ARM® Cortex®-M

32-bit Microcontroller

NuMicro® Family
NuGang Programmer
User Manual

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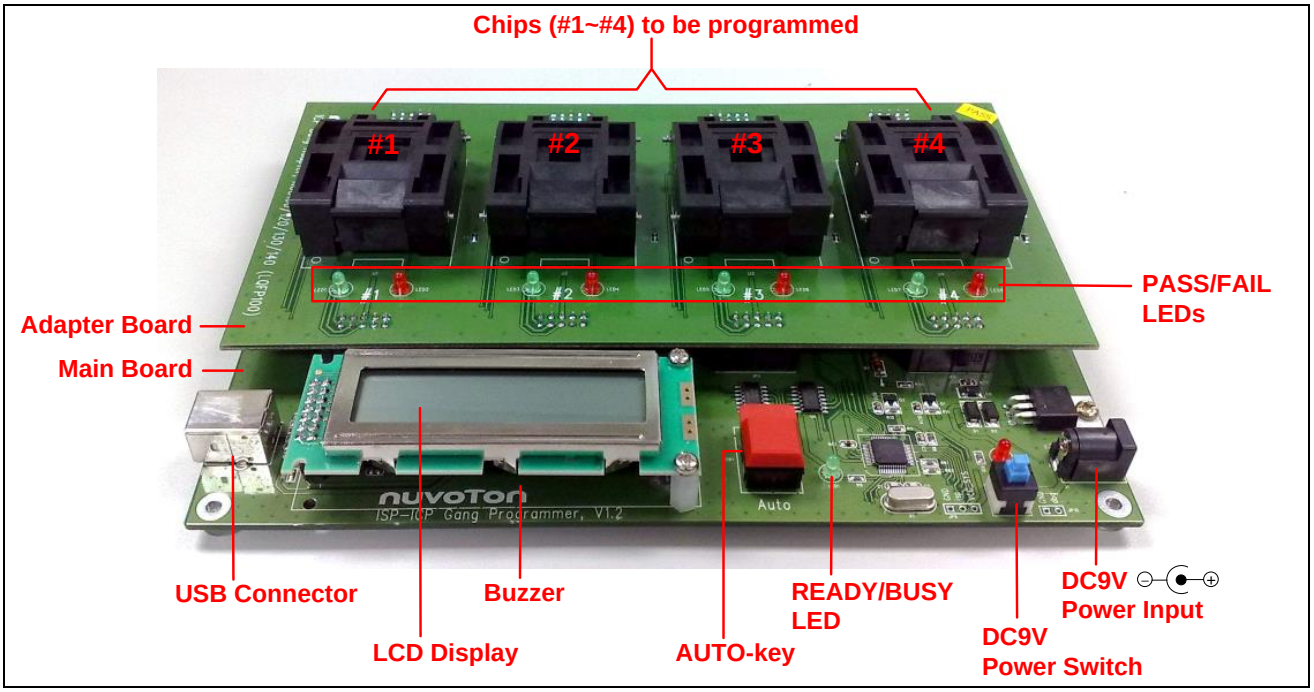
1 INTRODUCTION

The “NuGang Programmer” provides the four-chip gang programming functionality, which is designed especially for mass-production in the customer site. After online downloading the programming data into the programmer, user may start the off-line gang programming by pressing the **AUTO**-key on the programmer.

The Picture of “NuGang Programmer”



Component Description

Main Board and Adapter Board:

The programmer consists of a main board for gang programming control and an adapter board containing the sockets for the MCU chips to be programmed. Note that different chip package will have different adapter board.

USB Connector:

Connect to a PC for online downloading the programming data.

LCD Display:

Show the programmer’s information and status.

Buzzer:

Show the programmer’s status by a sound message.

AUTO-key:

Press this key to start off-line gang programming.

READY/BUSY LED:

Show the Gang Programmer's status; 'On' means READY and 'Off' means BUSY.

DC9V Power Input and Switch:

Supply DC 9V power for off-line operation. Note that the programmer is always powered On by host when it is connected to the USB port.

PASS/FAIL LEDs:

Show the individual programming result for chips #1 to #4; 'Green' means PASS and 'Red' means FAIL.

2 DRIVER AND APPLICATION PROGRAM

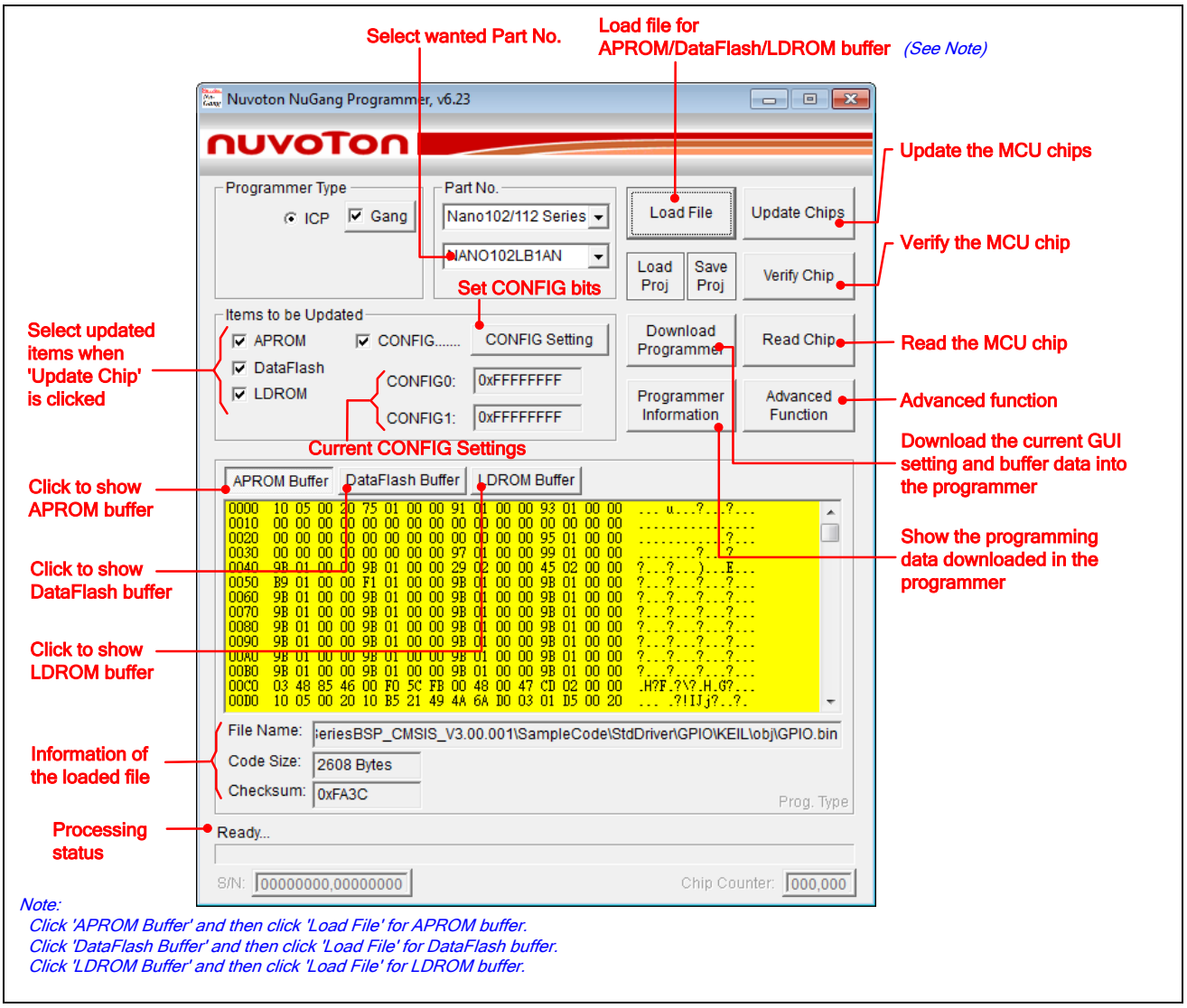
2.1 Installing the Driver

The NuGang Programmer has a built-in USB-to-Serial bridge chip (PL-2303). When connected to host, it will appear as a *USB-to-Serial COM port* in the System\Hardware\Device Manager. Before starting to use this programmer, the driver must be installed if the PL-2303 driver has never been installed in this host. The driver is included in the folder **[(1) Driver]**.

