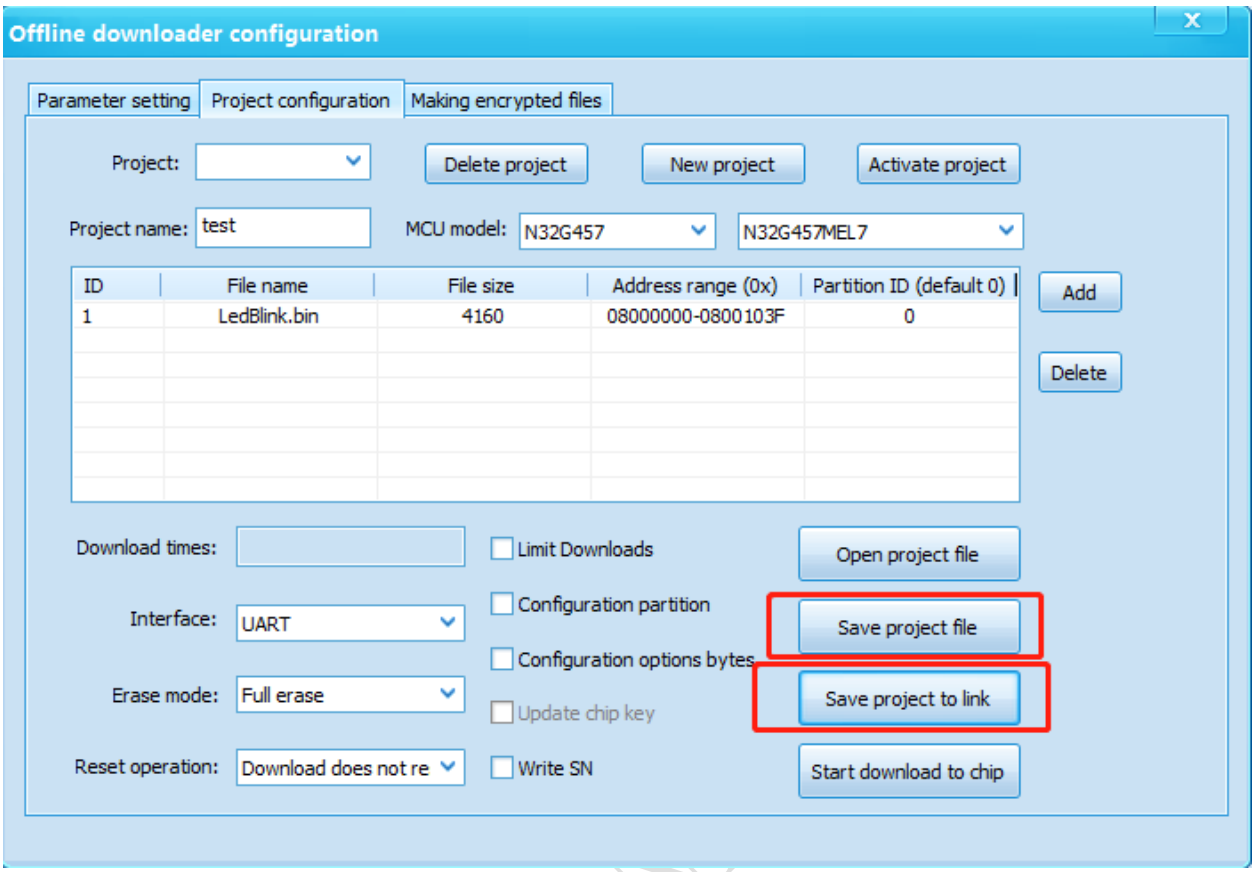


Figure 8-30 Save the project file or save the project to a downloader

8.3.1.2 Save the project to an offline downloader

Refer to Section 8.2.2 to save the project to an offline downloader.

8.3.2 Example of UART encryption authentication download configuration

Example describes how to set up a non-partitioned download project using encryption and authentication.

8.3.2.1 Offline Project Configuration

1、 Click New Project.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

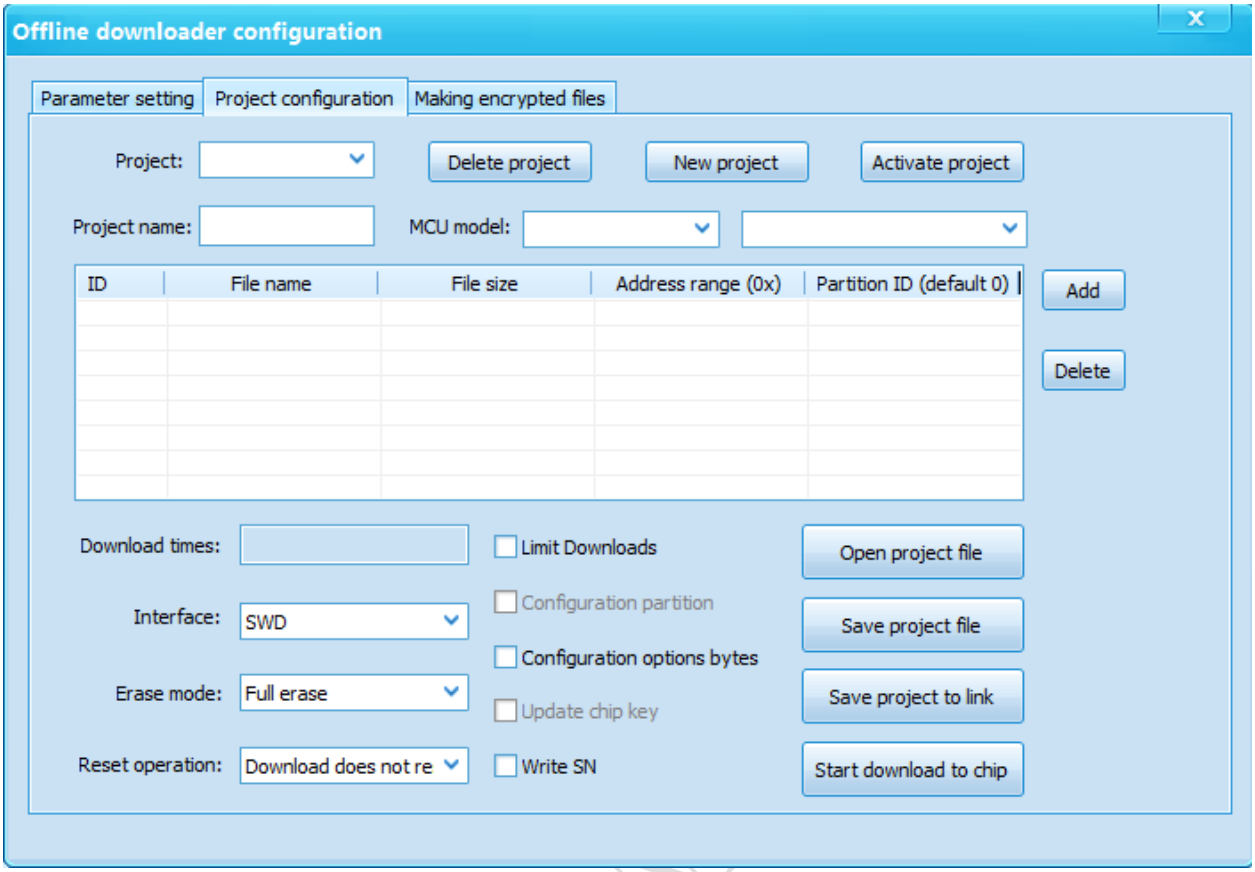


Figure 8-31 Click New Project

2、 Fill in the project name.

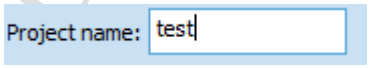
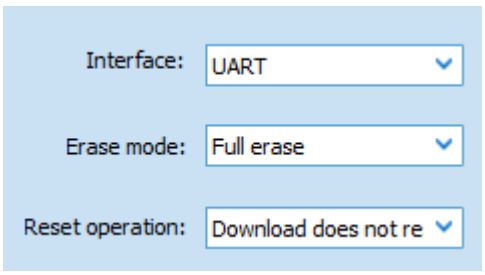


Figure 8-32 Fill in the project name

3、 Select the chip model from the drop-down list box.

Figure 8-33 Selecting the chip model

4、 Select communication interface as UART, erasing mode as full film erasing, and download as no more.



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

Figure 8-34 Selecting communication structure, erasing mode, and reset operation82

5、 Select partition configuration, set the size of partition 1 to 00, select encryption and authentication, and select the key ID.Note: The partition configuration is irreversible. Therefore, exercise caution when configuring a partition.

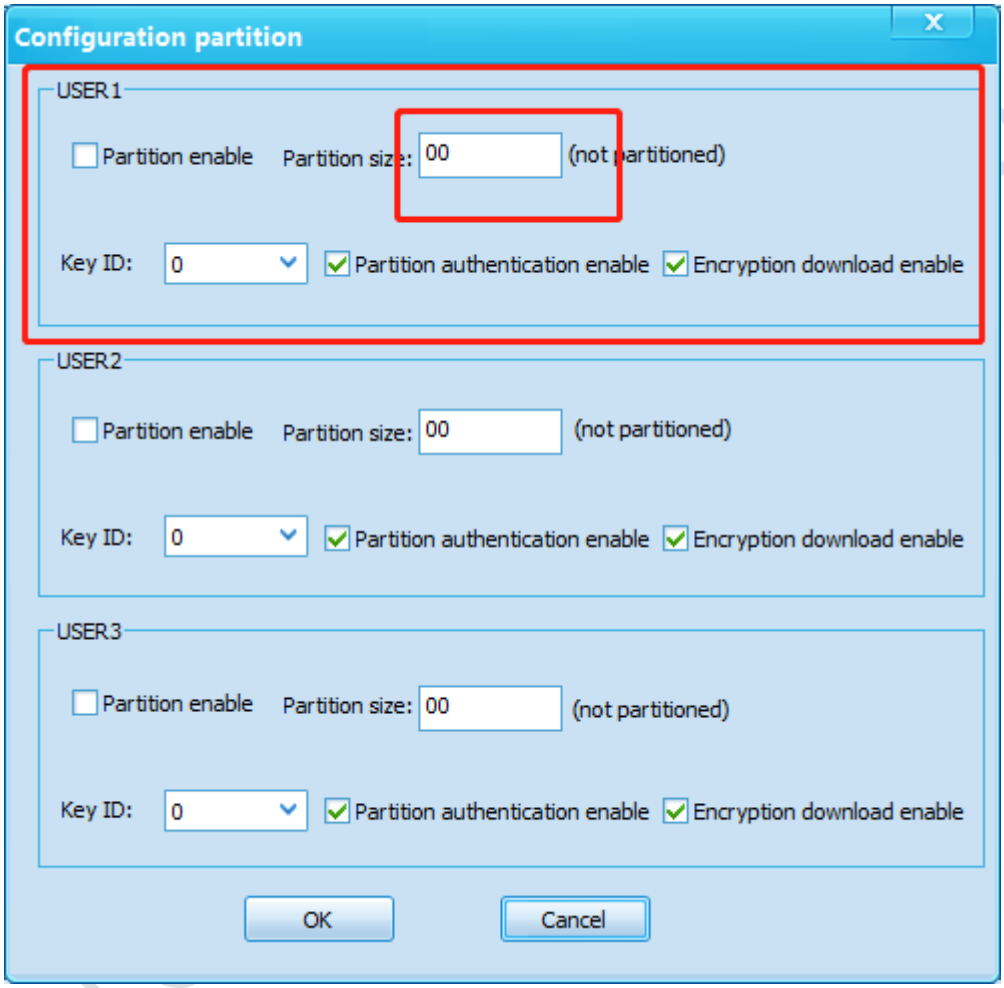


Figure 8-35 Partition configuration

6、 Click Add.

