

NSP ICP Writer User Guide

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Release Date: Aug. 2026

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1. Introduction

The ICP Writer can operate in two modes. One is online mode which ICP Writer connects to PC through USB cable, which is shown in Figure 1. The other mode is offline mode which is powered by an AC/DC adaptor, which is shown in Figure 2. The ICP Writer can detect the signal of USB connector and then decides which mode will be operated.



Figure 1. ICP Writer Operate at Online Mode

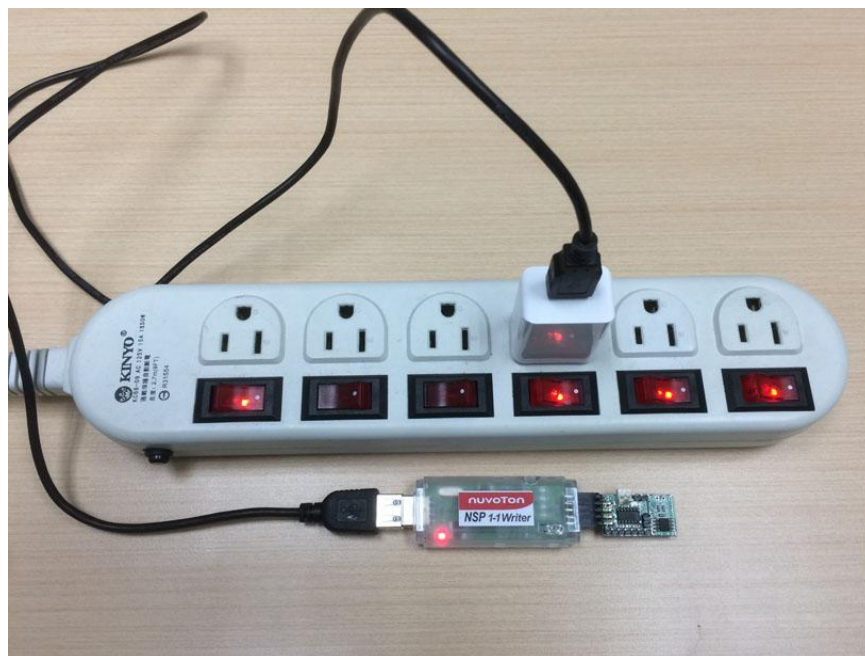


Figure 2. ICP Writer Operate at Offline Mode

It is a mistake to connect power to demo board which is plugged into the ICP Writer. The ICP Writer cannot work properly under such a condition, which is shown as Figure 3.



Figure 3. The power of ICP Writer can't be provided by demo board

2. The Components of the ICP Writer

There are five components in the ICP Writer which user should know how to handle. These five components are marked in the Figure 4.

- The USB connector of ICP Writer.
- One power LED indicating power supply is connected.
- A push-button.
- Four Status LEDs.
- Interface to Connect NSP Chip.

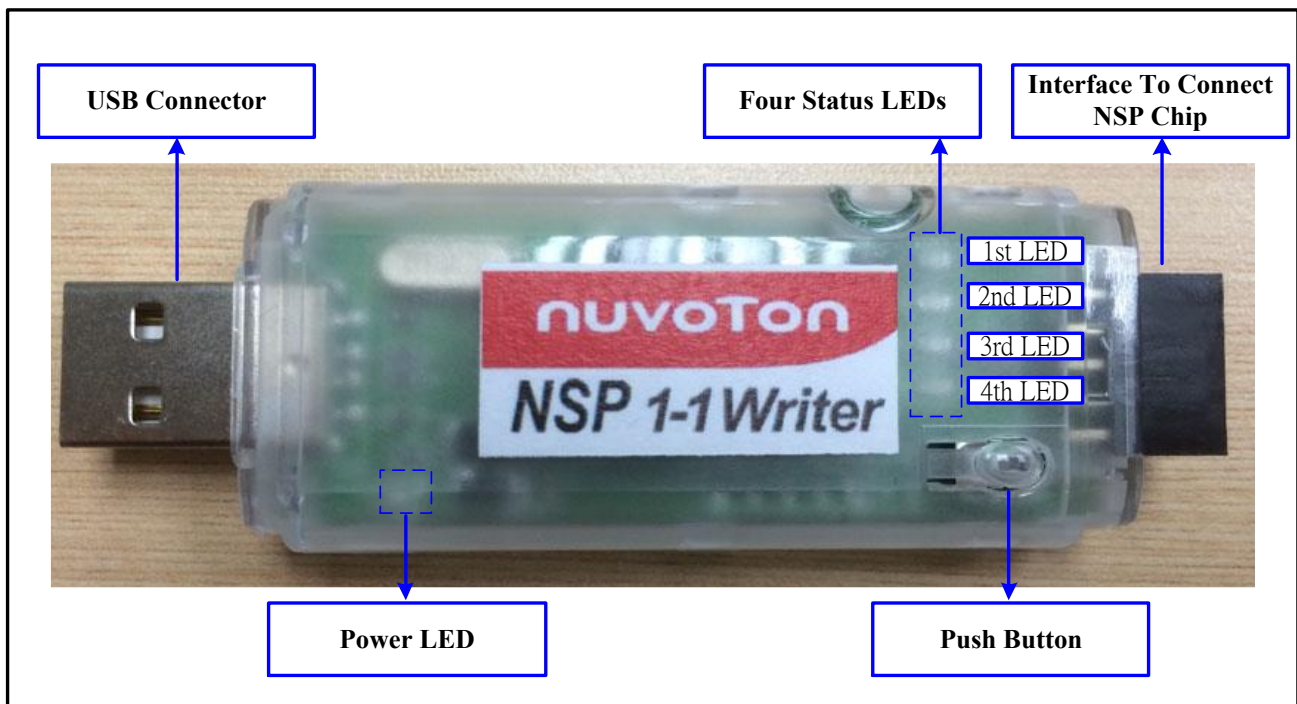
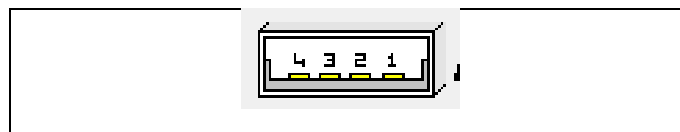


Figure 4. The Top View of ICP Writer

2.1 The USB connector of ICP Writer

The USB connector of ICP Writer is a standard 4P male A-type USB connector. The USB pin signals are shown in Figure 5.