2.2 Installing the Application Program

Doubly-click the setup file included in the folder **[(2) Application Program]** to install the application program. After the installation is completed successfully, a new item *"Nuvoton Tools \ Nuvoton NuGang Programmer, v?.??"* will appear in the Windows START-menu.

2.3 Introduction to the GUI



Note:
Click 'APROM Buffer' and then click 'Load File' for APROM buffer.
Click 'DataFlash Buffer' and then click 'Load File' for DataFlash buffer.
Click 'LDROM Buffer' and then click 'Load File' for LDROM buffer.

3 STARTING TO USE THE NUGANG PROGRAMMER

The NuGang Programmer always functions as an 'ICP Gang Programmer' for the NuMicro® family products.

3.1 Example-1: Nano102LB1AN

To do the ICP gang programming for Nano102LB1AN, please follow the steps below:

Step 1: Set the programmer type as '***ICP Gang Programmer***' (set as default).

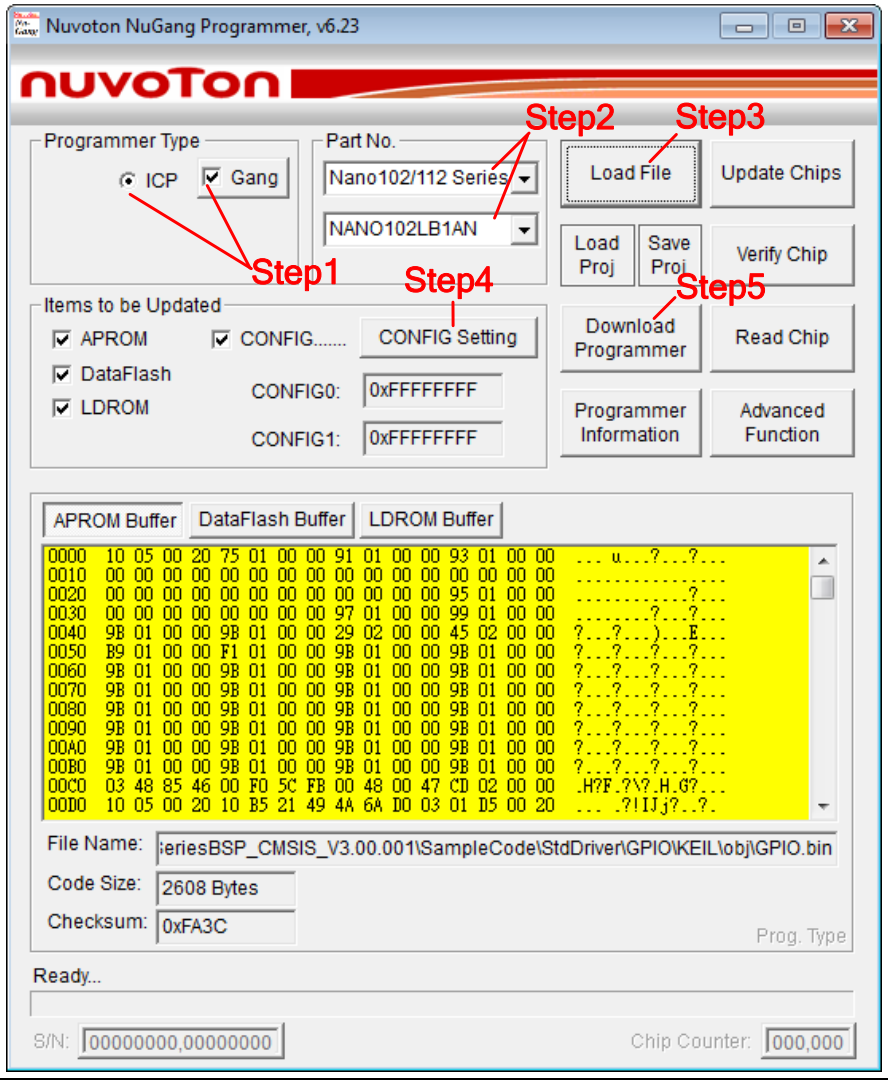
Step 2: Select the wanted part number (e.g. Nano102LB1AN).

Step 3: Load the programming data into APROM/DataFlash/LDROM buffers by clicking '**APROM Buffer** then **Load File**', '**DataFlash Buffer** then **Load File**' and '**LDROM Buffer** then **Load File**', respectively.

Step 4: Set the CONFIG bits. (***Note:*** *Step 2 - 4 can be completed by loading a TPJ file. Please refer to Section 4.)*

Step 5: Download the buffers' data and CONFIG setting into the programmer.

Step 6: Disconnect the programmer from the host, and press the **AUTO**-key on the programmer to start off-line gang programming.



3.2 Example-2: M0516LDN

To do the ICP gang programming for M0516LDN, please follow the steps below:

Step 1: Set the programmer type as '***ICP Gang Programmer***' (set as default).

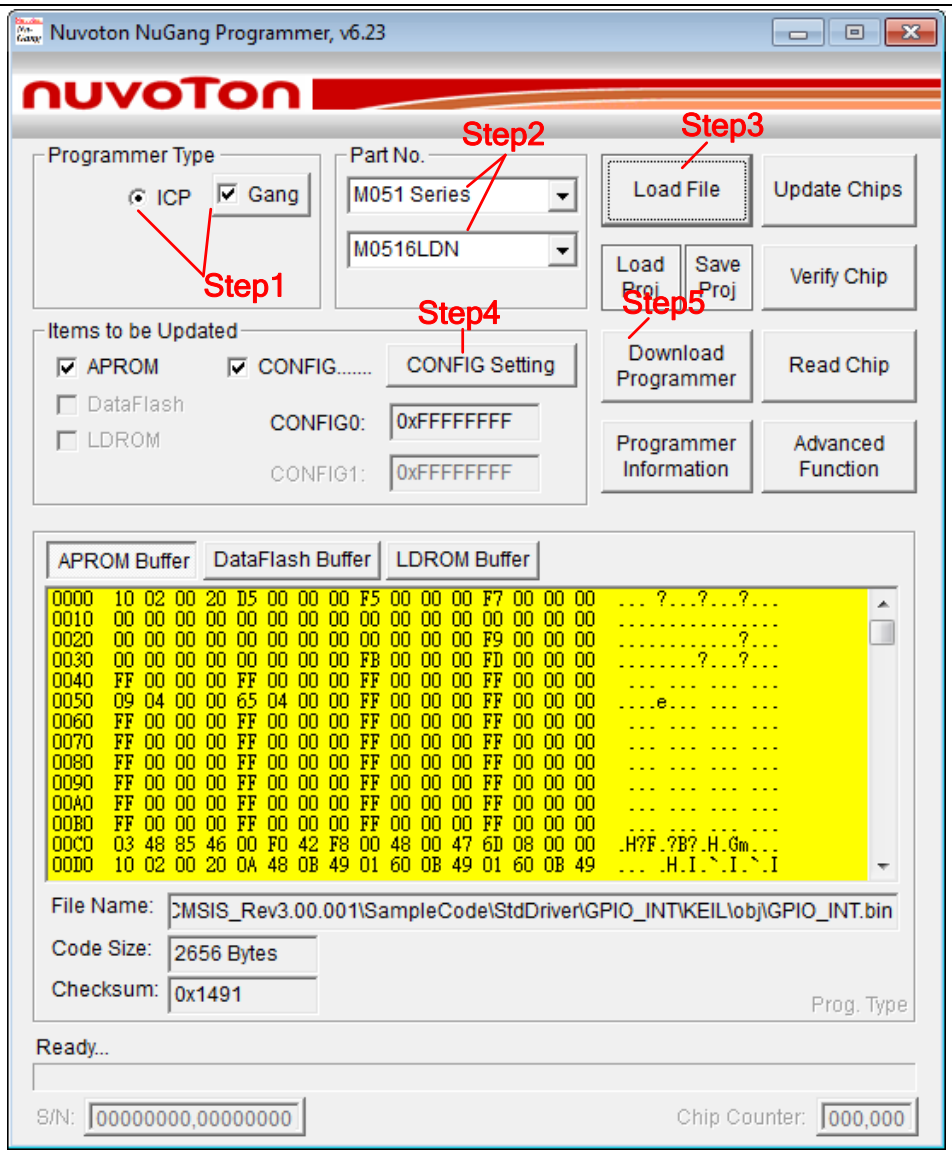
Step 2: Select the wanted part number (e.g. M0516LDN).

Step 3: Load the programming data into APROM/DataFlash/LDROM buffers by clicking '**APROM Buffer** then **Load File**', '**DataFlash Buffer** then **Load File**' and '**LDROM Buffer** then **Load File**', respectively.