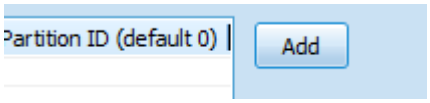
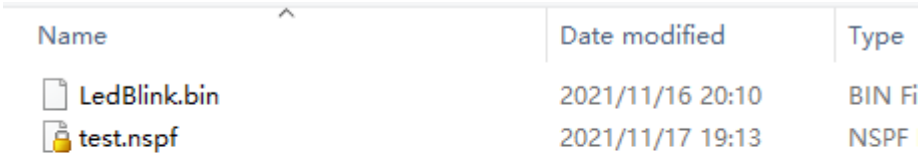


Figure 8-36 Click "Add"

7、 Select the file to be downloaded by partition 1 (USER1) and click "Open". In the dialog box that pops up for adding the start address, select USER1 and fill in the start address 0x08000000 (the start address of partition 1 is the start address of chip FLASH).

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China



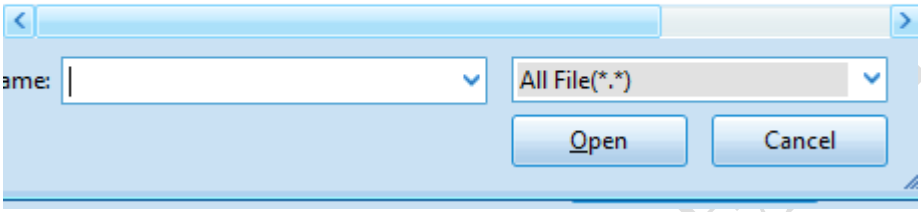


Figure 8-37 Selecting the file to be downloaded by USER1

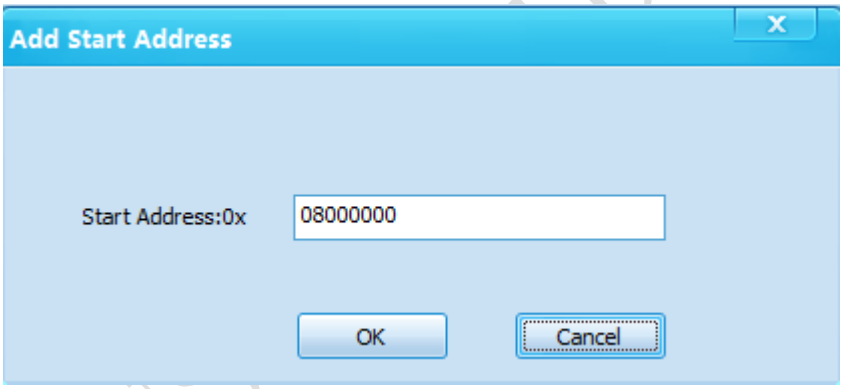


Figure 8-38 Select partition and fill in download start

8、 Click "Save project File" to save the project file locally.Or click "Save project to Downloader",

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

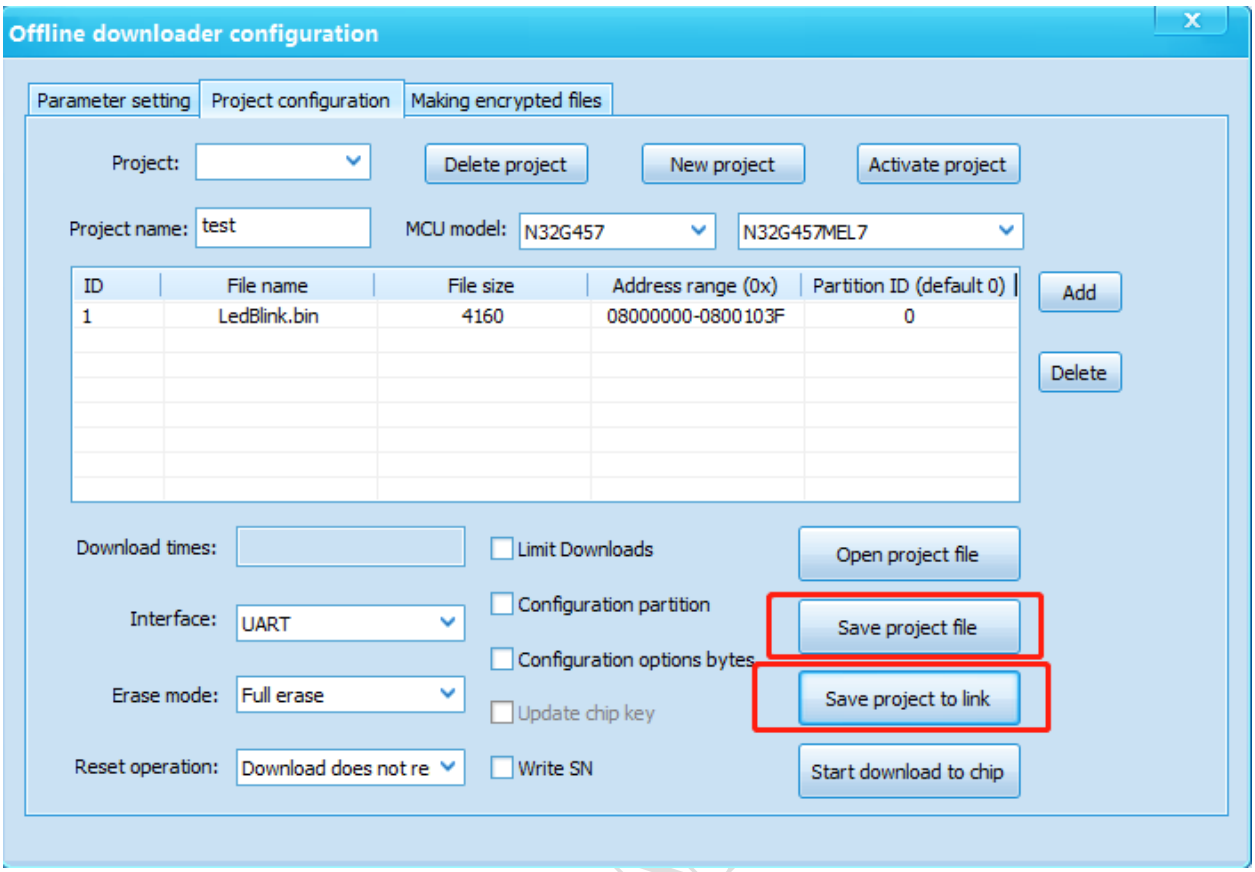


Figure 8-39 Saving the project file or saving the project to a downloader

8.3.2.2 Save the project to an offline downloader

Refer to Section 8.2.2 to save the project to an offline downloader.

8.3.3 UART(serial port) partition configuration

The example describes how to set up an offline project for a partition and download different files for each partition.

8.3.3.1 Offline Project Configuration

1、Click New Project.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

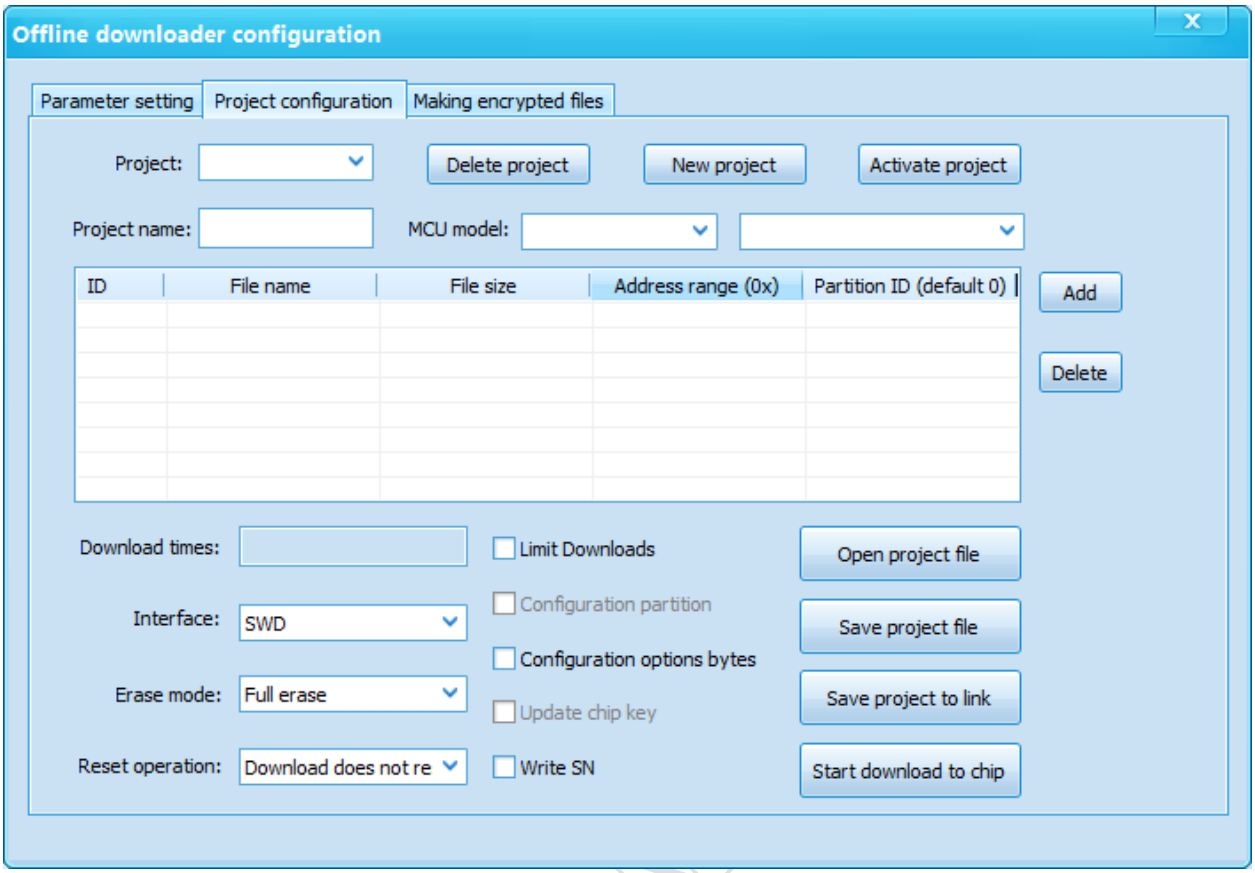


Figure 8-40 Click New Project

2、 Fill in the project name.