Pin	Name	Description
1	VCC	+5 VDC
2	D-	Data -
3	D+	Data +
4	GND	Ground

Figure 5. The USB Pin-out Signals of ICP Writer

2.2 One power LED

When this LED is turned on, it indicates the ICP Writer gets power. There are two sources from which the ICP Writer can take power. In online mode, the ICP Writer takes power from the USB connector which connects to a host controller (personal computer). At offline mode, the ICP Writer can be powered by an AC/DC adaptor connecting to the USB connector.

2.3 A push-button

This push-button is only workable in offline mode. It has no effect when operate in online mode.

2.4 Four Status LEDs

The LEDs aim to show the programming status at offline mode. But they may flash in online mode sometimes. Please refer to the table below for the meaning of LEDs in detail.

	At Online Mode	At Offline Mode
1st LED	Turn on temporarily when connecting to PC.	Waiting/OK
2nd LED	The host is reading or writing the serial flash on the system board.	Programming/Wrong Chip type
3rd LED	Unused	Chip is not blank
4th LED	Unused	Verification fails.

Table 1. Description of Four Status LEDs

2.5 Interface to connect NSP chip

The ICP Writer possesses an interface labeled by JDONGLE on the PCB which can connect to NSP chip. JDONGLE is a 2*5 connector layout on the PCB, the pitch between every pin is 2.54mm. The signals of the JDONGLE connector are shown in Figure 6.



Figure 6. The JDONGLE of ICP Writer

- Connection with NSP LQFP48 (Only For NSP2xxxT16L)

Connector of JDONGLE		LQFP48
Pin	Name	Pin Name
6	VDD_D	VDD1
7	ICEDAT_D	BP01
8	ICECLK_D	BP00
9	ICERST_D	/RESET1
10	GND_D	VSS1

- Connection with NSP TSSOP28 (Only For NSP2xxxT06E)

Connector of JDONGLE		TSSOP28
Pin	Name	Pin Name
6	VDD_D	VDD1
7	ICEDAT_D	BP01
8	ICECLK_D	BP00

9	ICERST_D	/RESET1
10	GND_D	VSS

- Connection with NSP SOP8/SOP14/SOP16/TSSOP28

Connector of JDONGLE		SOP8/SOP14/SOP16/TSSOP28
Pin	Name	Pin Name
6	VDD_D	VDD
7	ICEDAT_D	BP01
8	ICECLK_D	BP00
9	ICERST_D	/RESET or PWM- (Note)
10	GND_D	VSS

Note: Only NSP040 is PWM- and the other NSP chip is /RESET.

Table 2. The signal of JDONGLE for NSP Flash

When the pins of a non-NSP chip are connected to the programming interface, please ensure that these pins are in an input state; otherwise, it may affect the write results. For example, when programming an NSP chip that is already connected to the MCU pins, the MCU pins must be properly controlled to avoid inaccurate write and verification results.

Recommended solution: You can control the MCU's RESET pin to switch the MCU pins connected to the NSP into input mode. This option is only applicable to MCUs whose IO pins default to input state after reset.

3. The Online Operation of ICP Writer

The online operation means that the operation is done while ICP Writer being connected to PC. Nuvoton provide NSP ICP Writer Tool running on Windows system for this purpose. After opening the NSP ICP Writer Tool, the user operation interface is shown as Figure 7.

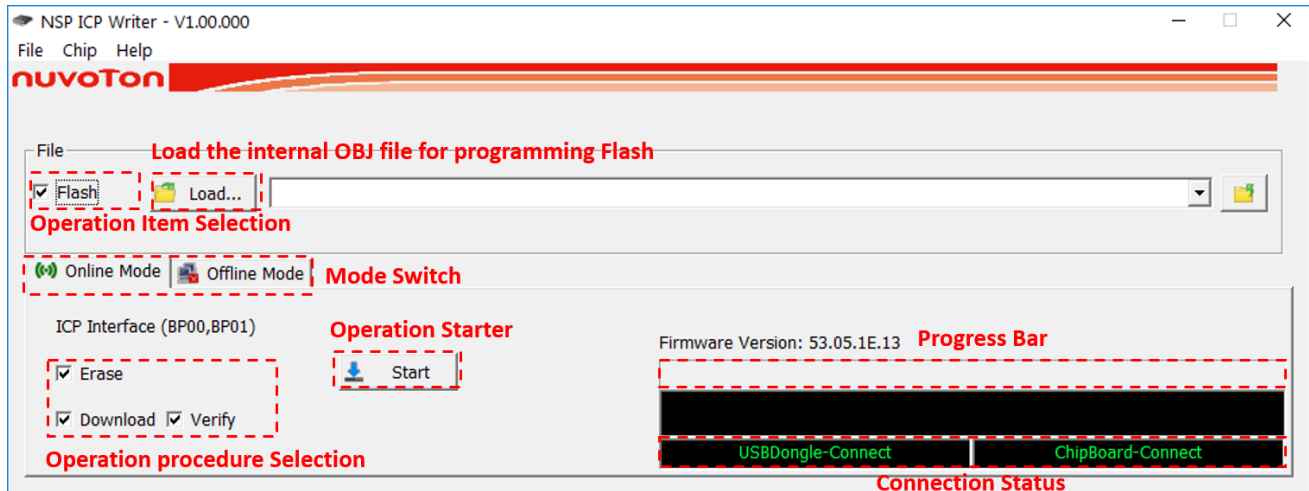


Figure 7. The UI of the NSP ICP Writer Tool

3.1 The Operation Step

Step 1: Connect ICP Writer to PC's USB port.