Step 4: Set the CONFIG bits. *(**Note:** Step 2 - 4 can be completed by loading a TPJ file. Please refer to Section 4.)*

Step 5: Download the buffers' data and CONFIG setting into the programmer.

Step 6: Disconnect the programmer from the host and press the **AUTO**-key on the programmer to start off-line gang programming.



3.3 Verifying Single Chip

Although the gang programming operation (by pressing the **AUTO**-key) includes verifying a chip, user may verify the chip again. To verify a single chip, please follow the steps below:

Step 1: Set the programmer type as '***ICP Gang Programmer***' (set as default).

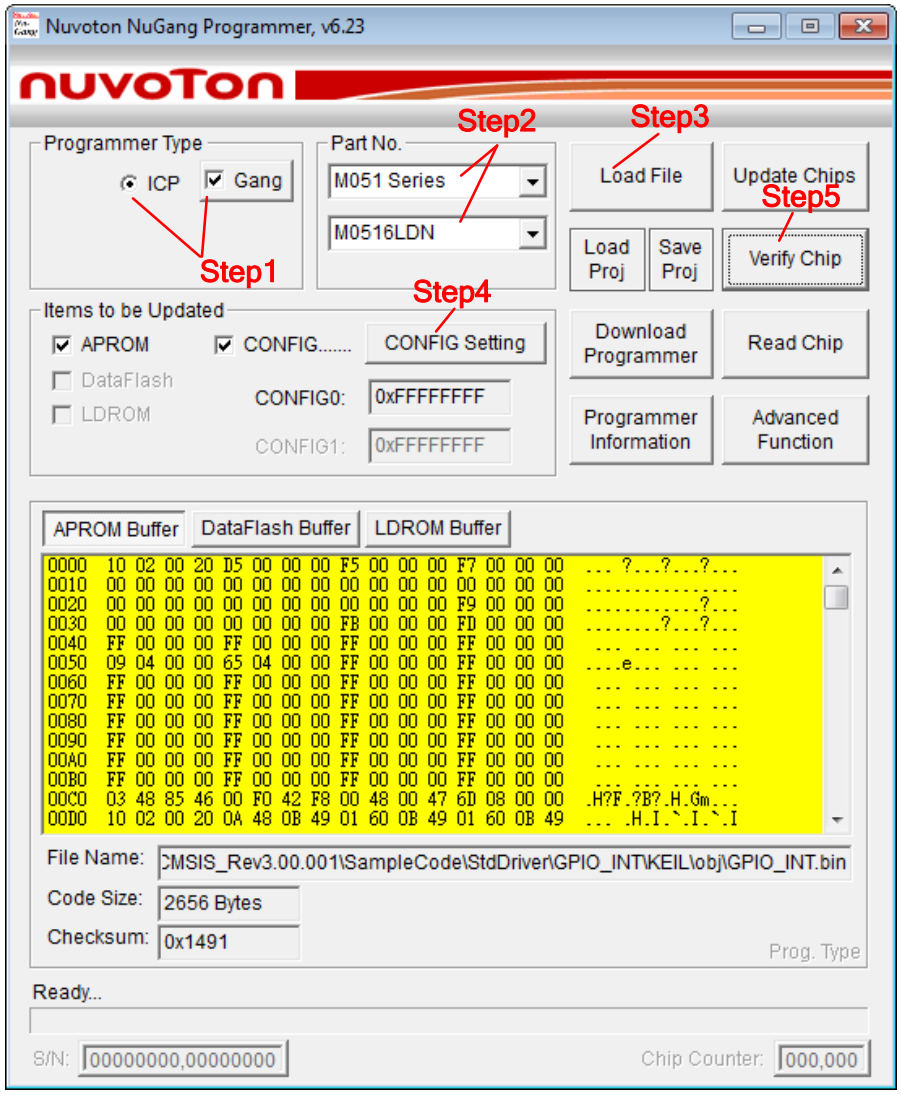
Step 2: Select the wanted part number.

Step 3: Load the programming data into APROM/DataFlash/LDROM buffers by clicking '**APROM Buffer** then **Load File**', '**DataFlash Buffer** then **Load File**' and '**LDROM Buffer** then **Load File**', respectively.

Step 4: Set the CONFIG bits. *(**Note:** Step 2 - 4 can be completed by loading a TPJ file. Please refer to Section 4.)*

Step 5: Compare the chip's contents with the buffers' data and CONFIG setting.

Note: The chip can be verified only when it was not locked.



3.4 Verifying All Chips

In NuGang Programmer, a special mode, Verify mode, can be used to verify all chips placed in the sockets simultaneously. To enter Verify mode, please follow the steps below:

Step 1: Set further settings by clicking **Advanced Function**.

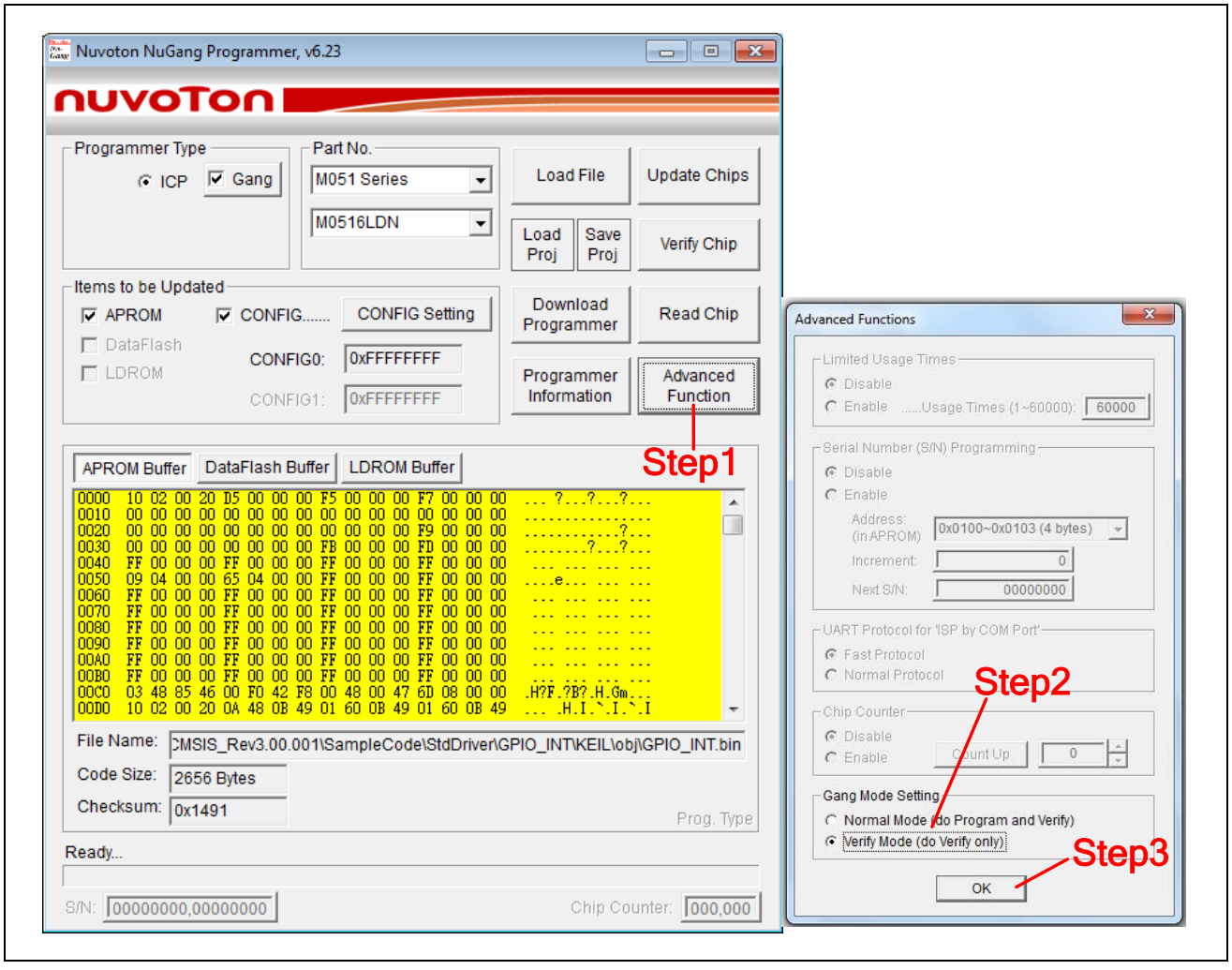
Step 2: Select the **Verify Mode (do Verify only)** option in the **Gang Mode Setting** section.