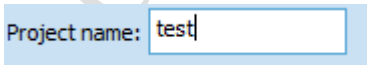
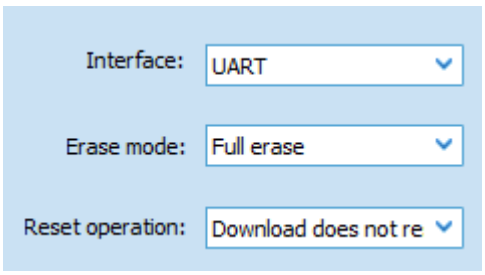


Figure 8-41 Fill in the project name

3、 Select the chip model from the drop-down list box.

Figure 8-42 Selecting the chip model

4、 Select communication interface as UART, erasing mode as full film erasing, and download as no more.



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

Figure 8-43 Selecting communication structure, erasing mode, and reset operation83

5、 Select zone Configuration, configure zone 1 and zone 3, and do not select encryption and authentication.Note: Partition configuration is irreversible. Exercise caution when configuring partitions. For details, see configuring Partitions in 8.1.2 Project Configuration.

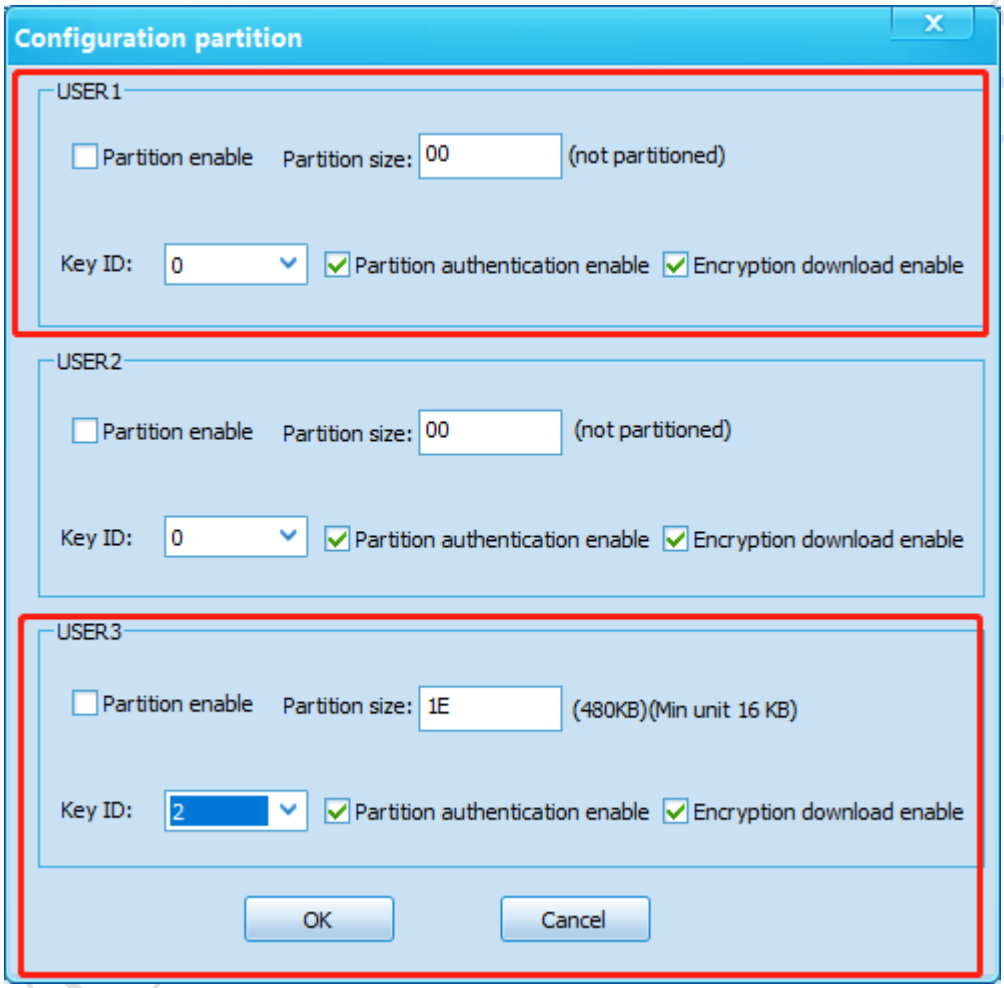


Figure 8-44 Partition configuration

6、 Click Add.

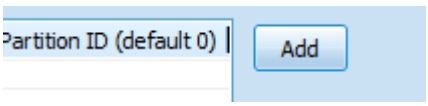


Figure 8-45 Click "Add"

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

7、 Select the file to be downloaded by partition 1 (USER1) and click "Open". In the dialog box that pops up for adding the start address, select USER1 and fill in the start address 0x08000000 (the start address of partition 1 is the start address of chip FLASH).

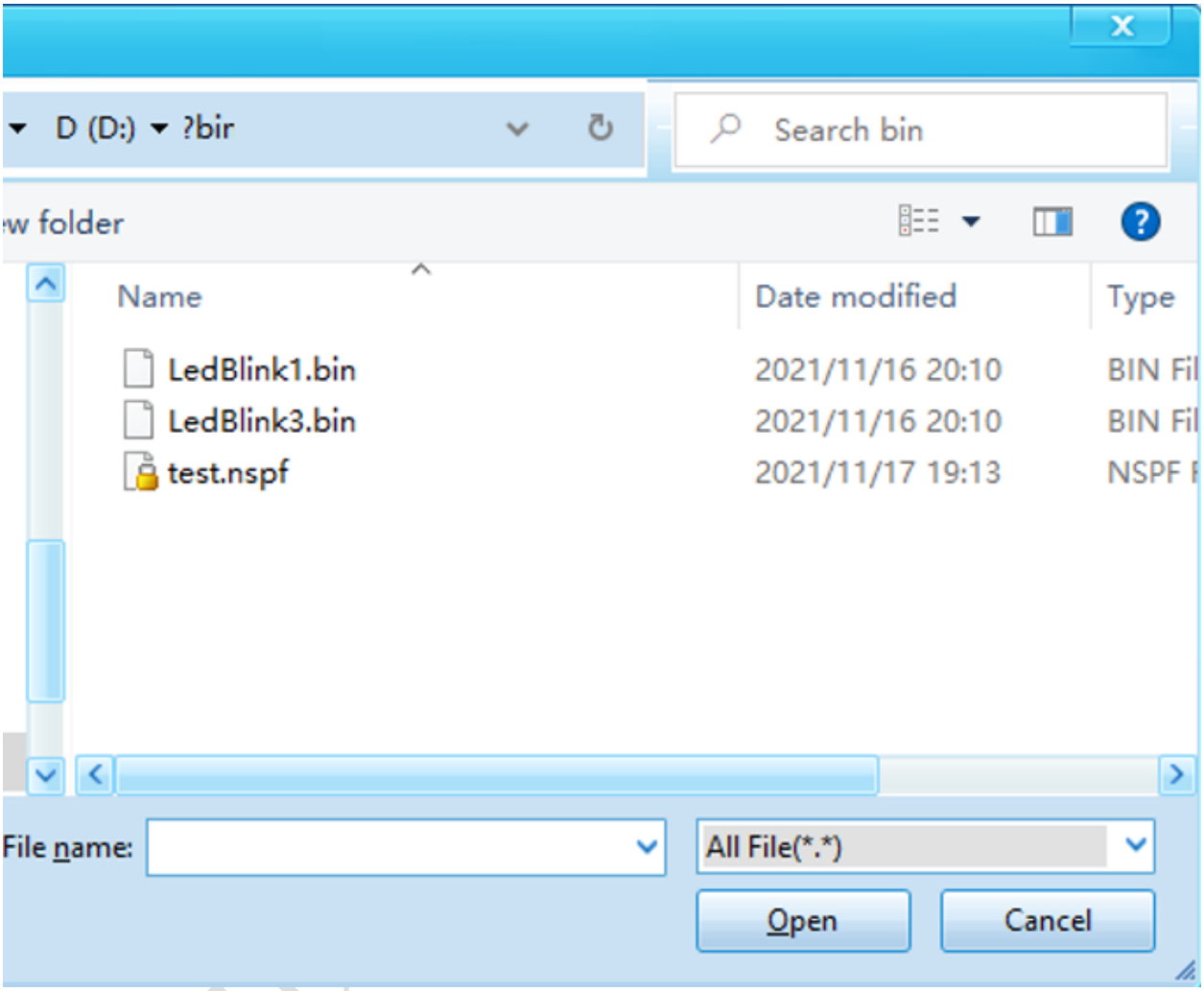


Figure 8-46 Selecting the file to be downloaded by USER1

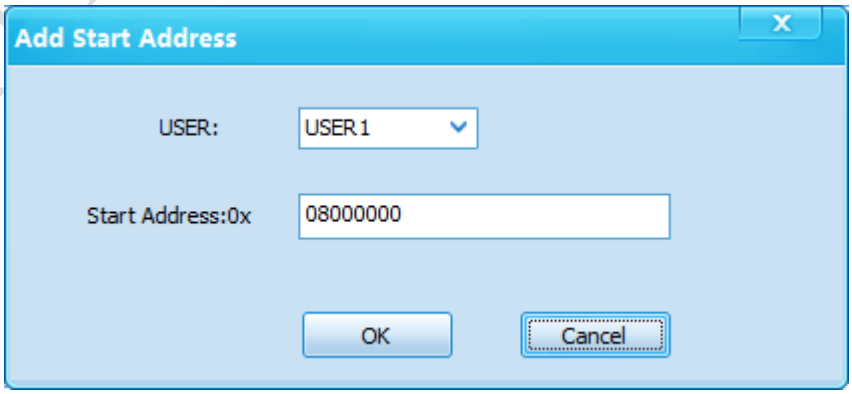


Figure 8-47 Selecting a partition and entering the start of download

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

8、 Click "Add" again, select the download file of partition 3 download file, and click "Open". In the dialog box that pops up for adding the start address, select USER3 and fill in the start address 0x08008000. (The start address of partition 3 is (FLASH end address (512KB = 0x08080000) - USER3 size (0x1E*16KB =480KB) = 0x08008000)).