Online operation requires that ICP Writer to be connected to PC through USB port. The connection status is presented as shown in Figure 8. After connecting to PC, please check if the "Connection Status" is "Connect".

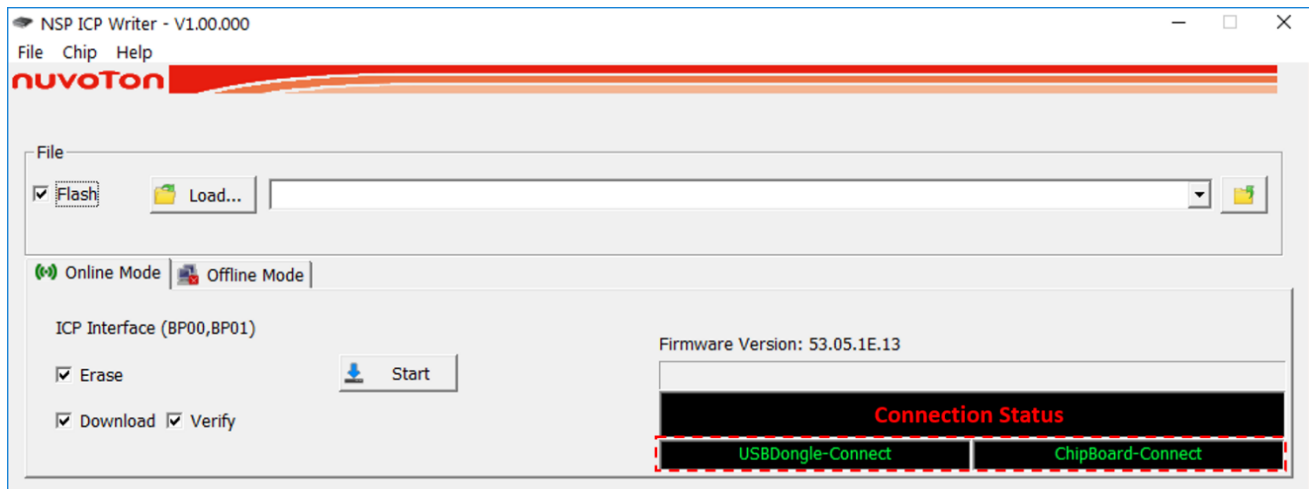


Figure 8. Check the "Connection Status"

Step 2: Load the OBJ file for programming and switch to the Online Mode.

The OBJ file is the content to be programmed into NSP directly or downloaded into the SPI Flash on the ICP Writer for offline programming.

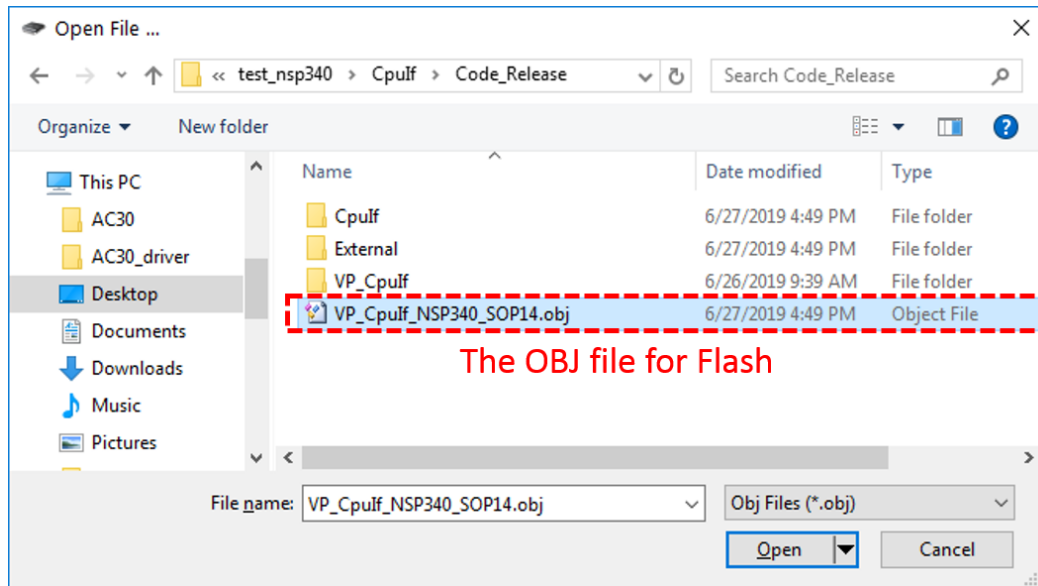


Figure 9. Load the OBJ file

When object file is loaded successfully, the GUI will show the chip name and the package type then is able to be programmed.

About the connection between NSP and NSP ICP Writer for programming “NSP Flash”, please refer the Table 2.