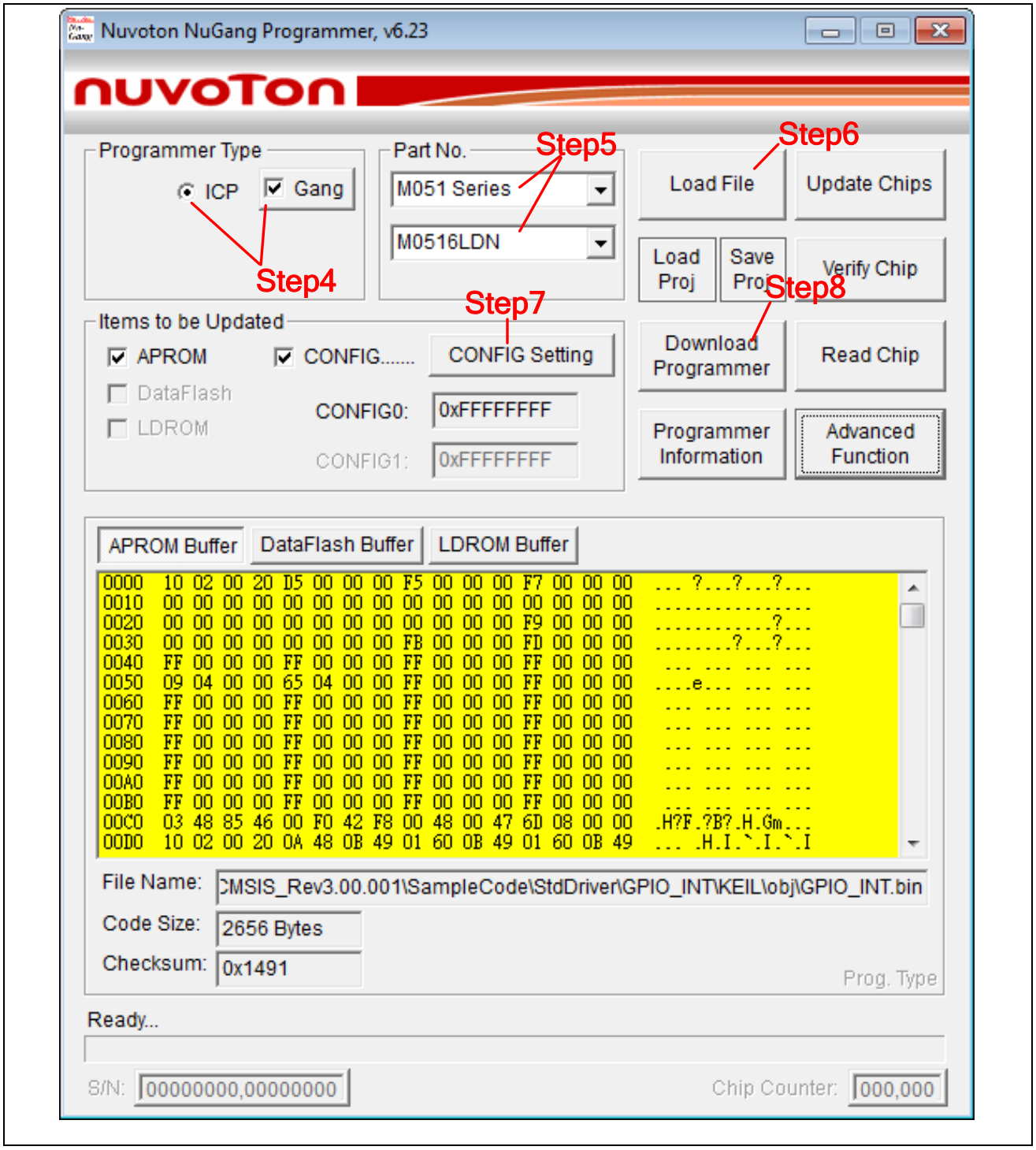
Step 3: Click **OK** to confirm the setting.

Step 4 - Step 8: Do the same steps as *Section 3.3*.

Step 9: Disconnect the programmer from the host, and press the **AUTO**-key on the programmer to start off-line all chips verification.

Note: User cannot update the code of the chip placed in the socket under this mode.




Nuvoton NuGang Programmer, v6.23
Programmer Type
ICP
Gang
Part No.
M051 Series
M0516LDN
Step4
Step5
Step6
Load File
Update Chips
Load Proj
Save Proj
Verify Chip
Step7
Step8
Items to be Updated
APROM
CONFIG.....
CONFIG Setting
DataFlash
LDROM
CONFIG0:
0xFFFFFFFF
CONFIG1:
0xFFFFFFFF
Download Programmer
Read Chip
Programmer Information
Advanced Function
APROM Buffer
DataFlash Buffer
LDROM Buffer
0000 10 02 00 20 D5 00 00 00 F5 00 00 00 F7 00 00 00 ... ?...?...?...
0010 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ....
0020 00 00 00 00 00 00 00 00 00 00 00 00 F9 00 00 00 ....?...
0030 00 00 00 00 00 00 00 00 FB 00 00 00 FD 00 00 00 ....?...?...
0040 FF 00 00 00 FF 00 00 00 FF 00 00 00 FF 00 00 00 ... ...
0050 09 04 00 00 65 04 00 00 FF 00 00 00 FF 00 00 00 ....e... ... ...
0060 FF 00 00 00 FF 00 00 00 FF 00 00 00 FF 00 00 00 ... ...
0070 FF 00 00 00 FF 00 00 00 FF 00 00 00 FF 00 00 00 ... ...
0080 FF 00 00 00 FF 00 00 00 FF 00 00 00 FF 00 00 00 ... ...
0090 FF 00 00 00 FF 00 00 00 FF 00 00 00 FF 00 00 00 ... ...
00A0 FF 00 00 00 FF 00 00 00 FF 00 00 00 FF 00 00 00 ... ...
00B0 FF 00 00 00 FF 00 00 00 FF 00 00 00 FF 00 00 00 ... ...
00C0 03 48 85 46 00 F0 42 F8 00 48 00 47 6D 08 00 00 .H?F.?B?.H.Gm...
00D0 10 02 00 20 0A 48 0B 49 01 60 0B 49 01 60 0B 49 ... .H.I.`.I.`.I
File Name:
CMSIS_Rev3.00.001\SampleCode\StdDriver\GPIO_INT\KEIL\obj\GPIO_INT.bin
Code Size:
2656 Bytes
Checksum:
0x1491
Prog. Type
Ready...
S/N:
00000000,00000000
Chip Counter:
000,000

