ARM® Cortex®- M

32-bit Microcontroller

NuMicro® ISP Programming Tool
User Manual

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ISP PROGRAMMING TOOL USER MANUAL

Table of Contents

1   OVERVIEW

The "ISP" (In-System Programming) tool allows the embedded Flash memory to be reprogrammed under software control through the firmware using on-chip connectivity interface, such as UART and USB, without removing any microcontroller from the system.

For NuMicro® Family microcontroller (MCU) products, the on-chip Flash memory is partitioned into three blocks: APROM, Data Flash and LDROM. The APROM saves the user application program developed for a specific application; the Data Flash provides storage for nonvolatile application data; and the LDROM saves the ISP code for MCU to update its APROM/Data Flash/CONFIG.

User can update the MCU's APROM, Data Flash, and User Configuration bits with Nuvoton standard ISP code programmed in LDROM easily by using the ISP function.

2   NUVOTON STANDARD ISP CODE

The Nuvoton standard ISP code for NuMicro® MCUs is included in the folder [(2) Nuvoton Standard ISP Code]. User can program the ISP code into LDROM by using a universal programmer or Nuvoton's NuMicro® ICP Programming Tool, and the User Configuration bit 'CBS' configured as Boot from LDROM.

The ISPTool samples repository is available on GitHub and GITEE.

Please check the following link to get the latest update.

https://github.com/OpenNuvoton/ISPTool or https://gitee.com/OpenNuvoton/ISPTool

ISP PROGRAMMING TOOL USER MANUAL

2.1   Pin Definition

Pins used as following for each interface

MCU Parts	UART Port RX/TX	USB
M031	UART0 PB.12/PB.13	PB.12 low
M051/M058S/M0519	UART0 P3.0/P3.1	-
M0518	UART0 PB.0/PB.1	-
M0564	UART0 PD.0/PD.1	-
NUC029xAN	UART0 P3.0/P3.1	-
NUC029FAE	UART0 P1.2/P1.3	-
NUC029xDE	UART0 PB.0/PB.1	-
NUC029xEE	UART0 PB.0/PB.1	PA.10 low
NUC029xGE	UART0 PA.3/PA.2	PA.3 low
Mini51DE/Mini55/Mini58	UART0 P1.2/P1.3	-
Mini57	USCI UART0 PD.6/PD.5	-
Nano100A/Nano100B	UART0 PA.14/PA.15	PB.15 low
Nano102_112	UART0 PB.1/PB.0	-
Nano103	UART0 PB.0/PB.1	-
NUC100	UART1 PB.4/PB.5	PB.15 low
NUC121	UART0 PB.0/PB.1	PB.0 low
NUC122	UART1 PB.4/PB.5	PA.10 low
NUC123	UART1 PB.4/PB.5	PB.14 low
NUC126	UART0 PD.0/PD.1	PD.0 low
NUC1261	UART0 PA.3/PA.2	PA.3 low
NUC131	UART0 PB.0/PB.1	-
NUC200_220/NUC230_240 NUC2201	UART0 PB.0/PB.1	PA.10 low
M2351	UART0 PB.12/PB.13	PB.12 low
NUC472_442	UART0 PA.13/PA.14	PB.15 low
NUC505	UART0 PB.1/PB.0	PB.14 low
M451	UART0 PD.0/PD.1	PB.6 low
M4521	UART0 PD.0/PD.1	PD.0 low
M480	UART0 PB.12/PB.13	PB.12 low
NM1120/NM1230	USCI UART0 PD.6/PD.5	-
NM1200_1100	UART0 P1.2/P1.3	-
NM1530	UART0 P3.0/P3.1	-

Table 2-1 Pin Definition for NuMicro M0, M23 and M4 Family

MCU Parts	UART Port RX/TX	USB
I91000 (ISD9000)	UART0 PA.11/PA.10	-
I91200	UART0 PA.5/PA.4	-
I94100	UART0 PB.9/PB.8	PD.2 low
ISD9100	UART0 PA.9/PA.8	-

Table 2-2 Pin Definition for NuVoice™ Series

MCU Parts	UART Port TX/RX
N76E003	UART0 P07/P06
N76E616	UART0 P21/P22
N76E885	UART0 P20/P03
MS51	UART0 P07/P06
ML51	UART0 P31/P30

Table 2-3 Pin Definition for 8bit 8051 MCUs

ISP PROGRAMMING TOOL USER MANUAL

3   USING THE ISP PROGRAMMING TOOL IN WINDOWS

The ISP Programming Tool is contained in the folder [(1) Application Program].