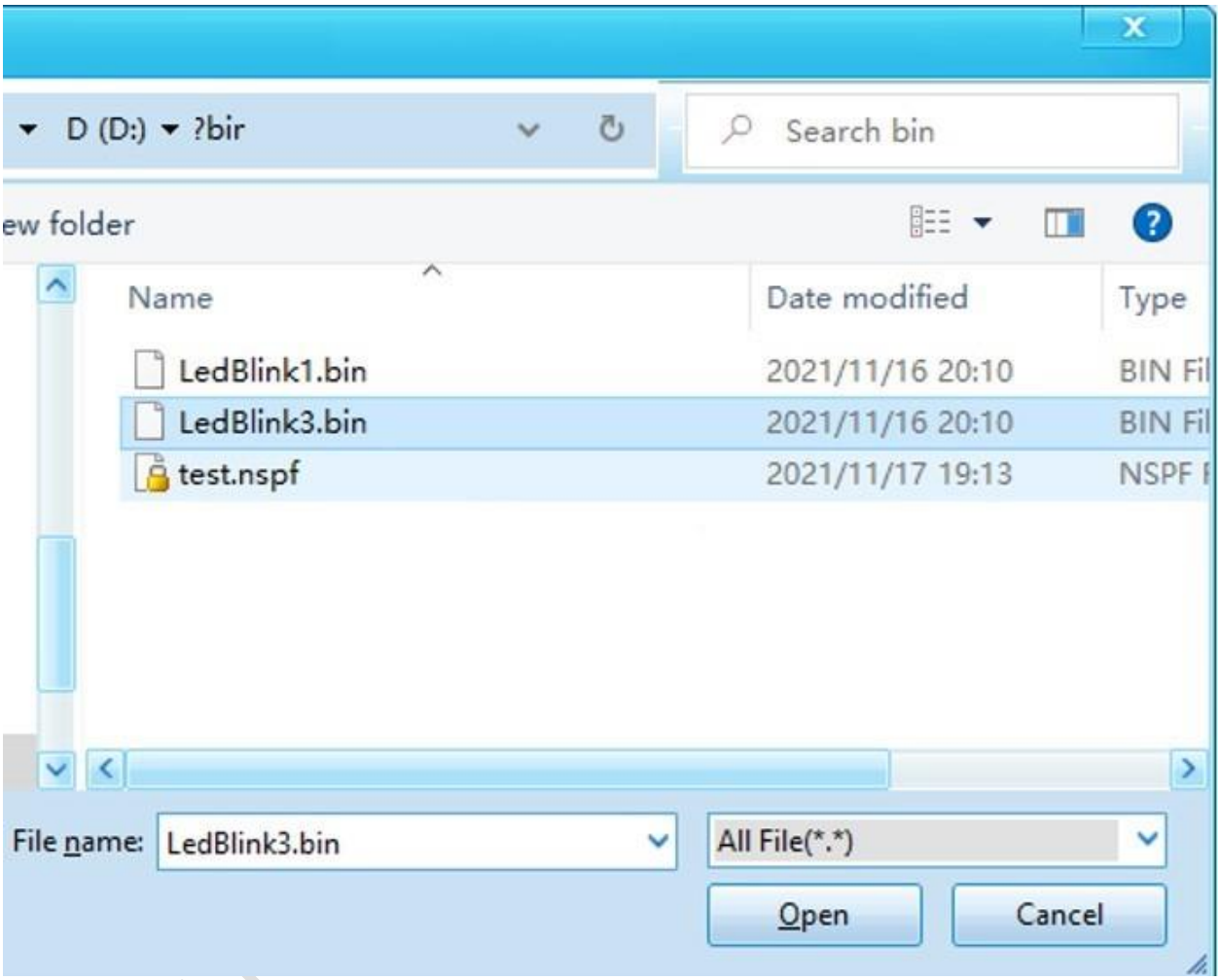


Figure 8-48 Selecting partition 3 to download the file

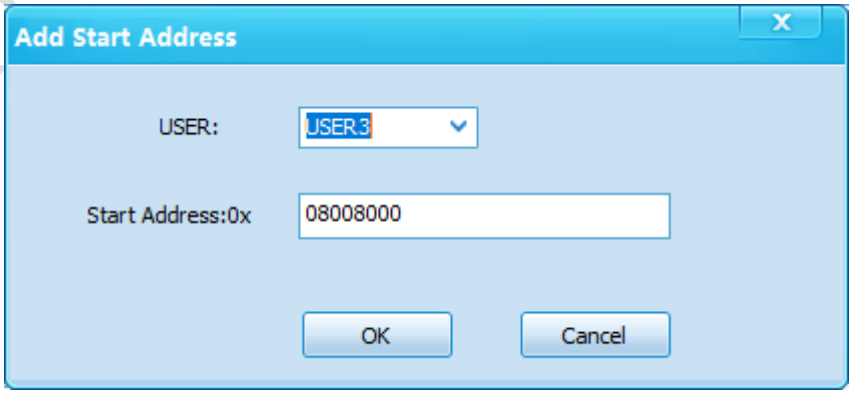


Figure 8-49 Selecting a partition 3. Enter the download address

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

9、 Click "Save project File" to save the project file locally.Or click "Save project to Downloader".

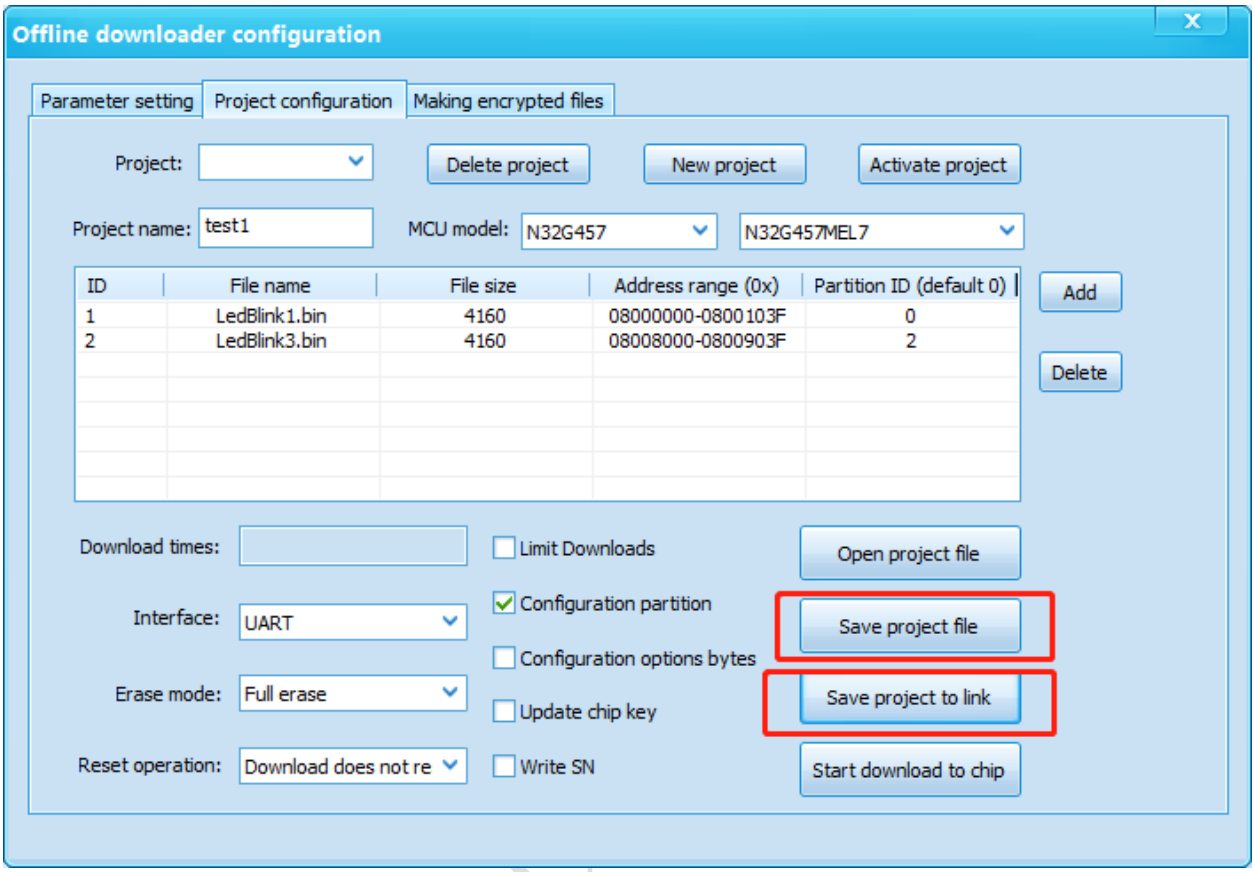


Figure 8-50 Save the project file or save the project to the downloader

8.3.3.2 Save the project to an offline downloader

Refer to Section 8.2.2 to save the project to an offline downloader.

8.3.4 Configure encryption authentication for UART(serial port) partitions

The example describes how to set up an offline project for partition encryption authentication and download different files for each partition.

8.3.4.1 Offline Project Configuration

1、 Click New Project.

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

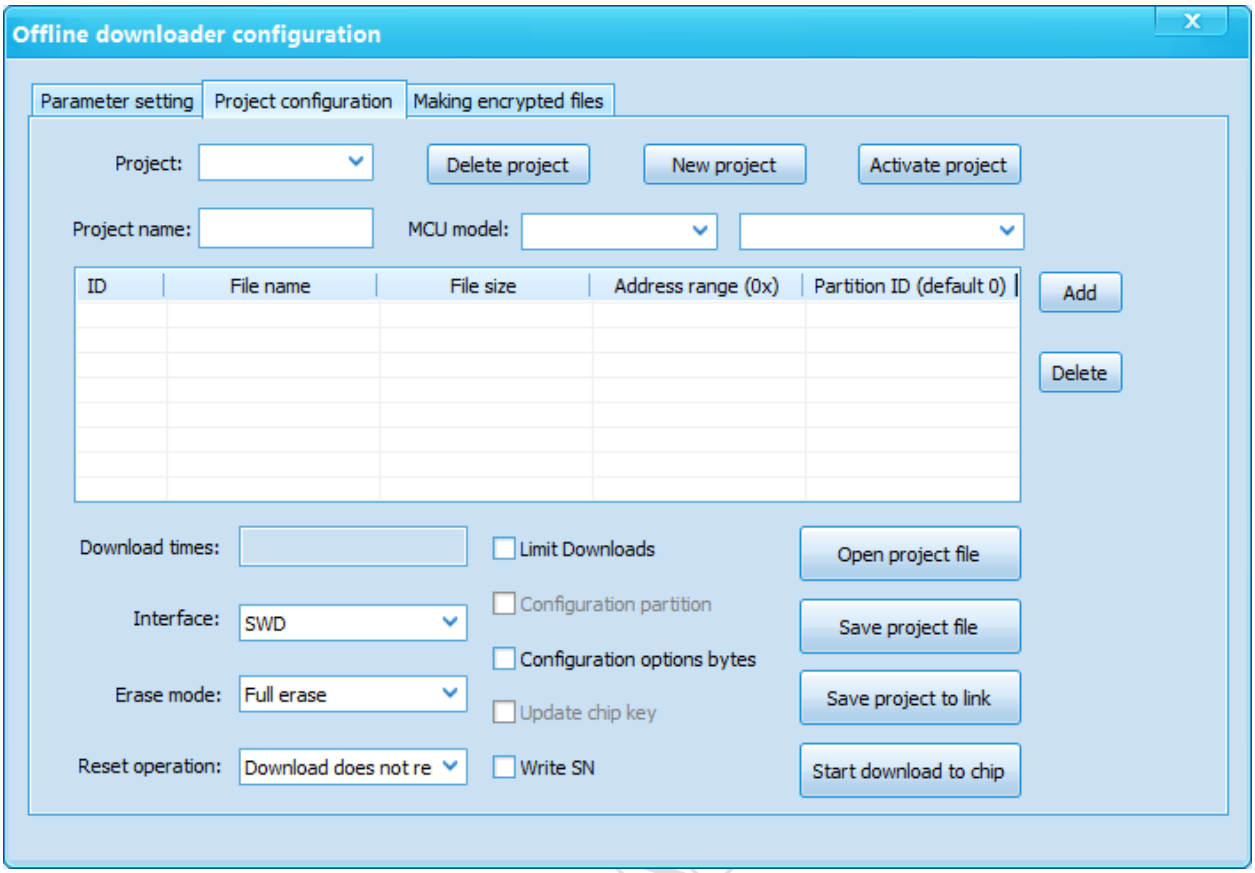


Figure 8-51 Click New Project

2、 Fill in the project name.