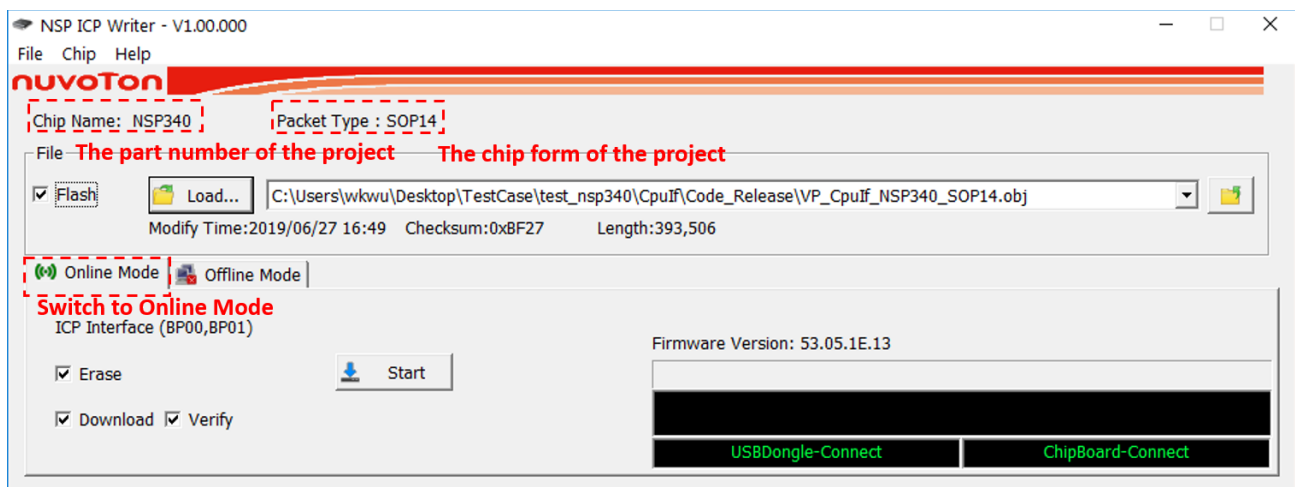


Figure 10. After Load the OBJ file

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Step 3: Click “Start” button and check “Operation Status”

When the “Operation Status” shows “All Process Success!!” message, the NSP Flash is programmed successfully.

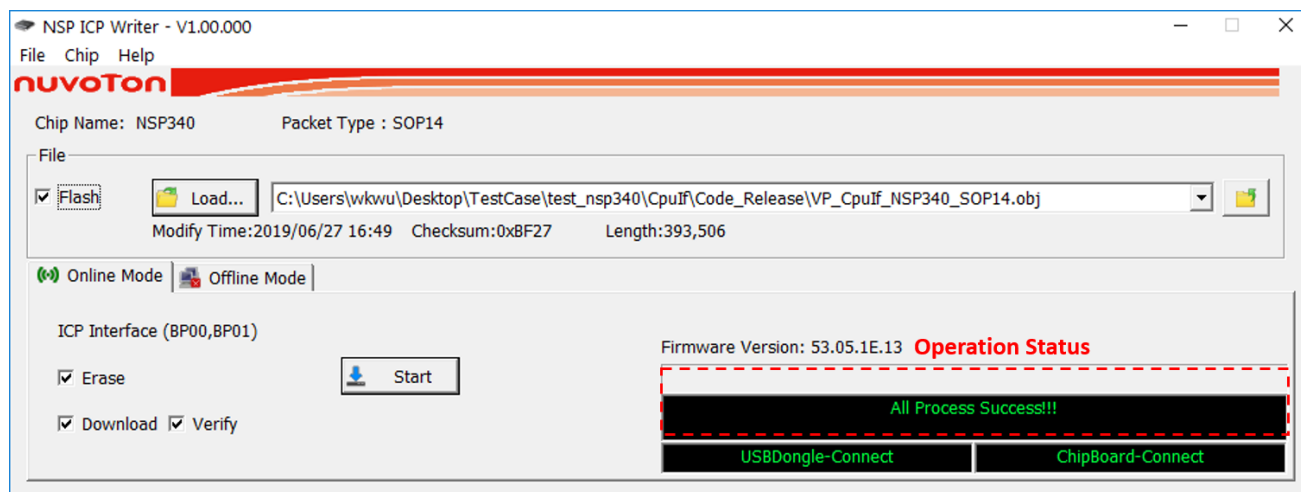


Figure 11. Programming NSP SOP14 in correct connection

3.2 Firmware Update

ICP Writer support to switch checking the update firmware is **Normal version** or **Factory version** or **Auto version**. The user can switch between three versions on menu [Help | ICP Firmware Check].

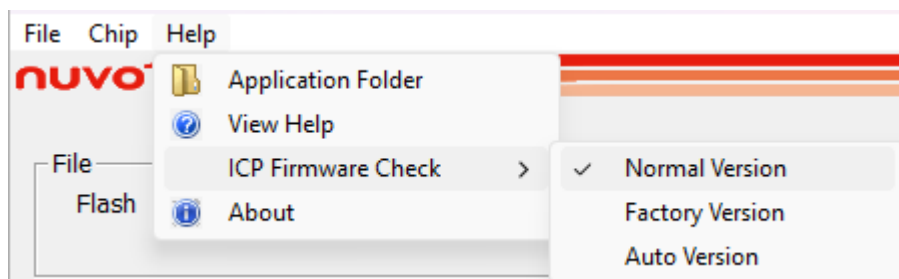


Figure 12. Switch the firmware version

	Description
Normal version	In offline mode, start to program the chip after press the button.
Factory version	Provide for use in automatic programming machine. The 1st LED is for showing that the programming result is OK. The 3rd LED is for showing that the programming is in-process. The 4th LED is for showing that the programming result is NG.
Auto version	In offline mode, automatically detect the chip then program it. It doesn't need to press the button. But it doesn't support programming NSP040.

Table 3. Firmware version description

ICP Writer allows F/W update on user's site. The F/W file (NSPIceFw.bin) will be installed in the sub-folder of the ICP Writer tool. ICP Writer tool will compare the F/W version inside the ICP Writer with the bundled F/W file. If the F/W file version is different from the ICP Writer, user will be prompted to update the F/W.

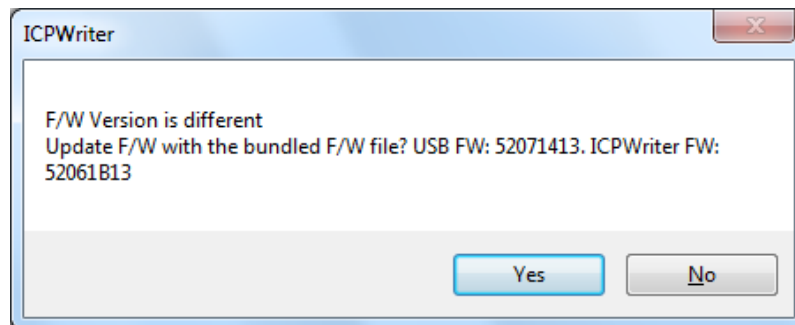


Figure 13. Prompting F/W updating

If “Yes” is selected, ICP Writer tool will start to upgrade the F/W of ICP Writer with the bundled F/W file. Please do not disconnect the ICP Writer with the PC during upgrading.