3.5 Reading Chip

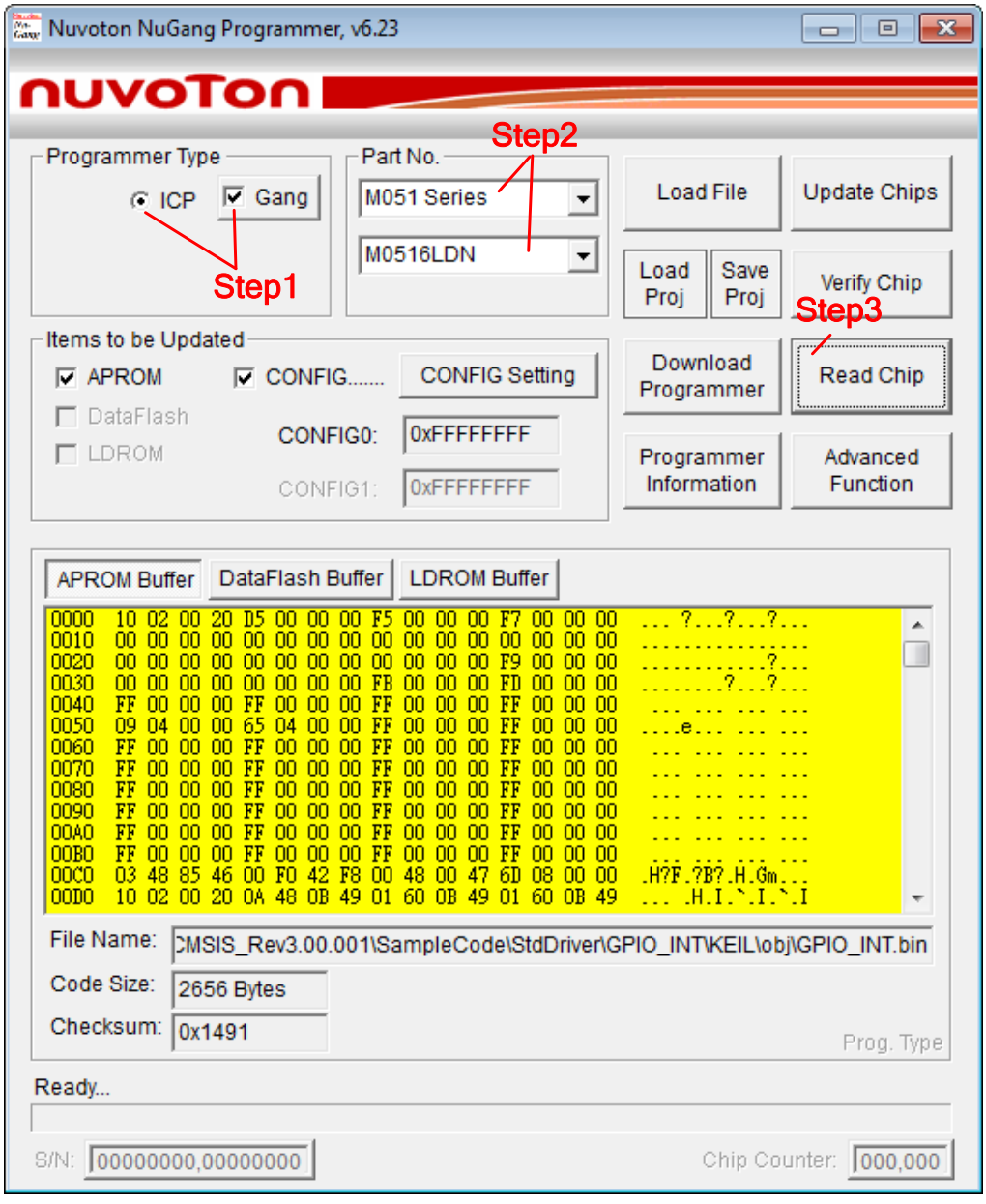
To dump the chip's contents, please follow the steps below:

Step 1: Set the programmer type as '***ICP Gang Programmer***' (set as default).

Step 2: Select the wanted part number.

Step 3: Read the chip.

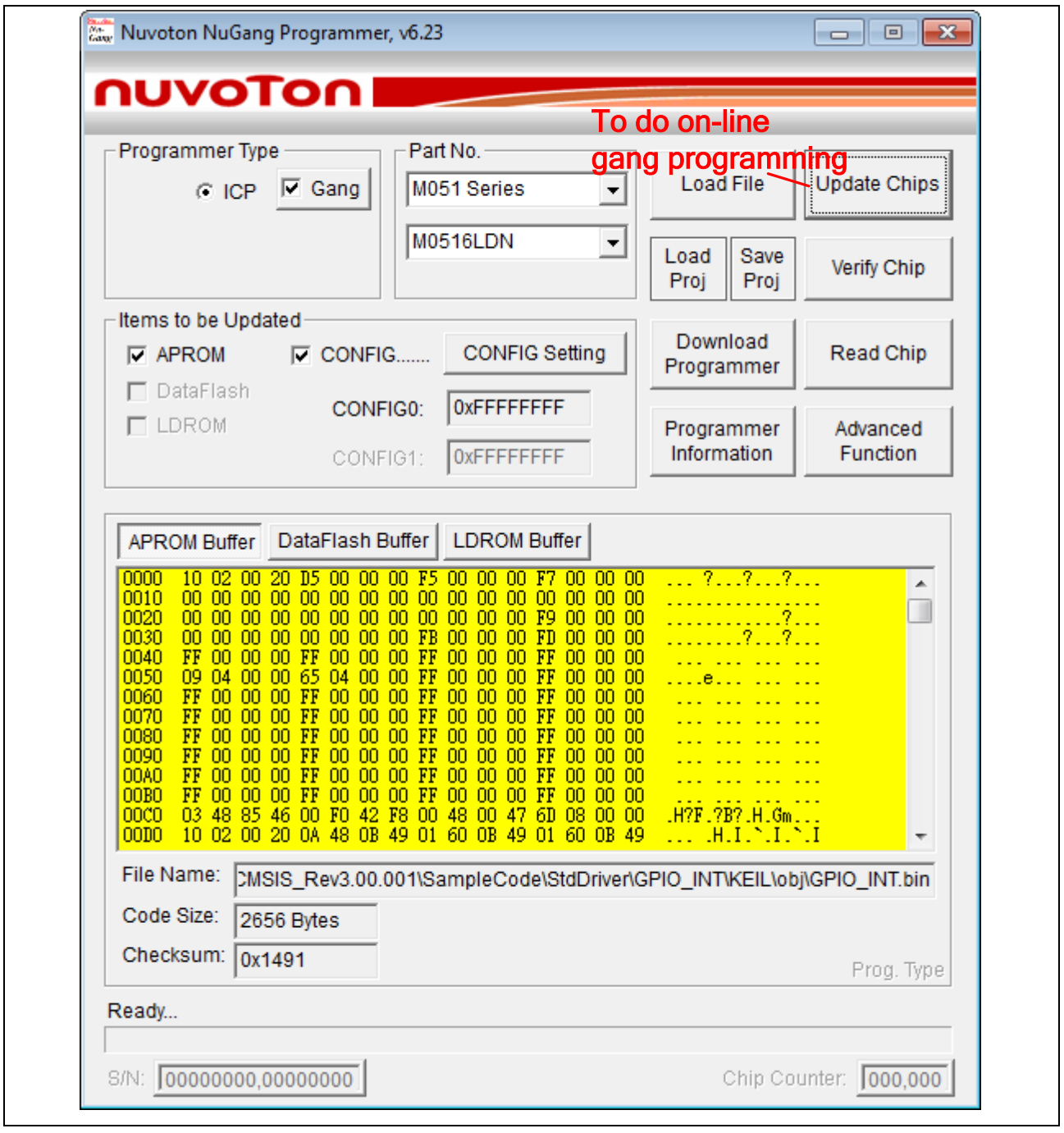
Note: The chip can be dumped only when it was not locked.



3.6 Updating Chips

In addition to off-line gang programming (by pressing the **AUTO**-key on the programmer), you can also do online gang programming by clicking the **Update Chips** button on the GUI, as shown below.

Note: Before starting online operation, '**Download Programmer**' should be completed or you will be requested to do it. Also, the programming result of each chip will be shown through its individual LEDs on the adapter board.



3.7 Automatic Detection of 'Chip-Removed-then-Placed'

Every time the gang programming is finished, the green/red LEDs on the adapter board will keep showing the last programming result until pressing the **AUTO**-key next. Sometimes the operator might forget to press the **AUTO**-key after placing new chips into the sockets, thus the new chips are un-programmed and regarded as programmed 'PASS'. To prevent from this carelessness, the auto-detection function of 'chip-removed-then-placed' is supported. That is, the green/red LEDs will turn to Off state once the 'chip-removed-then-placed' condition is detected. After the new chips are placed into the sockets, the green/red LEDs will become Off to indicate the chips have not been programmed yet.