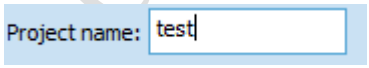
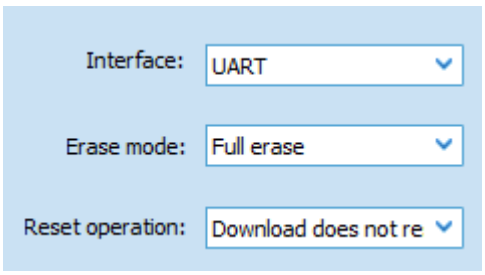


Figure 8-52 fill in the project name

3、 Select the chip model from the drop-down list box.

Figure 8-53 Selecting a chip model

4、 Select communication interface as UART, erasing mode as full film erasing, and download as no more.



Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

Figure 8-54 Selecting communication structure, erasing mode, and reset operation84

5、 Select Zone configuration, configure zone 1 and zone 3, and select encryption authentication.Note: Partition configuration is irreversible. Exercise caution when configuring partitions. For details, see configuring Partitions in 8.1.2 Project Configuration.

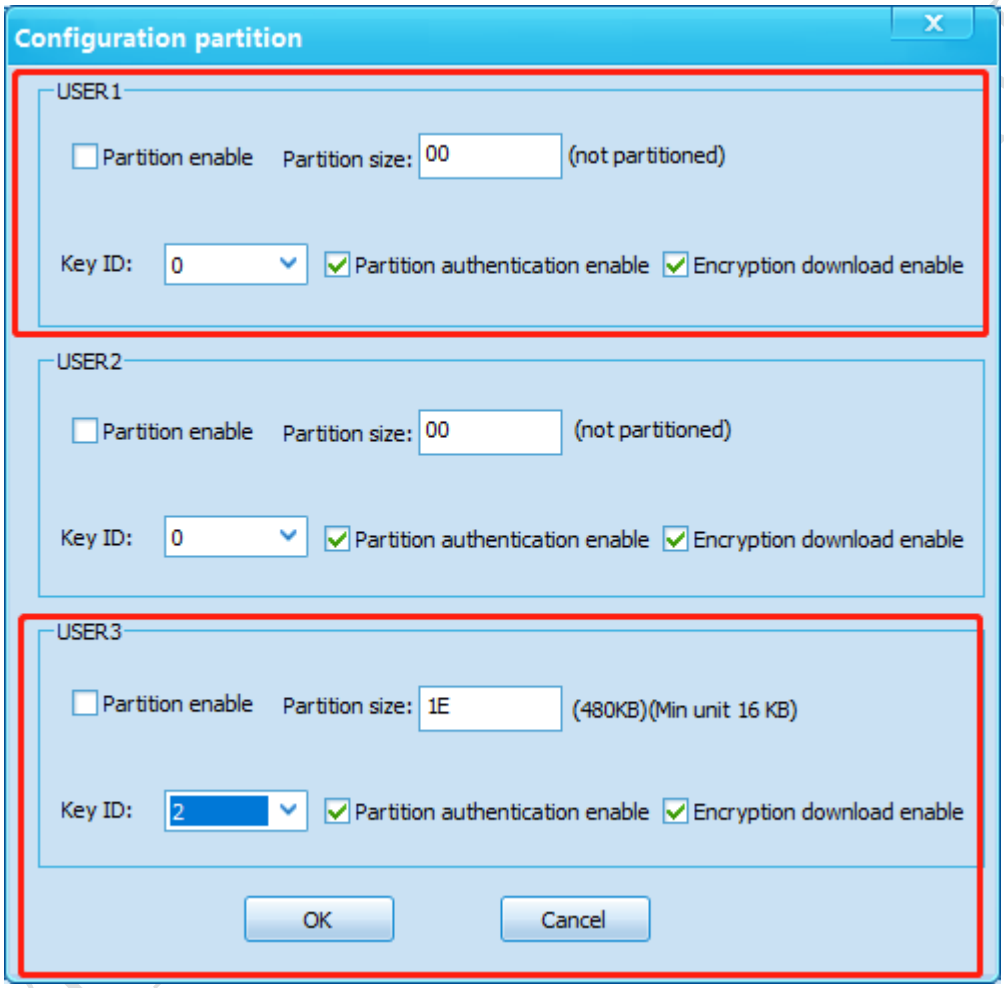


Figure 8-55 Partition configuration

6、 Click Add.

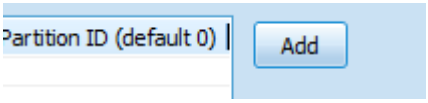


Figure 8-56 Click "Add"

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

7、 Select the file to be downloaded by partition 1 (USER1) and click "Open". In the dialog box that pops up for adding the start address, select USER1 and fill in the start address 0x08000000 (the start address of partition 1 is the start address of chip FLASH).

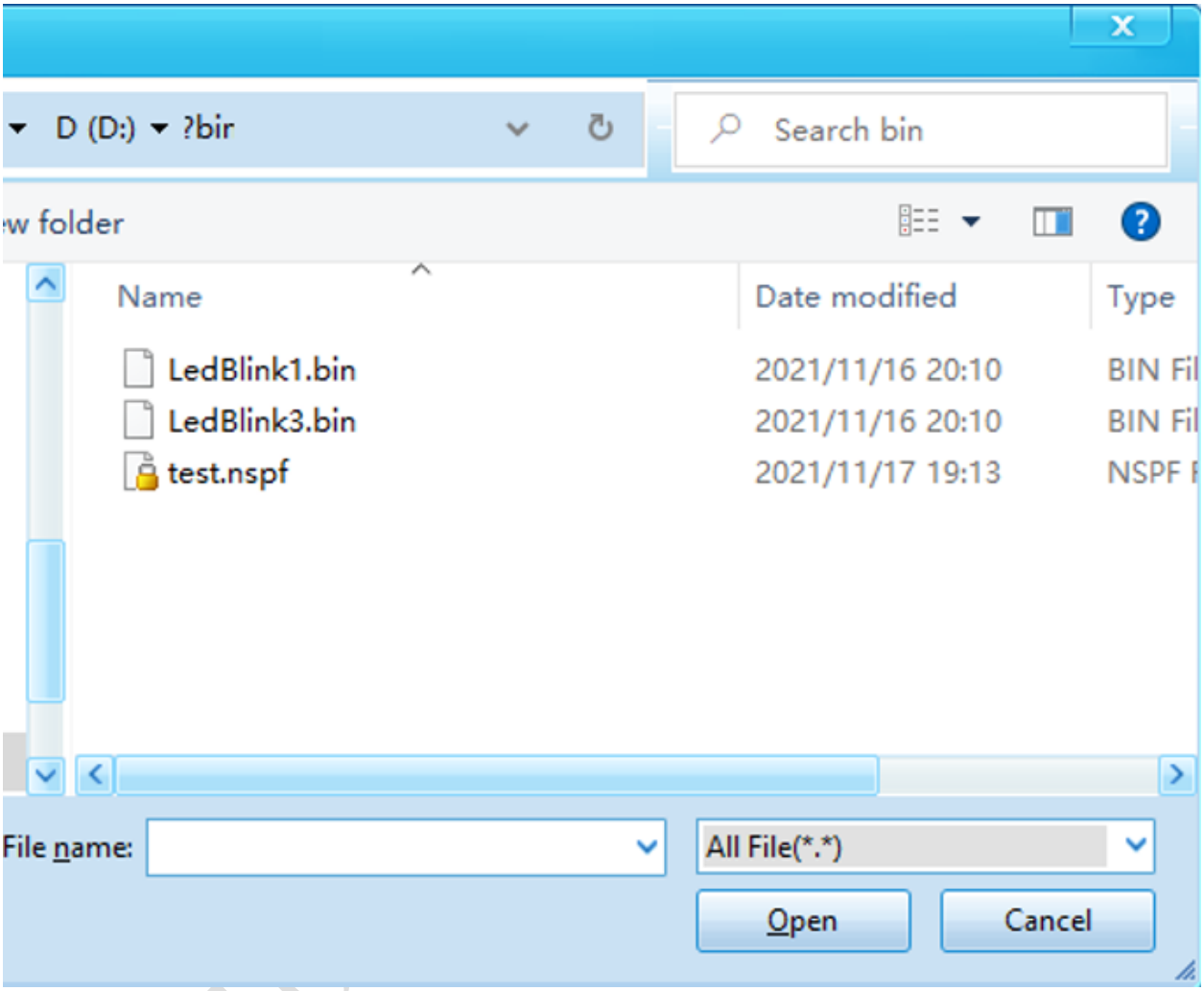


Figure 8-57 Selecting the file to be downloaded by USER1

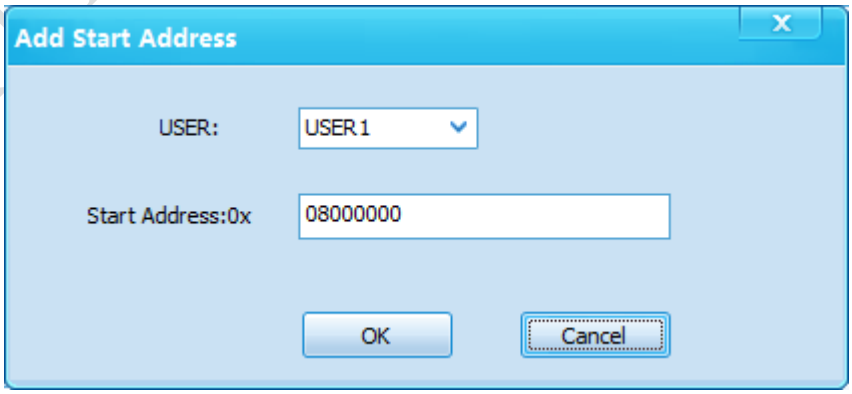


Figure 8-58 Select partition and fill in download start

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

8、 Click "Add" again, select the download file of partition 3 download file, and click "Open". In the dialog box that pops up for adding the start address, select USER3 and fill in the start address 0x08008000. (The start address of partition 3 is (FLASH end address (512KB = 0x08080000) - USER3 size (0x1E*16KB =480KB) = 0x08008000)).