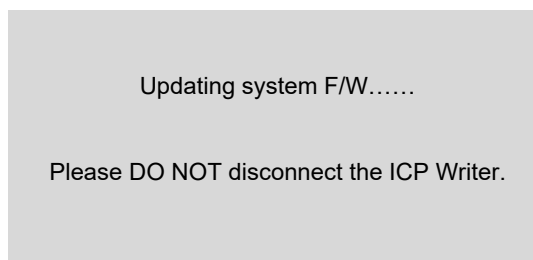
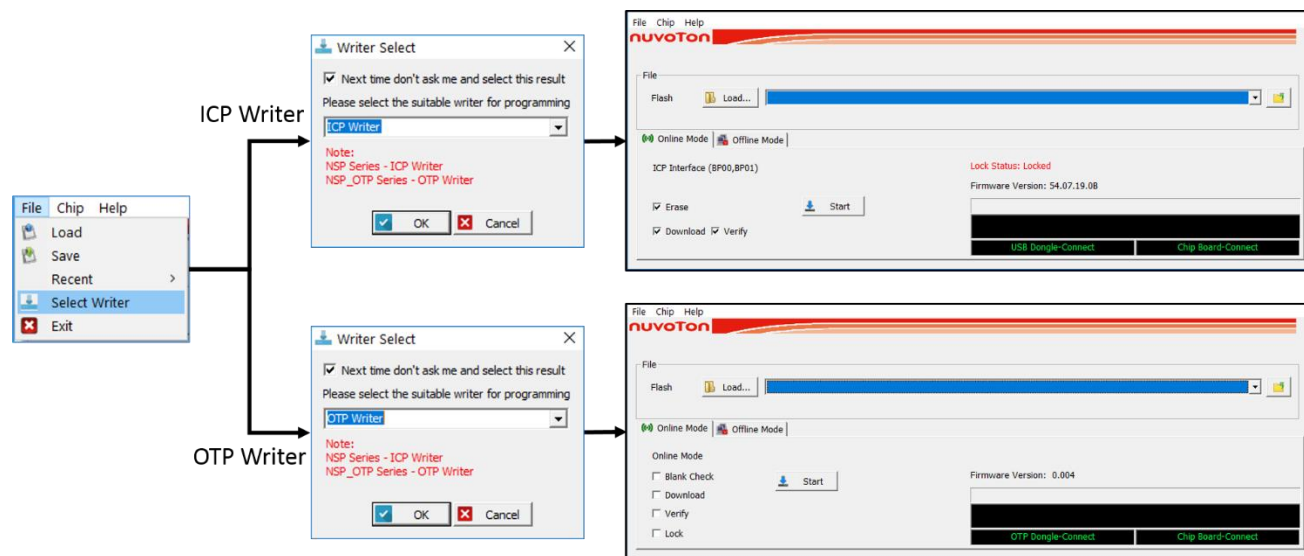


Figure 14. The Status of F/W Updating

4. The Online Operation of OTP Writer

The user can switch the writer mode between ICP Writer and OTP Writer on menu [File | Select Writer].



When the OTP Writer mode, the user can program NSP075/165/335 object files. The operation step is like the online operation ICP Writer.

5. The Offline Operation of ICP Writer

When the ICP Writer programs the NSP chip without connecting to PC, it is called offline mode. But before the ICP Writer operates in offline mode, the ICP Writer should be first downloaded with the object code in online mode. This object code is downloaded to the serial flash on the writer board.

5.1 Object Coed Download to ICP Writer

After the ICP Writer connects with the PC and opens the ICP Writer Tool, please refer to the sequence on the Figure 15 to operate.

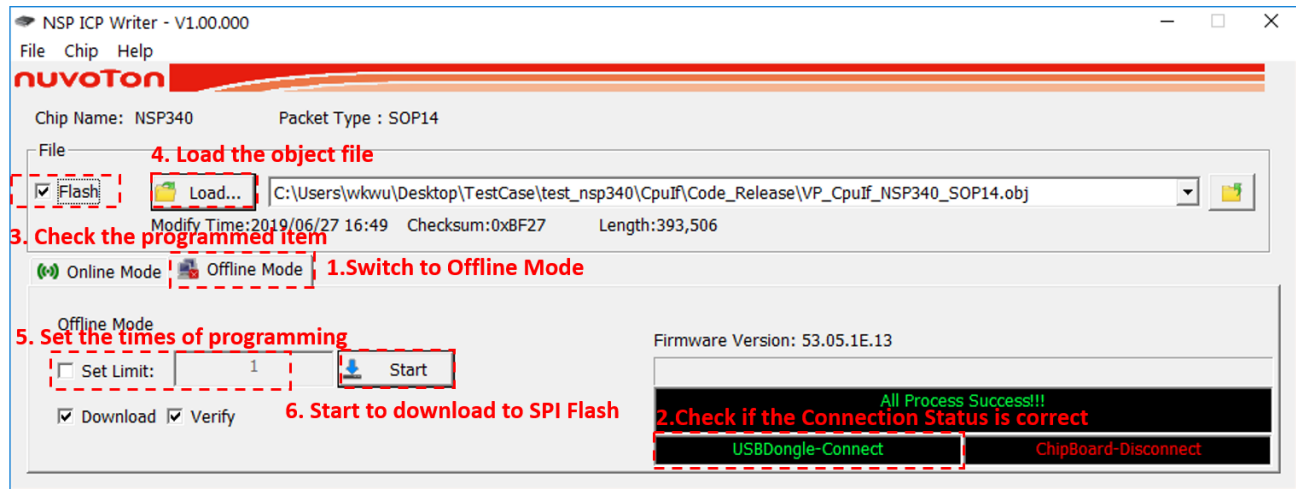


Figure 15. Download the object code to the ICP Writer

If user don't limit the times of program, the "Set Limit" don't need to check.