3.8 Special Alert for Failed Programming

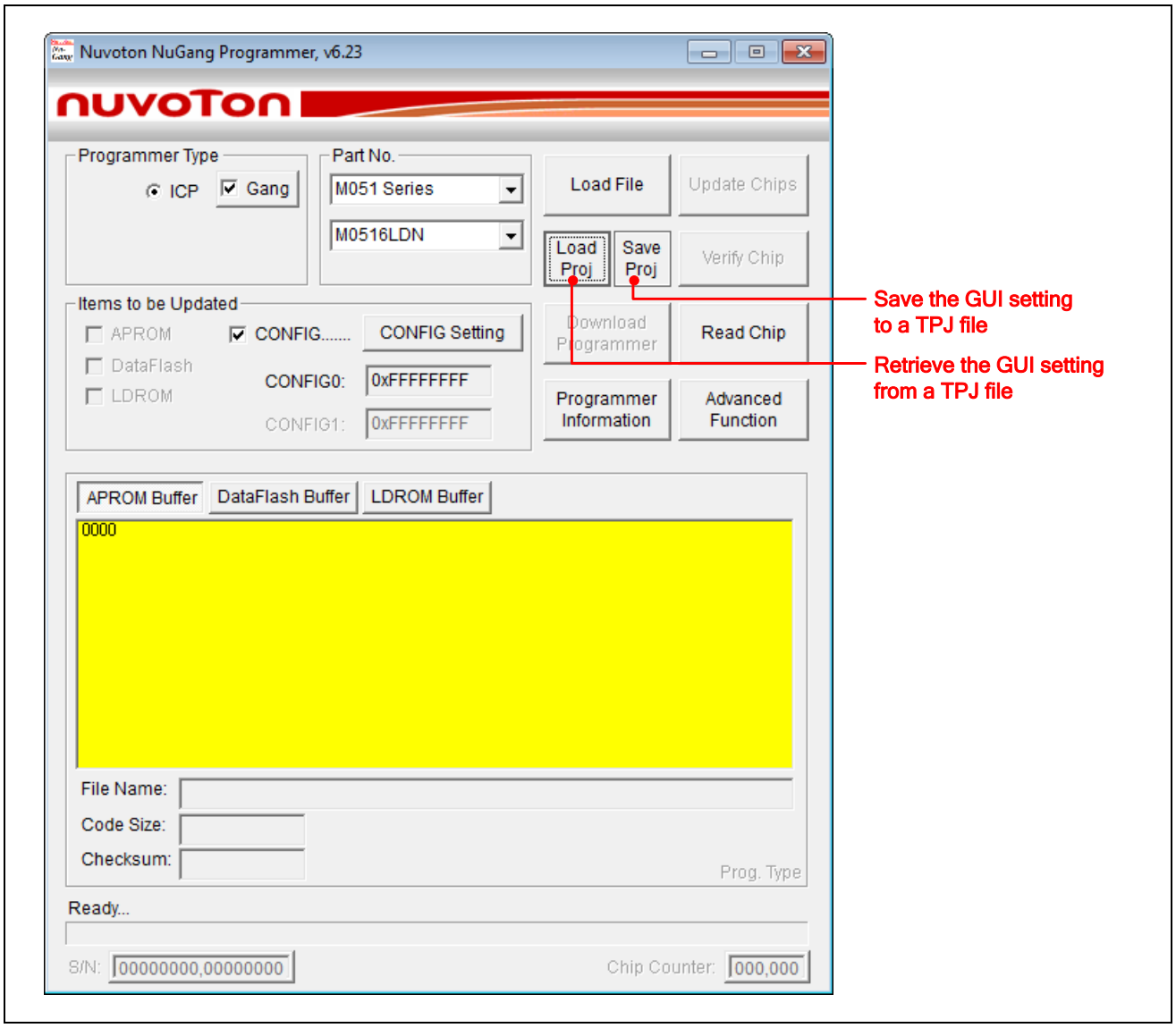
When programming is finished, if there is any chip failed, the buzzer will beep for 3 seconds to alert the operator. At this time, the operator should check the red LEDs to determine which chip(s) is/are failed.

4 TOOL PROJECT FILE (TPJ)

All the GUI settings can be saved into a Tool Project (TPJ) file and retrieved by loading the previously saved TPJ file. A variety of programming data can be managed by the 'project' type.

The GUI settings or the contents of the TPJ file include:

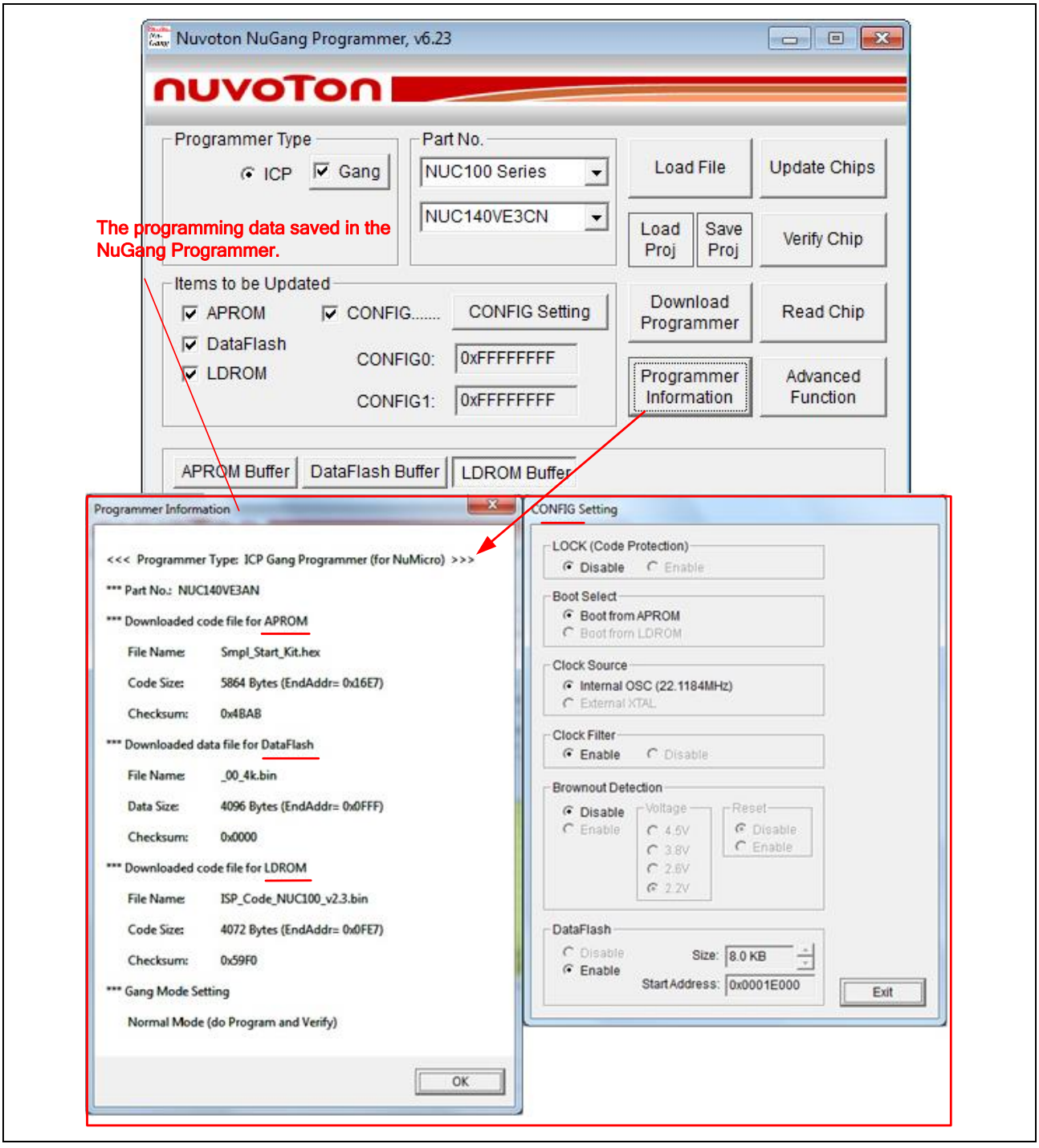
(1) Programmer type
(2) Part number
(3) Items to be updated
(4) APROM buffer data if APROM is one of the updated items
(5) DataFlash buffer data if DataFlash is one of the updated items
(6) LDROM buffer data if LDROM is one of the updated items
(7) CONFIG setting if CONFIG is one of the updated items