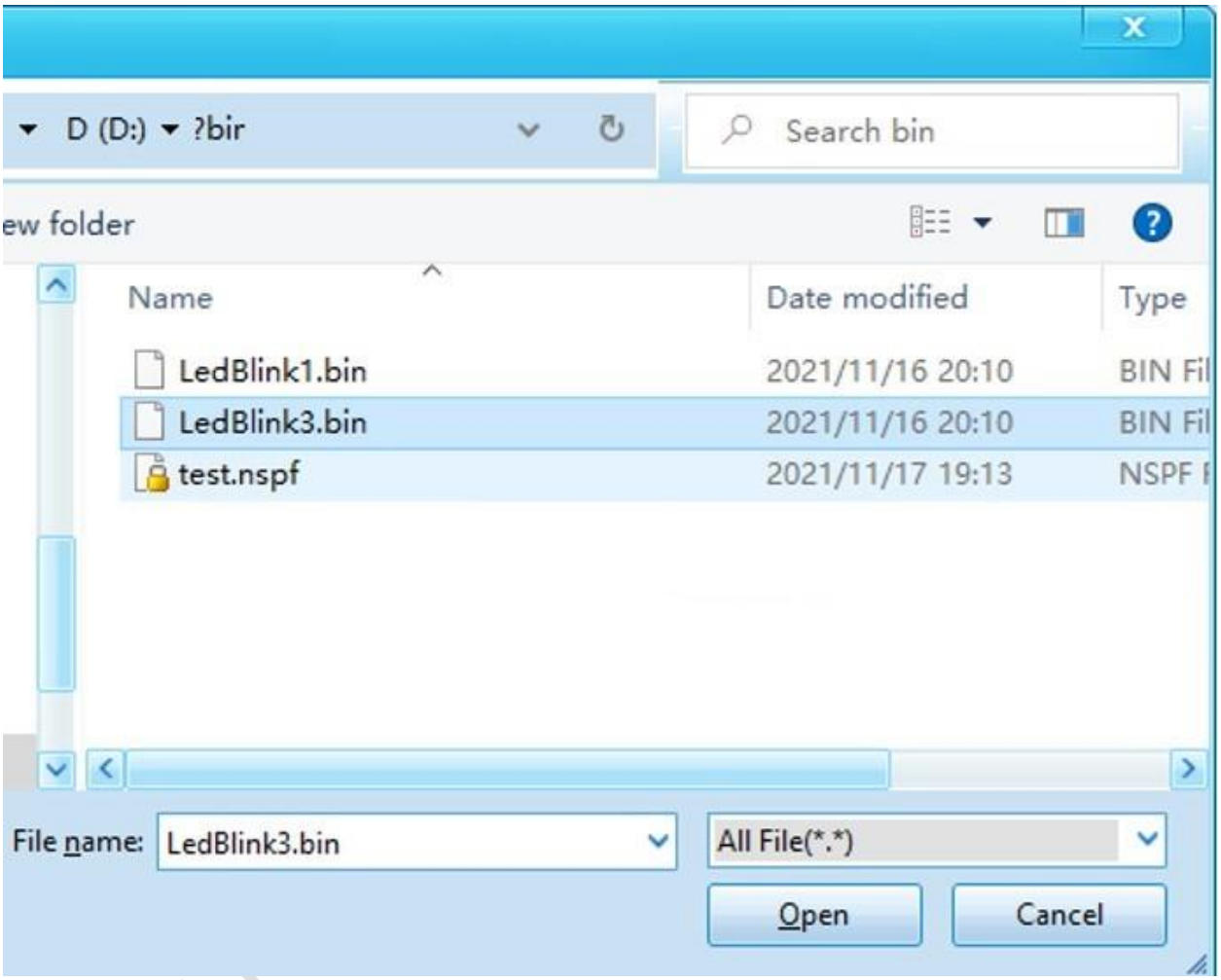


Figure 8-59 Selecting partition 3 to download the file

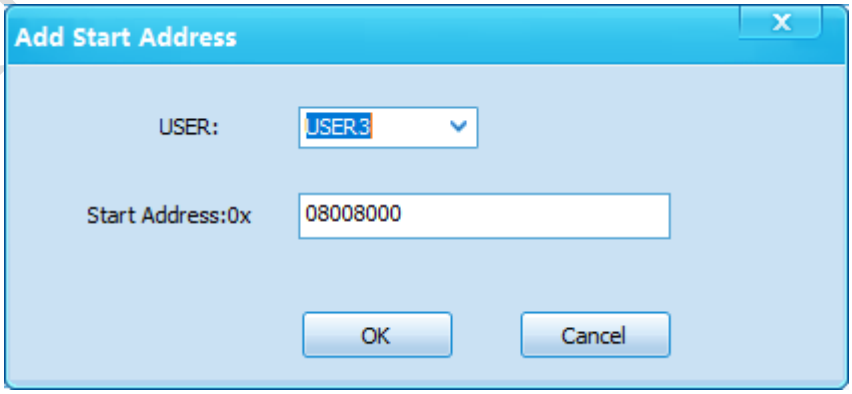


Figure 8-60 Selecting a zone 3. Enter the download address

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

9、 Click "Save project File" to save the project file locally.Or click "Save project to Downloader".

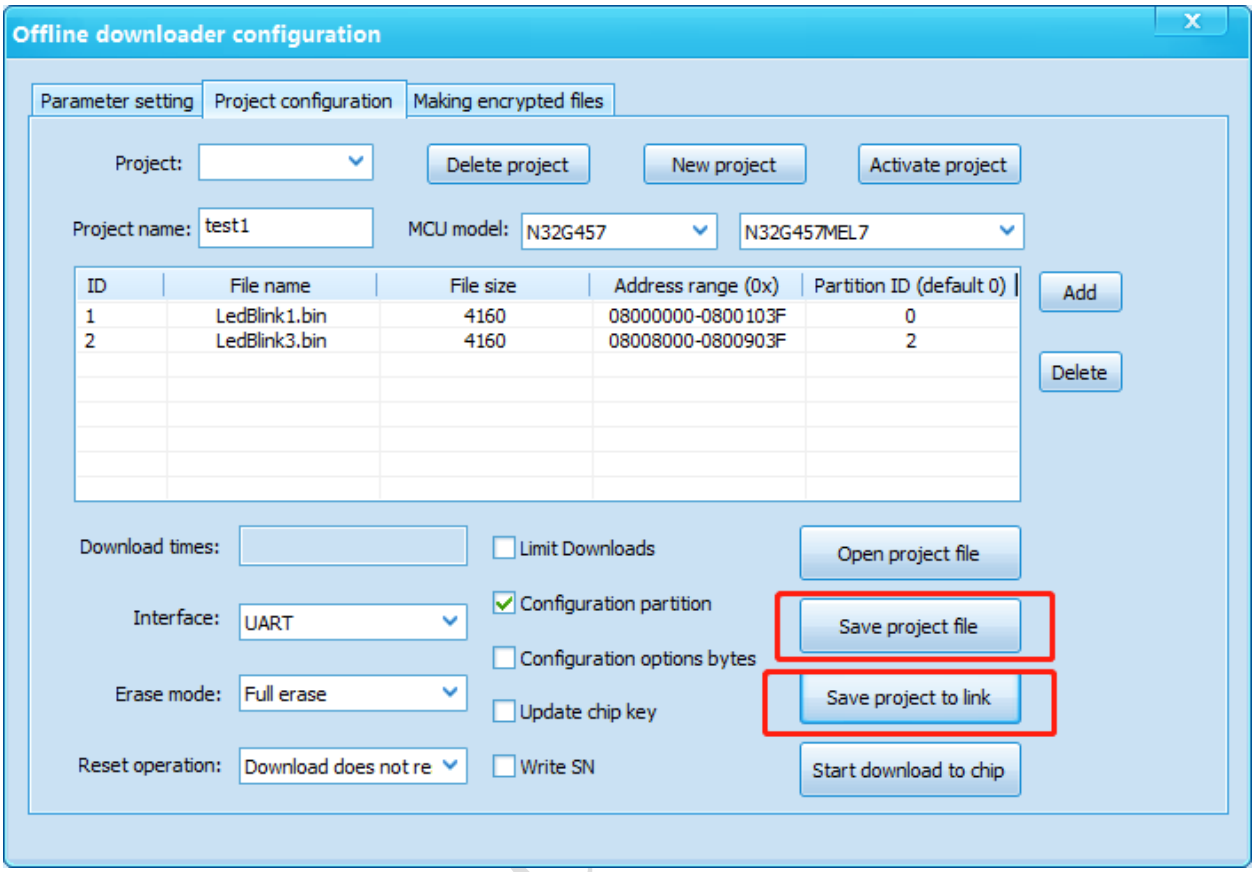


Figure 8-61 Saving the project file or saving the project to a downloader

8.3.4.2 Save the project to an offline downloader

Refer to Section 8.2.2 to save the project to an offline downloader.

8.4 Offline downloader external interface

The external interfaces of offline downloader are defined as follows (note that the interface of offline downloader is not a standard JTAG interface, and it is forbidden to use the standard JTAG cable for access) :

GND	IO3	NRST	BT	IO2	SWCLK	SWDIO	IO1	VT	GND
5V	GND	RX_SDA	TX_SCL	ERROR	PASS	BUSY	START	GND	3V3

Figure 8-62 Interface definition

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

3V3:3.3V voltage output

5V: 5V output voltage

VT: The output voltage can be configured through the upper computer. When no VT output is configured, the external power supply can be connected through VT.When the upper computer configures the holding time of output voltage after downloading, the output will be kept after downloading, and the VT power output will be shut down after the setting time.Reset control can be used to check that the downloaded code is running correctly while the output is held.

SWDIO: SWD data download interface

SWCLK: SWD clock download interface

BT: BOOT0 control pin for serial port download

NRST: reset control pin, external download chip reset pin

START: machine download control signal

BUSY: The machine controls the BUSY signal

PASS: indicates the successful control signal of the machine

ERROR: indicates that the machine control fails

TX_SCL: indicates the TX output of the serial port

RX_SDA: serial port RX input

IO1, IO2, and IO3: reserved

Dip switch: Switch to the left (to the USB port) in single-download mode

Dial right (dial to download interface) for continuous download mode

Button S1:

Main interface: single download start button.

Other interface: Select operation.

Button S2:

Press to confirm or enter the next-level menu.