If check "Set Limit" and fill to 10, the ICP Writer will only permit to program 10 times.



The range of number is 1~4294967294.

Once programming times are over the limited times, user can't use the ICP Writer to program. And the Four Status LEDs will be lit in turn.

5.2 Program NSP by ICP Writer

The following five steps describe the procedure to program the NSP chip on offline mode.

Step 1: Connect the USB connector of the ICP Writer to AC/DC adapter. Please note that it can't connect to PC or the adapter that send USB D+D- signal.

Please refer the Figure 2. When the ICP Writer gets power, the Power LED will be lit.

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Step 2: Connect the ICP interface of NSP to JDONGLE. Please refer the Table 2.

Four Status LEDs are all turned off.

Step 3: Press the push-button.

The 2nd LED will flash after pressing the push-button. The status of the 2nd LED will change per second.

Step 4: Watch which LED is on finally.

Finally, only-one LED will be on. If 1st LED (green LED) is on, this means the NSP chip is programmed successfully. If the other LED is on, then one LED represents one failure reason. The Table 3 summarizes the programming result.

When the 2nd LED is on, this means the Chip ID stored in the serial flash of writer does not match the Chip ID of NSP chip connected with the writer. So, the current object code in the serial flash is not applicable to the NSP chip connected with the writer. The Chip ID stored in the serial flash of writer is downloaded with the object code simultaneously in the online mode.

	Status Before Result Comes out.	Programming Result
1st LED (green)		OK
2nd LED (red)	Writer is being writing NSP chip.	Wrong NSP chip type
3rd LED (red)		NSP chip is not blank
4th LED (red)		Verification fails.

Table 4. The description of Four Status LEDs in offline mode

Step 5: Disconnect the NSP chip.

Four Status LEDs are all turned off.

Repeat **Step 2 ~ Step 5** to write another NSP chips.

5.3 Program Time on Offline Mode

Program time (Erase + Blank check + Program + Verify)

Part No.	Time (seconds)
NSP2K0	59
NSP960	29
NSP650	22
NSP481	15
NSP342	14
NSP341	12
NSP172	10
NSP082	6
NSP040	10
NSP2340/NSP2340A01/ NSP2340A03/NSP2340T06 NSP2340T16/NSP2340BA24	22
NSP2170/NSP2170A01 NSP2170A03/NSP2170T06 NSP2170T16/NSP2170BA24	12
NSP2080/NSP2080A01 NSP2080A03/NSP2080T06 NSP2080T16/NSP2080BA24	10

Table 5. Program Time of NSP Series

6. Save and load GUI setting

User can use the menu [File | Save] to save current GUI setting to specified file [xxx.ini]. Next time user can use the menu [File | Load] or [File | Recent | NSP Series | xxx.ini] to load the last GUI setting from setting file.