3.1   Connecting Interface Selection

User needs to select the ISP connection interface before using the ISP function and makes sure the IO pins used for communication are connected correctly. For USB interface, an extra entry pin must be tied to ground pin to enter ISP mode. Please refer to Pin Definition for all ISP samples.
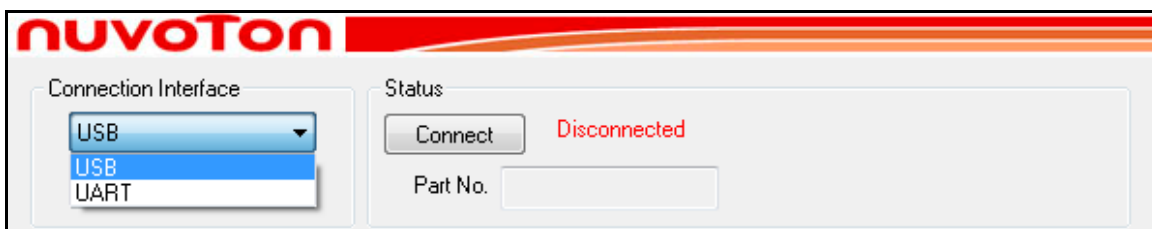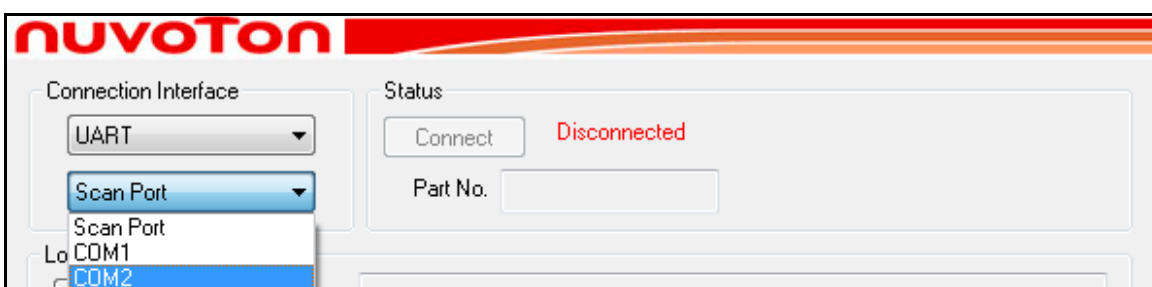

Figure 3-1 Connection via USB Interface

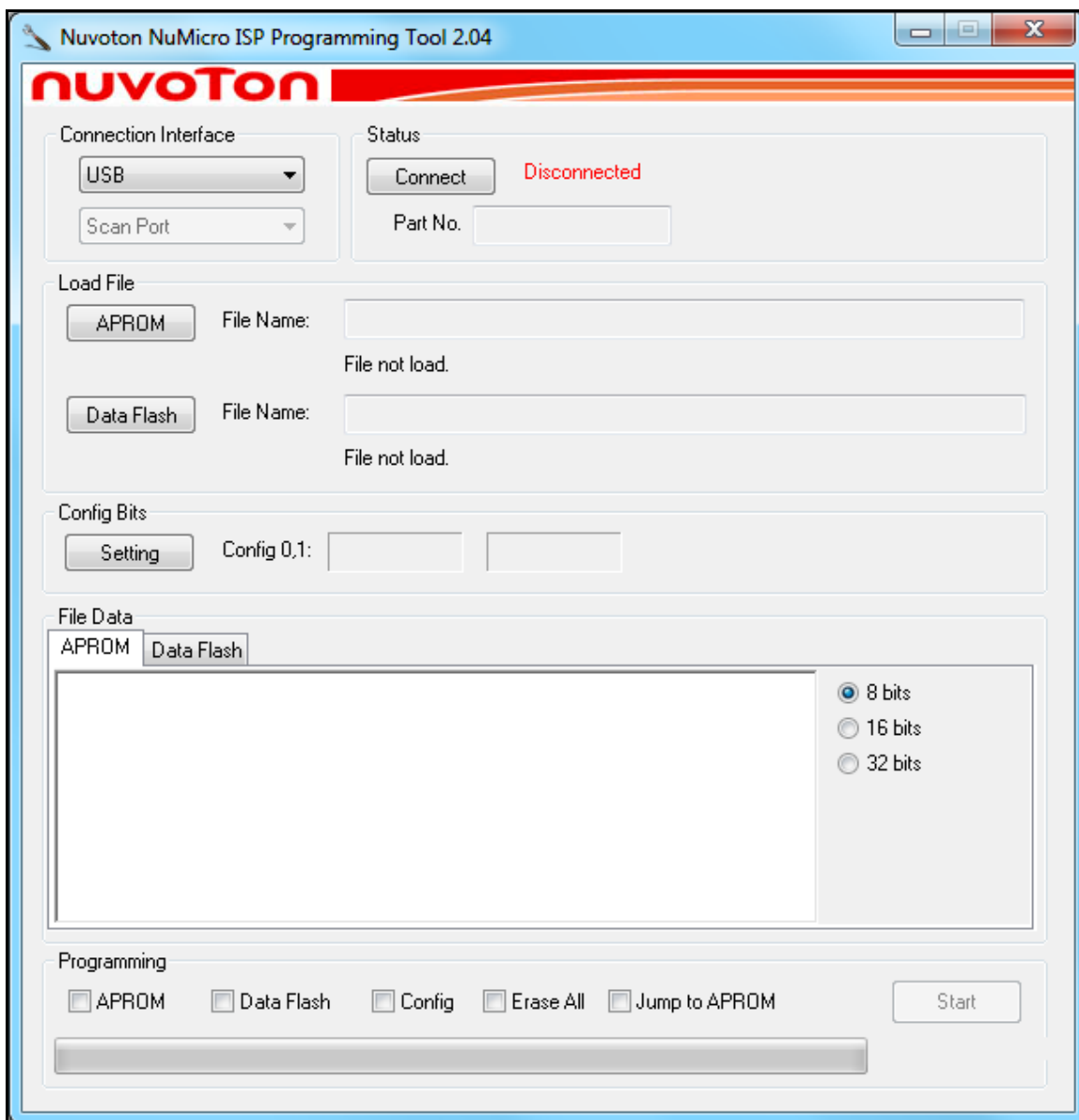Figure 3-2 Connection via UART Interface using specific COM port