Long press: Return or exit.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

8.5 Offline downloader sound and light status information

	LED3			LED2			LED1			buzzer
	red	yellow	green	red	yellow	green	red	yellow	green	
power on	off	off	One flash	off	off	One flash	off	off	One flash	A short sound
spare	off	Change according to download mode	off	off	According to download mode		off	off	on	quiet
Offline download	off	Change according to download mode	off	off	According to download mode		off	off	Quick flicker	quiet
Download successful	off	Change according to download mode	off	off	According to download mode		off	off	on	A short sound
Download failed	off	Change according to download mode	off	off	According to download mode		Quick flicker	off	off	Emergency quick sound for 3s
The number of downloads is 0	on	off	off	on	off		Quick flicker	off	off	Emergency quick sound for 3s
The device key does not match the file encryption key	off	off	off	on	off	off	Quick flicker	off	off	Emergency quick sound for 3s
Continuous download mode	off	Change according to download mode	off	off	on		Changes according to the running state			
Single download mode	off	Change according to download mode	off	off	off	off				
SWD download mode	off	on	off	off	According to download mode					
Serial Port Download mode	off	off	off	off	According to download mode					
Firmware Update Mode	off	off	off	off	off		off	flashing	off	quiet

Figure 8-63 Sound and light information

8.6 The machine controls the timing

1. All levels are valid at high levels, and pulse width of PASS and ERROR effective levels is 0, that is, signal output level.

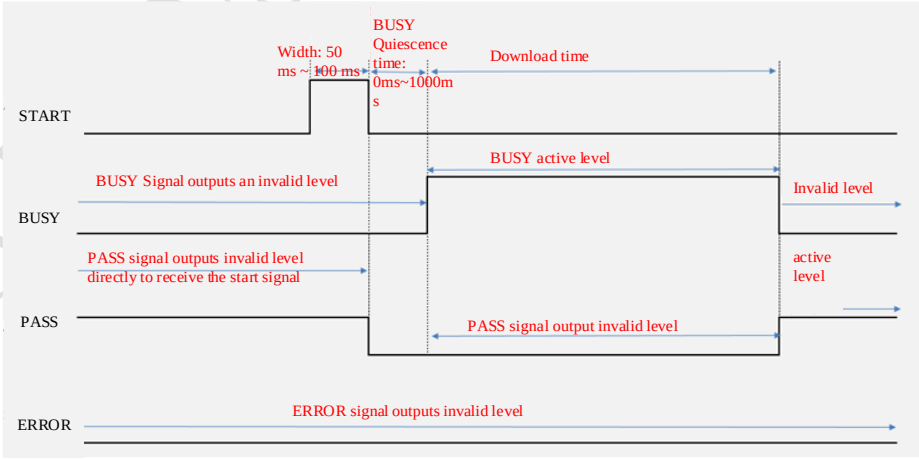


Figure 8-64 Sequence diagram of successful download

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

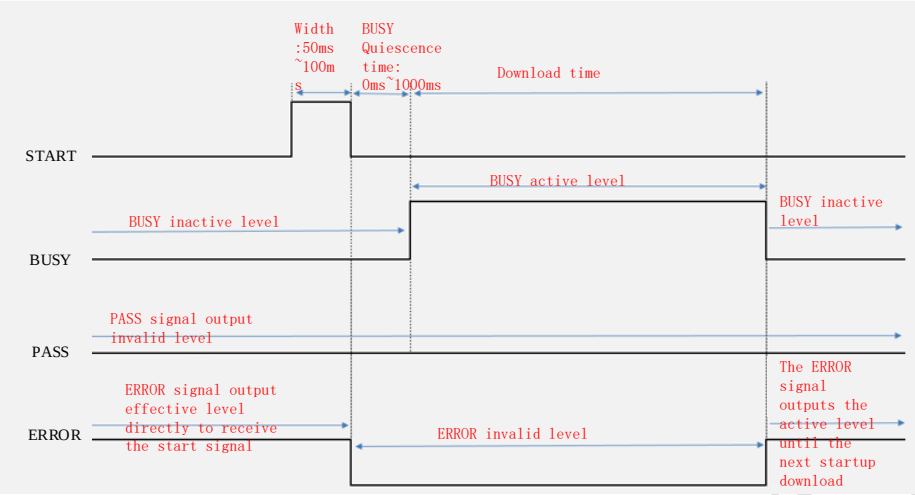


Figure 8-65 Download failure sequence diagram

2. The high level of START and BUSY is valid, while the low level of PASS and ERROR is valid. The pulse width of the effective level is not 0, that is, the signal output pulse.

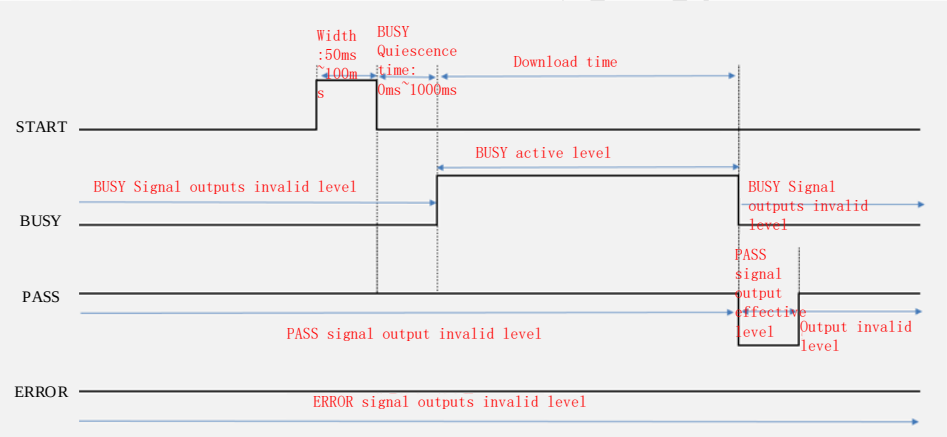


Figure 8-66 Download succeeded

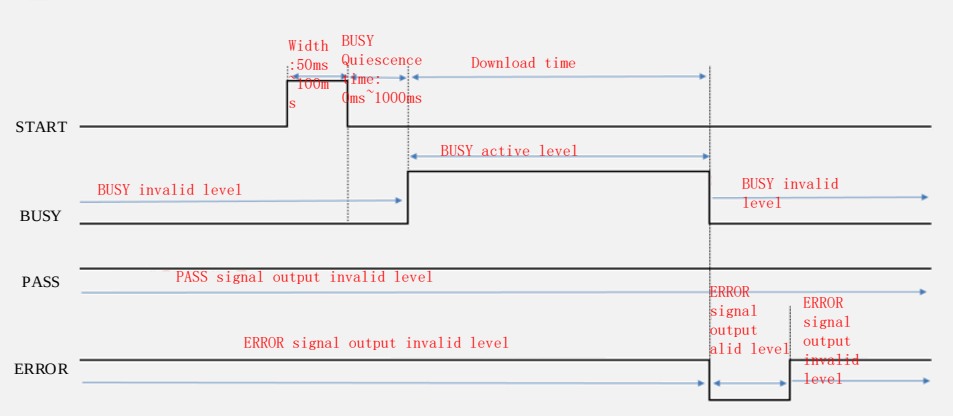


Figure 8-67 Download failed

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

8.7 Multipath download control

Ns-link-pro offline downloader is a single channel downloader, each downloader has a separate machine control signal.When the user needs to use multi-channel download multiple chips, only need to use multiple devices to load the download file, by the machine separately connected to each download, and control, can be composed of multi-channel download.The connection diagram between the machine and the downloader is as follows:

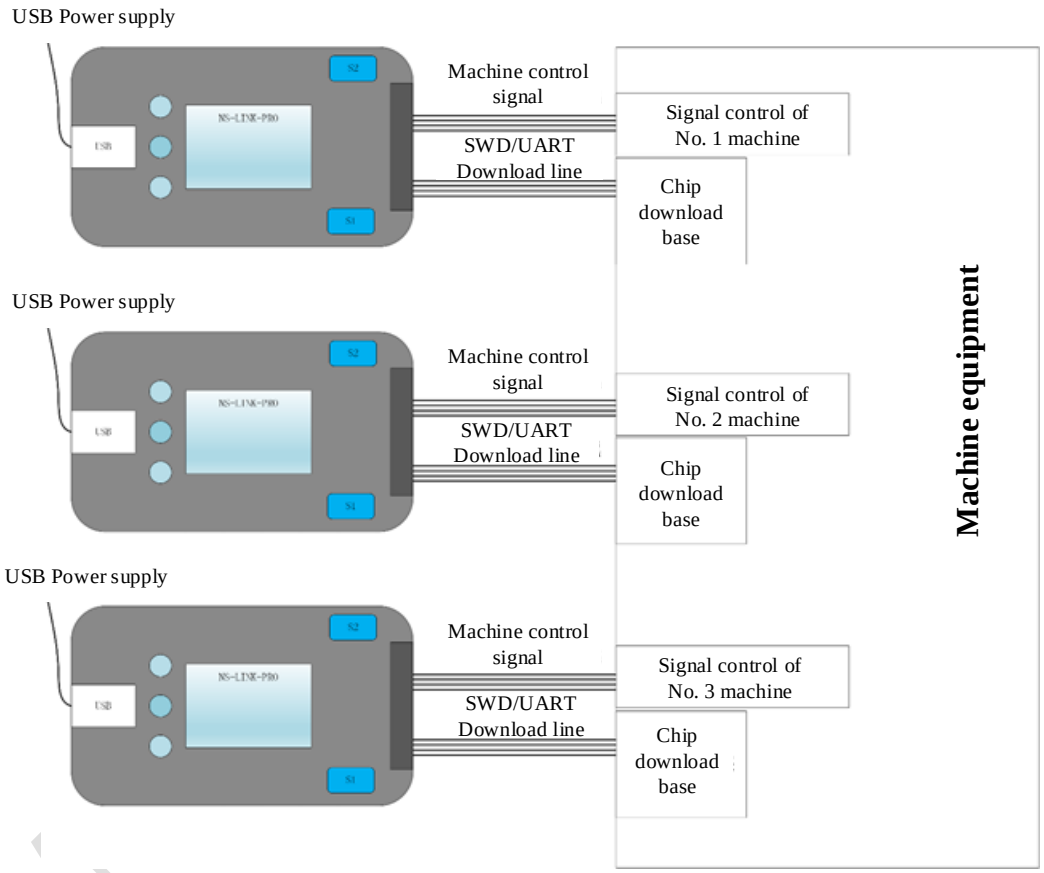


Figure 8-68 Schematic diagram of multi-way download connection

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

9 Common Errors and Solutions

9.1 Bad download of onboard NS_LINK serial port

Phenomenon: The download speed is very slow, or the progress bar is stuck in the middle of the download, and the baud rate of the serial port is increased, and the speed increase is not obvious.