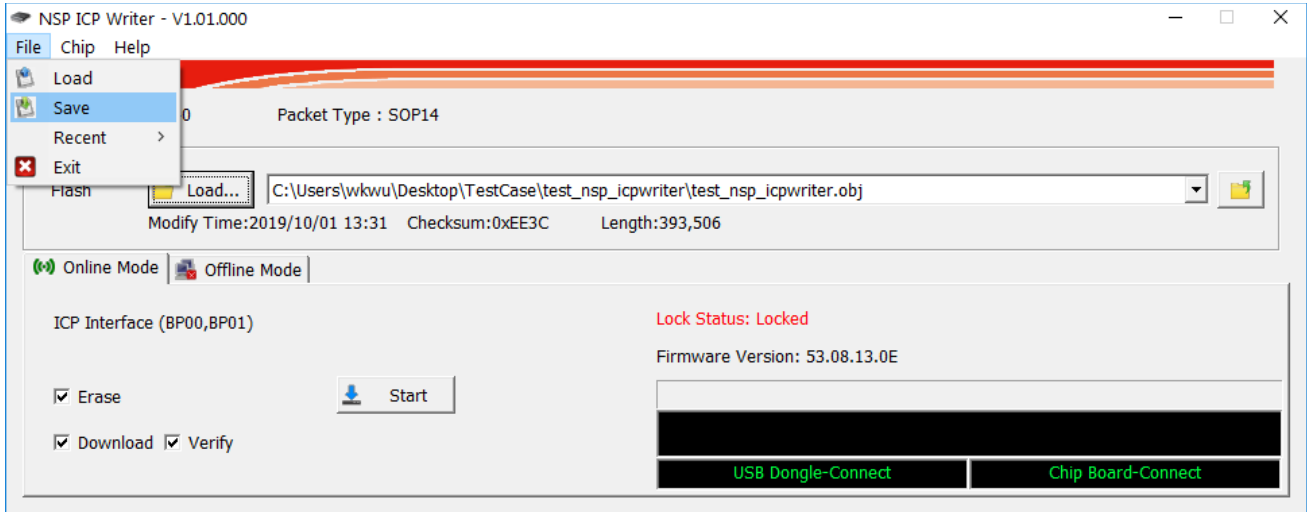


Figure 16. Save the current GUI setting

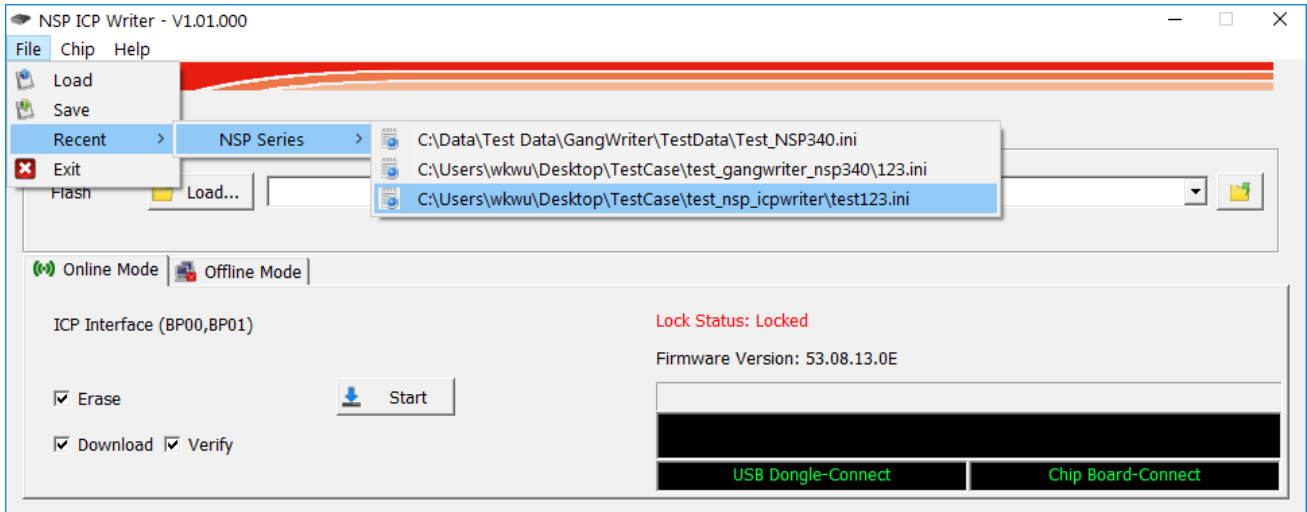


Figure 17. Load the last GUI setting

7. Console Mode

User can use console mode to do some specified action. Open the command prompt and switch folder to specified directory that contain NSP ICP Writer.exe.



```
Administrator: C:\Windows\System32\cmd.exe
(c) 2018 Microsoft Corporation. All rights reserved.
C:\Nuvoton\NSP ICP Writer\V1.14.000>
```

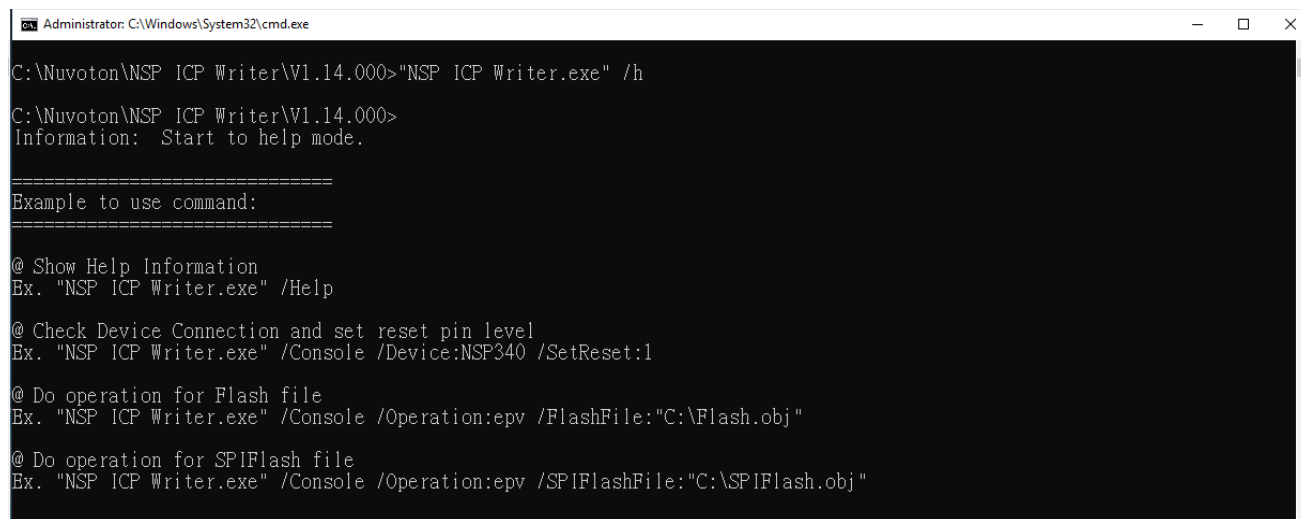
NSP ICP Writer provide these command to do specified action.

- (1) [Show help information](#)
- (2) [Erase 、 program 、 verify the flash section using object file](#)
- (3) [Check dongle and chip board connect status](#)
- (4) [Check dongle support firmware version and update](#)

7.1 Show help information

Commands
"NSP ICP Writer.exe" /Help
"NSP ICP Writer.exe" /h

Example:



```
Administrator: C:\Windows\System32\cmd.exe
C:\Nuvoton\NSP ICP Writer\V1.14.000>"NSP ICP Writer.exe" /h
C:\Nuvoton\NSP ICP Writer\V1.14.000>
Information: Start to help mode.

=====
Example to use command:
=====

@ Show Help Information
Ex. "NSP ICP Writer.exe" /Help

@ Check Device Connection and set reset pin level
Ex. "NSP ICP Writer.exe" /Console /Device:NSP340 /SetReset:1

@ Do operation for Flash file
Ex. "NSP ICP Writer.exe" /Console /Operation:epv /FlashFile:"C:\Flash.obj"

@ Do operation for SPIFlash file
Ex. "NSP ICP Writer.exe" /Console /Operation:epv /SPIFlashFile:"C:\SPIFlash.obj"
```

7.2 Erase 、 Program 、 Verify the flash section using object file

Commands

"NSP ICP Writer.exe" /Console /Operation:[epv] /FlashFile:[Object File Full Path]

Explanation:

[e]: Erase all flash section

[p]: Program object file to the flash section

[v]: Verify the flash section to use object file

[Object File Full Path]: The object file that will program or verify with flash section