5 PROGRAMMER INFORMATION

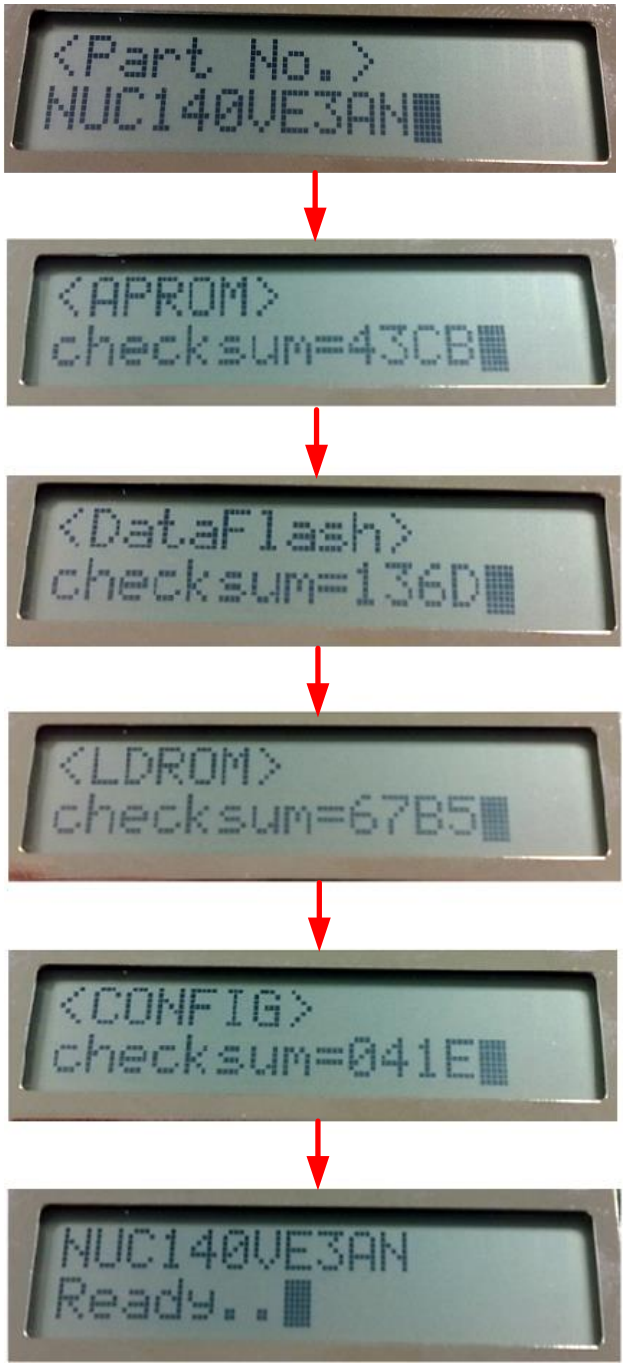
5.1 Checking through Application Program

To check the information of downloaded data saved in the programmer, connect the programmer to host and then click the **Programmer Information** button. The *Programmer Information* form will appear to show the downloaded data, as shown below.



5.2 Checking through LCD Display

Every time the NuGang Programmer is powered on, the LCD module will sequentially display the previously downloaded programming data, as shown below.



The target chip's Part No.

When APROM is to be programmed, its checksum will be displayed.

When DataFlash is to be programmed, its checksum will be displayed.

When LDROM is to be programmed, its checksum will be displayed.

When CONFIG is to be programmed, its checksum will be displayed.

Programmer ready.
Now, the user may press the AUTO-key to start gang programming.

6 ADVANCED FUNCTIONS

6.1 Serial Number Programming

Serial number (S/N) programming is used when the programmer is operated in Online mode. The serial number is BCD coded and 8 bytes long with 16 decimal digits supported. Only the APROM can be programmed with the serial number. To proceed with serial number programming, please follow the steps below:

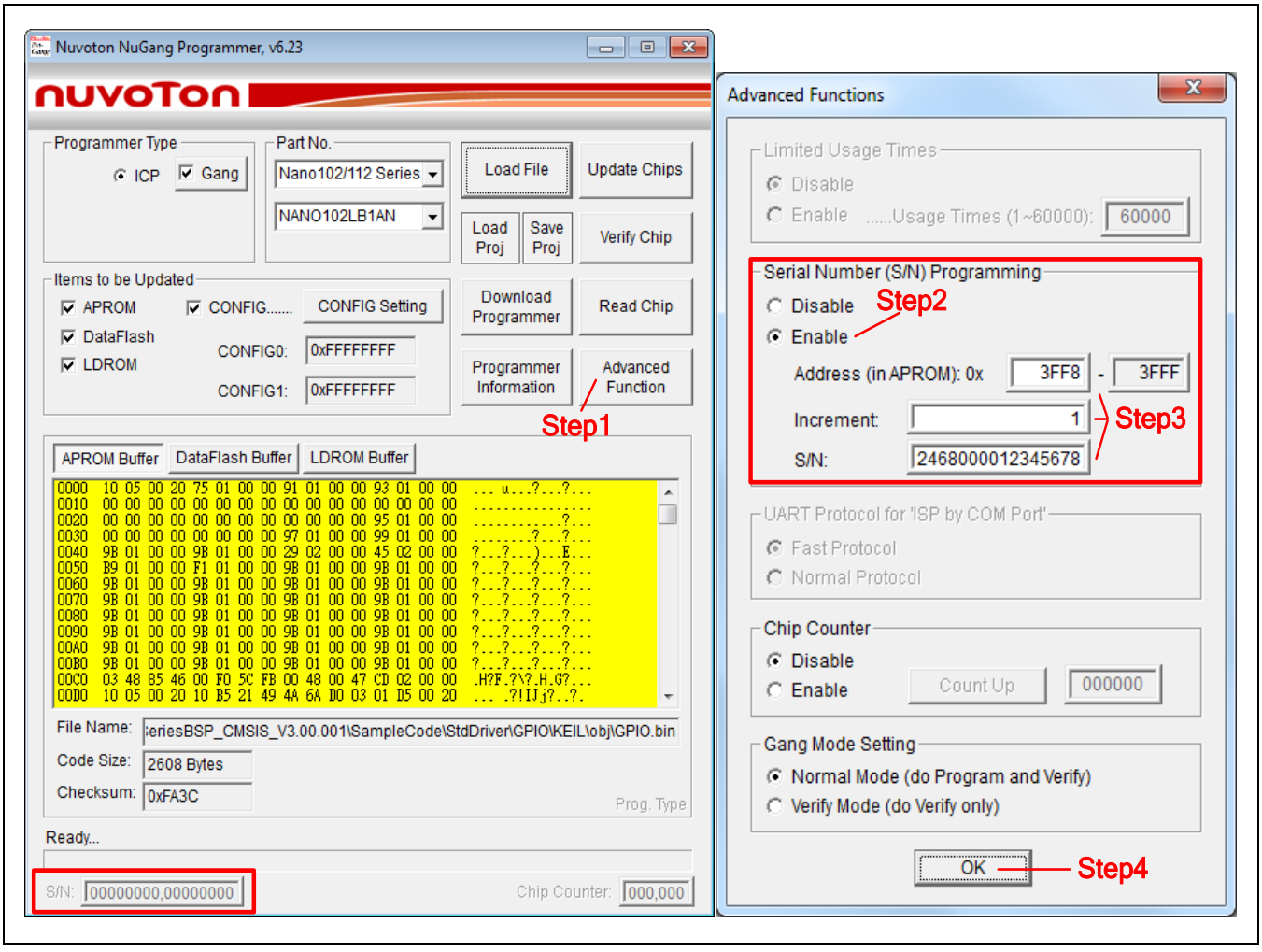
Step 1: Set further settings by clicking **Advanced Function**.

Step 2: Make sure the **Enable** option in the **Serial Number (S/N) Programming** section is selected.

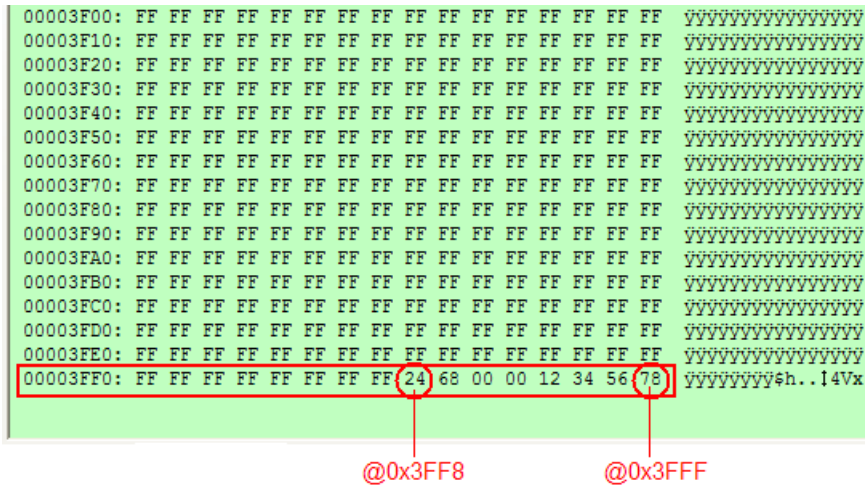
Step 3: Specify the address, increment, and serial number to be programmed.

Step 4: Click **OK** to confirm the setting.

Note: The next time NuGang Programmer is started, the serial number shown in the lower-left corner will depend on the previously programmed serial number.



As shown in the figure above, '**2468000012345678**' is set as the serial number for programming at address **0x3FF8** in APROM. The BCD-coded serial number programmed in the chip has a '*what you see is what you get*' format, as shown below.