Reason: The NS_LINK serial port of the board is a virtual serial port implemented by software. On the NS_LINK main control chip, the data is parsed through the USB interface and then transferred to the serial port and sent to the MCU. This process is much more complicated than the independent serial port, and the data must also be considered. Packet loss problem, so it takes a long time.

Solution: Use an independent USB-to-serial port. Generally, it is recommended to use a serial port tool whose main control is CH340 or MAX232.

9.2 Bad download of independent serial port

9.2.1 The serial port cannot be connected

Phenomenon 1: The serial port cannot be connected to the chip, no matter which baud rate is selected, the connection fails;

Reason: The chip may not enter the BOOT0 mode, and the TX of the serial port tool may reverse current to the chip, resulting in failure to enter the BOOT state;

Solution: The power-on sequence of VDD, BOOT0 and serial port is: 1. Pull up BOOT0; 2. Supply power to the VDD of the chip; 3. Access the serial port tool;

Phenomenon 2: Only one baud rate can be connected to the chip, other baud rates fail to connect

Reason: The chip may not be the latest version, and the BOOT sub-version is a chip before V2.2, which does not support automatic baud rate identification;

Solution: use the current baud rate to download, or replace the chip with a new version;

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

9.2.2 When the chip is programmed for the first time, it indicates that it is in the state of level protection L1

Reason: Due to factors such as unstable power-on, L1 level protection is automatically turned on inside the chip;

Solution: After connecting, select "Release L1 read protection level L1" in common operations to release the read protection level L1 state;

9.2.3 Download bin file and hex file, the software behavior of the two is inconsistent

The object files compiled in the development environment generally include three files: Bin, Hex and Axf.

Bin file: the most direct code image;

Hex file: In addition to the code itself, it also contains the address information of the program;

Axf file: The file generated by default for compilation, not only contains code data, but also contains debugging information. This file is used for debug debugging in MDK.

Abnormal phenomenon: The bin file and hex file compiled by the same project are burned to the same board, and the software behavior is different. After burning the hex file, the program does not run or runs away, but the program that burns the bin file executes normally.

Reason: When the Nations MCU Download Tool tool downloads the hex file, it will first decode the hex file, convert it into a bin file, and then burn it to the chip. During the conversion process, redundant data may appear in some areas, resulting in program exceptions.

Solution: Update Nations MCU Download Tool and use V1.2.5 or above; or use third-party tools such as JFlash to download firmware.

9.3 USB does not recognize the device

Reason 1: The DFU device driver is not installed on the user's computer;

Solution: In the driver\USB DFU folder in the tool directory, choose to install the USB driver corresponding to the system, and then the device can be connected normally;

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

NATIONS CONFIDENTIAL

Reason 2: If this happens on the development board, it may be caused by the conflict between the serial port of NS_LINK and the USB command. After pulling up BOOT0 to return to the BOOT state, the serial port connection will be used first by default, so the serial port of NS_LINK will be connected first, resulting in an abnormal USB connection.

Solution: Before pulling up BOOT0, first unplug the serial jumper cap of NS_LINK on the development board, and then enter the BOOT state.

9.4 Bad SWD download

9.4.1 Unable to connect chip

Reason 1: The driver is not installed;

Solution: Install the driver for the corresponding system in the driver\CMSIS DAP CDC path in the tool directory.

9.5 The offline downloader is poorly programmed

9.5.1 NS_LINK cannot connect

Reason 1: The driver is not installed;

Solution: Install the driver for the corresponding system in the driver\CMSIS DAP CDC path in the tool directory.

9.5.2 Offline download project cannot be saved

Phenomenon: After configuring the download project, saving to the downloader fails, prompting "Project name already exists"

Reason 1: There is already a project with the same name in the downloader;

Solution: 1. Delete the items that exist in the downloader;

2. Change the name of the currently downloaded project

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

10 Version history

Version	Date	Modification point
V1.1.1	2019-12-3	first version, support N32G(WB)45x_FR series chips
V1.1.2	2020-2-20	1. Increase the display of chip model 2. Modify the problem of CRC check error when enabling encrypted download and checking the downloaded file as cipher text 3. When the encryption download is disabled, it is not allowed to check the download file as ciphertext 4. Increase and modify the baud rate
V1.1.3	2020-4-16	1. Optimize the process of connecting devices 2. Added support for USB (DFU) interface
V1.1.4	2020-8-10	1. Modify the erasure range display error problem 2. Optimize the interface
V1.1.5	2020-9-20	1. Put the configuration partition into the advanced configuration 2. Optimize the interface
V1.1.6	2020-9-28	1. Optimize the display of chip information 2. Optimize the configuration partition 3. Modify the size limit of the serial port number
V1.1.7	2020-10-28	1. Added support for N32G432, N32G435, N32L43X, N32L40X, N32G030, N32G032 series chips
V1.1.8	2020-12-24	1. Added the function of making encrypted files 2. Add multiple languages, support switching between Chinese and English
V1.1.9	2020-12-30	1. Added support for N32G031 series chips
V1.1.10	2021-1-14	1. Optimize the display of connected devices and chip information 2. Optimize the main interface 3. Add JLINK interface and release read protection

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

		4. Added support for hex file download 5. Modify the encrypted file format and add the first 4 bytes as plaintext CRC 6. Modify the print format of the diary, and print all instruction streams when it fails
V1.1.11	2021-4-25	1. Modify the problem of incorrect identification of individual chips of N32G030 and N32G032
V1.1.12	2021-5-24	1. Modify the problem of connection failure after power on and off 2. Modify the N32L40X and N32L43X chips to identify the flash size error problem
V1.2.0	2021-7-8	1. Added NS_link offline downloader related 2. Optimize the interface
V1.2.1	2021-7-27	1. Common functions added to enable read protection L1, L2 2. Optimize and update the chip key 3. Optimize the configuration partition 4. When the offline downloader saves the project, compare the partition id and the partition key id of the updated key 5. Increase the initialization of related variables when entering the offline downloader configuration and creating a new project 6. Modify the problem that the file size is 0 after the offline downloader deletes the file 7. When modifying read protection L1 l2, the first two pages cannot be downloaded, and other pages can be downloaded 8. Optimize the page number algorithm for erasing
V1.2.2	2021-10-9	1. Add write protection for common operations 2. Modify N32G030 64k read Flash size error problem 3. The chip key is encrypted and saved in the registry 4. Do not send 7F when connecting, that is, the UART interface of subsequent versions no longer supports BOOT V2.1 version 5. Add the automatic connection when the USB interface is disconnected

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

V1.2.3	2021-12-14	1. Added support for N32G031 series chips 2. The offline downloader adds support for N32WB031 series chips 3. Add 10ms delay between erasing and downloading for N32G031, N32G030, N32G032 4. Modify the problem that the color of the display content is sometimes displayed incorrectly 5. Optimize the firmware update of offline downloader 6. Delete the 576000 option from the baud rate selection list 7. Modify the error report of the XP system open tool, and use the ini configuration file for the language pack 8. Modify the problem that the win7 home version computer does not recognize the hid device correctly
V1.2.4	2021-12-28	1. Modify the configuration file Series CFG Table.ini and add N32G031 series chips 2. Add N32G031x_NRP.FLM algorithm file
V1.2.5	2022-1-5	1. Added support for N32G430 series chips
V1.2.6	2022-5-12	1. Add SWD (CMSIS DAP) interface 2. Add read protection operation before and after downloading 3. Modify the multi-byte character set to unicode character set 4. Increase the print download address range, check code, download time 5. Main interface adjustment and other optimizations 6. Added tool online upgrade and update function
V1.3.0	2022-7-27	1. Modify the offline downloader to open the hex file to report an error 2. Under the SWD (CMSIS DAP) interface, add automatic connection when resetting and replacing devices 3. When deleting an item in the offline downloader, add a progress bar 4. Under the SWD (CMSIS DAP) interface, modifying the download address is not

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

		the problem of page alignment download failure 5. Added online upgrade of offline downloader firmware 6. Under the SWD (CMSIS DAP) interface, add the entire Flash verification after downloading 7. Under the SWD (CMSIS DAP) interface, modifying N32G030,N32G032,N32G031 can also interpret the protection in the L1 state 8. Added automatic pop-up prompt tool upgrade 9. Other function optimization
V1.3.1	2022-8-23	1. Added support for N32A455 series chips 2. Other function optimization
V1.3.2	2023-1-11	1. Added support for N32G003 series chips, offline downloader temporarily supports SWD interface download 2. Added support for N32G401 series chips, offline downloader temporarily supports SWD interface download 3. Offline downloader adds UART interface download supporting N32G031 series chips 4. The baud rate is set to 115200 by default 5. When selecting a file, record the suffix and directory of the last selected file 6. Unlimit the minimum file size of 2k 7. Added support for hex files with option bytes

11 Online upgrade tool

In the online state, open the tool to judge the version, if it is not the latest version, the tool will pop up an upgrade prompt window (no network will not prompt).

If you choose to upgrade, you will be upgraded to the latest version.

If you choose not to upgrade, you will not be prompted to upgrade until the next time you open the tool; in addition, users can also select "Download tool to check for updates" in the help menu to upgrade the tool.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China

Note: The online upgrade tool must be online.

12 Online upgrade offline downloader firmware

In the online state, after the offline downloader is successfully connected, the firmware version of the offline downloader will be judged. If it is not the latest version, the tool will pop up an upgrade prompt window (not connected to the Internet will not prompt).

If you choose to upgrade, you will be upgraded to the latest version of the firmware.

If you choose not to upgrade, you will not be prompted to upgrade until the next time you open the tool and connect to the offline downloader successfully; in addition, the user can also select "Check the update for the offline downloader" in the help menu to upgrade the firmware of the offline downloader.

Note: The online upgrade of the offline downloader firmware must be done in the state of the Internet.

13 Legal Notice

Nations Technologies Inc. (Hereinafter referred to as NATIONS) reserves the right to make changes, corrections, enhancements, modifications, and improvements to this document at any time without notice.

Although NATIONS has attempted to provide accurate and reliable information, NATIONS assumes no responsibility for the accuracy and reliability of the information.

Please contact and obtain the latest version of this USER MANUAL before placing orders.

Any express, implied or statutory warranties, including, but not limited to, the implied warranties of merchantability, fitness for a particular purpose and non-infringement of third party intellectual property rights are disclaimed to the fullest extent permitted by law.

In no event shall nations be liable for any direct, indirect, incidental, special, exemplary, or consequential damages arising in any way out of the use of this product, even if advised of the possibility of such damage.

The Product is not recommended to be applied to life support systems or devices.

USER MANUAL is and will remain the exclusive property of NATIONS.

Unless otherwise explicitly permitted by NATIONS, anyone may not use, duplicate, modify, transcribe or otherwise distribute this USER MANUAL for any purposes, in whole or in part.

NATIONS CONFIDENTIAL

Nations Technologies Inc.
Tel：+86-755-86309900
Email：info@nationstech.com
Address: Nations Tower, #109 Baoshen Road, Hi-tech Park North.
Nanshan District, Shenzhen, 518057, P.R.China