Example:

```
Administrator: C:\Windows\System32\cmd.exe
C:\Nuvoton\NSP ICP Writer\V1.14.000>"NSP ICP Writer.exe" /Console /Operation:epv /FlashFile:"C:\test_nsp_340.obj"
C:\Nuvoton\NSP ICP Writer\V1.14.000>
Information: Start to console mode.
Information: Detect the erase operation.
Information: Detect the program operation.
Information: Detect the verify operation.
Information: Find the file on "C:\test_nsp_340.obj"
Information: Start to do operation...
Information: Find chip item name NSP340 from object...
Information: Set current chip name NSP340...
Information: Online ICP Mode Use Mass Storage Protocol.
Information: Use ICP Interface (BP00,BP01)
Information: Online ICP Mode Use Mass Storage Protocol.
Information: Erase Whole Chip...
Information: Blank Check Flash...
Progress: 0 %
Progress: 4 %
Progress: 8 %
Progress: 12 %
Progress: 16 %
Progress: 20 %
Progress: 25 %
Progress: 29 %
Progress: 33 %
Progress: 37 %
Progress: 41 %
Progress: 45 %
Progress: 50 %
Progress: 54 %
Progress: 58 %
Progress: 62 %
Progress: 66 %
Progress: 70 %
Progress: 75 %
Progress: 79 %
Progress: 83 %
Progress: 87 %
Progress: 91 %
Progress: 95 %
Progress: 100 %
Information: Allowed: You are downloading a NSP340 obj file, and the download target chip is compatible with this obj file.
Information: Load Flash Pure Data...
Information: Flash Programming...
```

7.3 Check dongle and chip board connect status

Commands

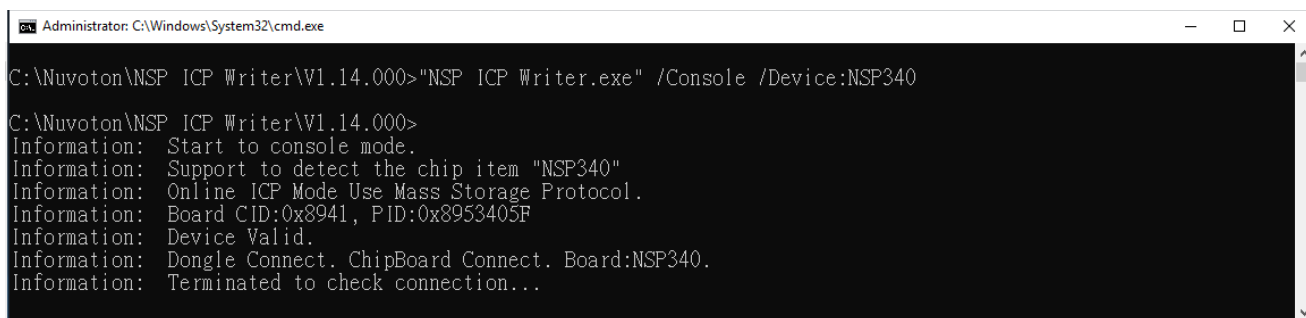
"NSP ICP Writer.exe" /Console /Device:[Chip Name]

Explanation:

[Chip Name]: Supported NSP chip

- NSP040
- NSP080/NSP081/NSP082
- NSP170/NSP171/NSP172
- NSP340/NSP341/NSP342
- NSP481/NSP650/NSP960/NSP2K0
- NSP2080/NSP2170/NSP2340
- NSP2080A01/NSP2170A01/NSP2340A01
- NSP2080T06/NSP2170T06/NSP2340T06
- NSP2080T16/NSP2170T16/NSP2340T16
- NSP2080BA24/NSP2170BA24/NSP2340BA24

Example:



```
Administrator: C:\Windows\System32\cmd.exe
C:\Nuvoton\NSP ICP Writer\V1.14.000>"NSP ICP Writer.exe" /Console /Device:NSP340
C:\Nuvoton\NSP ICP Writer\V1.14.000>
Information: Start to console mode.
Information: Support to detect the chip item "NSP340"
Information: Online ICP Mode Use Mass Storage Protocol.
Information: Board CID:0x8941, PID:0x8953405F
Information: Device Valid.
Information: Dongle Connect. ChipBoard Connect. Board:NSP340.
Information: Terminated to check connection...
```

7.4 Check the dongle firmware version and update

Commands

"NSP ICP Writer.exe" /Console /CheckFWVer:[Chip Name]

Explanation:

[Chip Name]: Supported NSP chip

- NSP040
- NSP080/NSP081/NSP082
- NSP170/NSP171/NSP172
- NSP340/NSP341/NSP342
- NSP481/NSP650/NSP960/NSP2K0
- NSP2080/NSP2170/NSP2340
- NSP2080A01/NSP2170A01/NSP2340A01
- NSP2080T06/NSP2170T06/NSP2340T06
- NSP2080T16/NSP2170T16/NSP2340T16
- NSP2080BA24/NSP2170BA24/NSP2340BA24

Example:

```
Administrator: C:\Windows\System32\cmd.exe
C:\Nuvoton\NSP ICP Writer\V1.14.000>"NSP ICP Writer.exe" /Console /CheckFWVer:NSP340
C:\Nuvoton\NSP ICP Writer\V1.14.000>
Information: Start to console mode.
Information: Start to check firmware version.
Information: Online ICP Mode Use Mass Storage Protocol.
Information: Online ICP Mode Use Mass Storage Protocol.
Information: Online ICP Mode Use Mass Storage Protocol.
Information: Online ICP Mode Use Mass Storage Protocol.
Information: Board CID:0x8941, PID:0x8953405F
```

8. Revision History

Version	Date	Substantial Changes	Page
1.0	October. 2019	Initial Release	All
1.1	December.2019	Add NSP480/NSP650/NSP960	7
1.2	April. 2020	Add console mode	15
1.3	August, 2020	Add online operation of OTP Writer, firmware update version change	11, 12
1.4	June, 2022	Update program time on offline mode	16
1.5	July, 2023	Update supported chips on programming time table	19
1.6	August, 2023	Update supported chips on console mode information	16
1.7	July, 2025	Add the note about programming chip.	10
		Add the firmware of Auto Version.	14
1.8	August 2026	Modify the description of interface connection.	7
		Add firmware version description	12

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