00003F00: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003F10: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003F20: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003F30: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003F40: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003F50: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003F60: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003F70: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003F80: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003F90: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003FA0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003FB0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003FC0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003FD0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003FE0: FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
00003FF0: FF FF FF FF FF FF FF FF 24 68 00 00 12 34 56 78
@0x3FF8
@0x3FFF

6.2 Chip Counter

Chip counter is used to calculate the number of chips successfully programmed. To enable the chip counter and related settings, please follow the steps below:

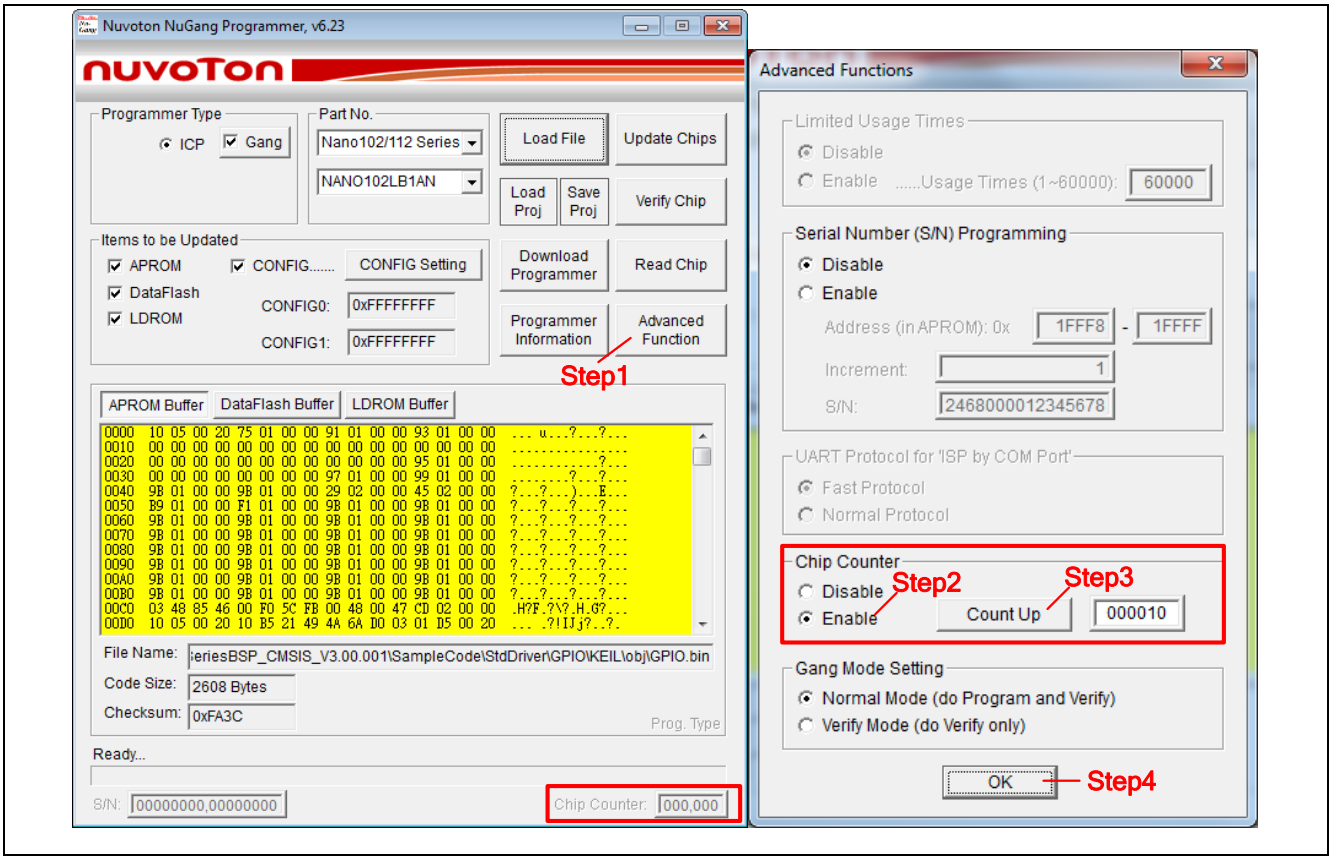
Step 1: Set further settings by clicking **Advanced Function**.

Step 2: Make sure the **Enable** option in the **Chip Counter** section is selected.

Step 3: Click the **Count Up (Count Down)** button to set the counter as up counter (down counter), and then specify the initial counter value.

Step 4: Click **OK** to confirm the setting.

Note: The next time NuGang Programmer is started, the chip counter shown in the lower-right corner will depend on the previously programmed chip counter.



7 REVISION HISTORY

Date	Revision	Description
2015.11.19	7.02	1. Fixed a minor firmware bug for ISD Series. 2. Supported the NUC123SD4SN3.
2015.08.13	7.01	1. Fixed a minor firmware bug.
2015.07.15	7.00	1. Supported the NUC123AE and Mini55 Series.
2015.06.03	6.27	1. Supported the M451, NUC442/472, M0519, and Mini58 Series. 2. Supported the NUC220LE3AE, NUC123SD4SN0. 3. Supported the NANO100 BN Series QFN48 and LQFP64 package.
2015.01.12	6.24	1. Fixed CONFIG Setting dialog GUI for Nano102/112 Series. 2. Fixed Read Chip dialog GUI for all series in the NuMicro Cortex-M0 Family.
2014.12.09	6.23	1. Supported the NUC029AN/AE, NUC120DE, NANO102/112AN, NUC230/240AE, NUC131AE, M0518AE series. 2. Updated the CONFIG Setting GUI for all series in the NuMicro Cortex-M0 Family. 3. Removed the "Exit" button and moved "Advanced Function" to the main window.
2014.04.10	6.22	1. Fixed the CONFIG Setting dialog GUI bugs(Clock Source and DataFlash) for NUC123 series.
2014.01.24	6.21	1. Supported the NUC100 DN, NUC200AN, M051 DN/DE, M058S AN, Mini51 DE and AU9110 series.
2012.11.01	6.19	1. Supported the NUC123 AN series. 2. Modified ISD Family related GUI settings.
2012.10.03	6.18	1. Supported the NUC103 and NUC105 AN series. 2. Supported the Nano100 BN Series. 3. Supported the NUC122SD2BN. 4. Fixed minor bugs of ISD Family.
2012.05.25	6.15	1. Fixed a minor software bug.
2012.05.16	6.14	1. Supported NUC101LE3AN.

2012.04.26	6.12	1. Supported Serial Number Programming. 2. Supported Chip Counter function. 3. Fixed a minor software bug.
2012.03.15	6.05	1. Supported the NUC130 and NUC140 CN series. 2. Supported the Mini51 Series TAN and QAN parts.
2012.02.14	6.02	1. Supported the N512 series. 2. Fixed minor software bugs. 3. Supported verifying all chips mode.
2011.12.20	6.00	1. Supported the Nano100 series.
2011.11.22	5.73	1. Corrected the Device ID of M051 B-version. 2. Supported to show the failed sockets number on the LCD panel when gang programming is finished.
2011.11.04	5.70	1. Improved programming stability when NuGang is powered by the USB port instead of a DC9V power adaptor.
2011.10.20	5.60	1. Supported the M051 B-version parts. 2. Updated the Mini51 parts. 3. Supported to show the PASS/FAIL message on the LCD panel when gang programming is finished.
2011.08.18	5.52	1. Fixed minor GUI bugs.
2011.07.28	5.51	1. Supported the Mini51 Series. 2. Fixed minor software bugs.
2011.06.15	5.50	1. Supported to show “PASS” or “FAIL” on the LCD panel for programming results. 2. Supported to beep for 3 seconds for any failed programming. 3. Supported to turn Off the green/red LEDs when the programmed chip is taken out from the socket and a new chip is placed into the socket. 4. Supported the ‘Update Chips’ function.
2011.04.07	5.31	1. Adjusted the NUC102/NUC122 parts list.
2011.03.18	5.30	1. Supported Tool Project File (TPJ) for GUI setting management. 2. Supported read/verify operation of single chip in one of the 4 sockets. 3. Supported the NUC102/NUC122 series.

		4.	Fixed some software bugs.
2010.11.09	1.00	1.	Preliminary version

Important Notice

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Insecure usage includes, but is not limited to: equipment for surgical implementation, atomic energy control instruments, airplane or spaceship instruments, the control or operation of dynamic, brake or safety systems designed for vehicular use, traffic signal instruments, all types of safety devices, and other applications intended to support or sustain life.

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