Figure 3-3 Main Dialog

3.2 Connecting to the target chip

After clicking the "**Connect**" button, the ISP tool will keep trying to connect to a target board every 30 ms until the target board is successfully connected or the "**Stop**" button is clicked. If there is no response from the target board during connection, please reset the MCU to execute the ISP code.

3.3 Load File

Click the "**APROM**" or "**Data Flash**" button to select the image from the pop-up window. Or using drag & drop function from Windows Explorer to select the image file.
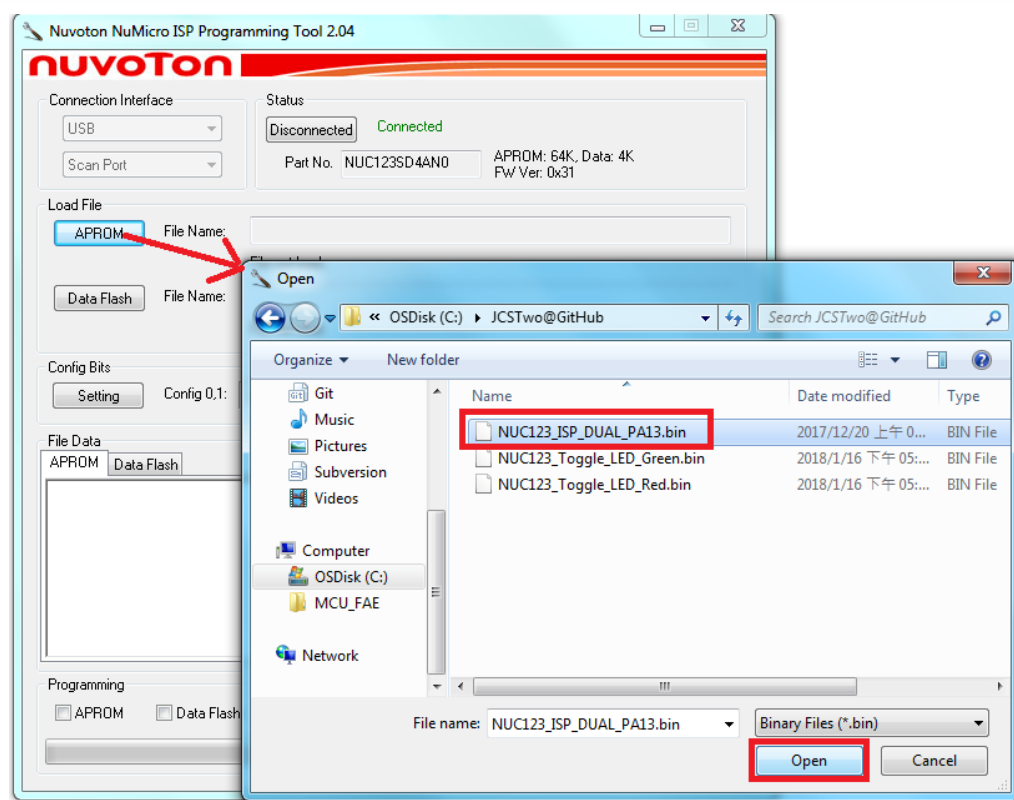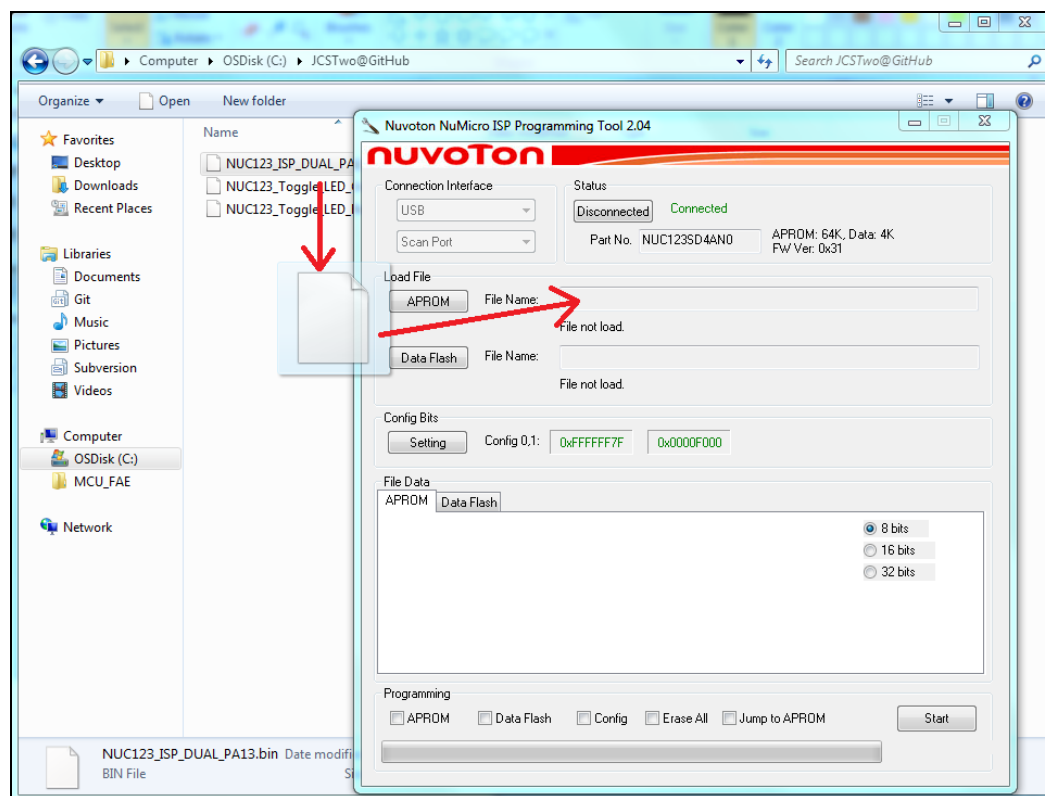
Figure 3-4 Click Button to Load Image file

Figure 3-5 Drag image file from explorer window

3.4   Setting the User Configuration Bits

After clicking the "**Setting**" button, a "**User Configuration**" dialog will open to display all User Configuration settings. The corresponding "**User Configuration**" dialog will be displayed according to the MCU currently connected. Figure 3-6 shows the "**User Configuration**" setting of the NUC123AN series MCU.

The ISP tool does not allow user to modify target board boot selection, either. The "**Boot Select**" shown in the User Configuration form is for informative purpose only. This setting can be updated with Nuvoton's NuMicro® ICP Programming Tool.

Figure 3-6 User Configuration Dialog

3.5 Programming Options

The following table lists the ISP actions for different programming options.

Programming Options	ISP Actions
APROM	APROM will be updated.
Data Flash	Data Flash will be updated.
Config	User Configuration will be updated while target chip is not in write protected mode. 1. User Configuration is in write protected mode when security lock is enabled. 2. Program APROM or Erase All option can remove write protection of User Configuration.
Erase All	APROM and Data Flash will be erased. The Security Lock in User Configuration will be disabled.
Jump to APROM	The system reset is issued and the chip is running user application on APROM.

Table 3-7 ISP Programming Options

ISP PROGRAMMING TOOL USER MANUAL

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