MPU Gang Writer G1
User Guide

V1.00.000

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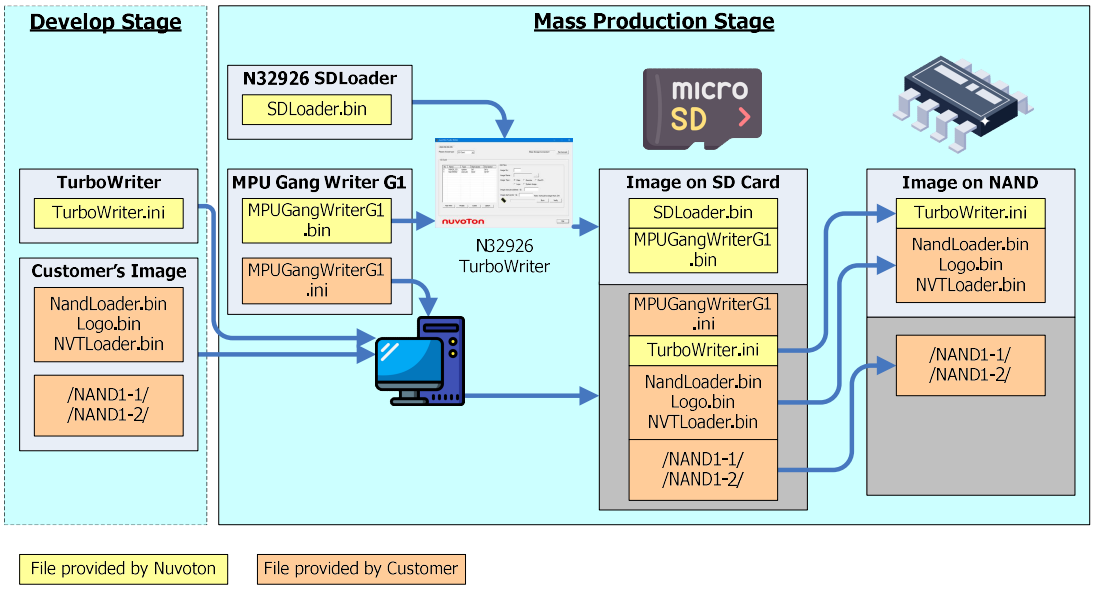
1. Introduction

1.1. MPU Gang Writer G1 Firmware

The **MPU Gang Writer G1** is a firmware that executed on the **MPU Gang Writer G1 board** to program the NAND flash according to the image on Micro SD card. This document will guide you how to prepare the Micro SD card, modify the configuration file, and execute it to program NAND flash.



The N329 series IC have two boot flows – one is **Normal mode**; the other is **Recovery mode**. For N32926, the boot flows are as below:

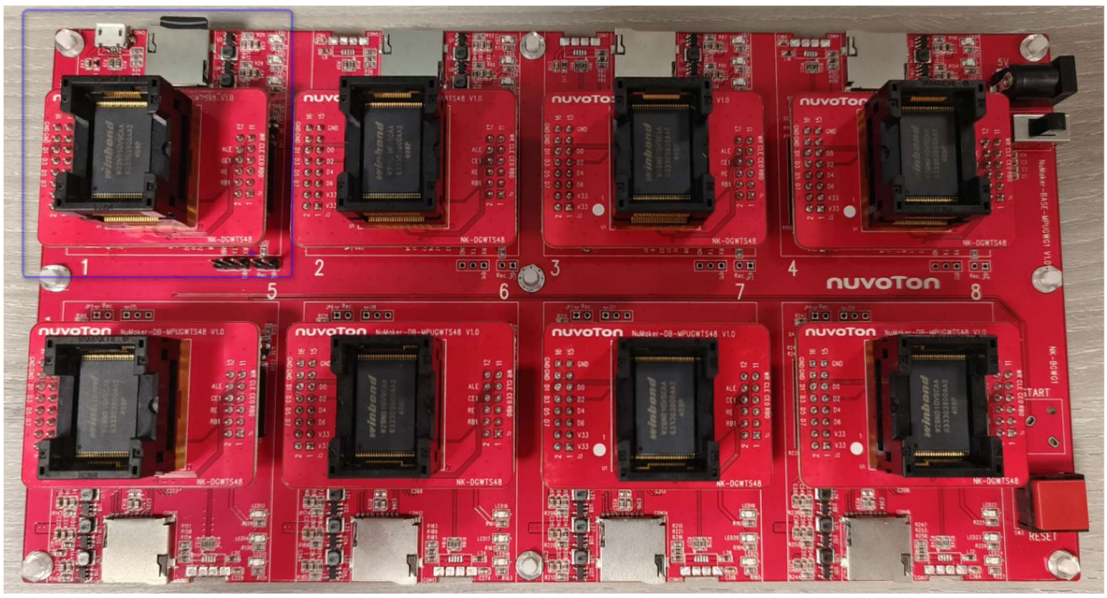
- The Normal mode boot flow is SD card 0 boot → NAND 0 boot → NAND 1 boot → SPI boot → SD card 1 boot → SD card 2 boot → USB boot
- The Recovery mode boot flow is USB boot only.

The **MPU Gang Writer G1** utilizes the character of Normal mode to load code of **MPUGangWriterG1.bin** from SD card 0. When MPUGangWriterG1.bin program executes, it will read the configuration file, **MPUGangWriterG1.ini,** from SD card 0 and then program the NAND flash according the setting in MPUGangWriterG1.ini.

The MPU Gang Writer G1 can program the NAND flash for all N329 series ICs such as N3290x, N3291x, and N3292x. Different IC will use different **TurboWriter.ini** setting. The TurboWriter.ini setting can be defined by the keyword "**[TurboWriter INI]**" in the configuration file MPUGangWriterG1.ini.

1.2. MPU Gang Writer G1 Board

The MPU Gang Writer G1 firmware can be executed on the MPU Gang Writer G1 board which has 8 independent modules. Each module has one Micro SD card socket and one NAND flash memory socket.



The MPU Gang Writer G1 Board

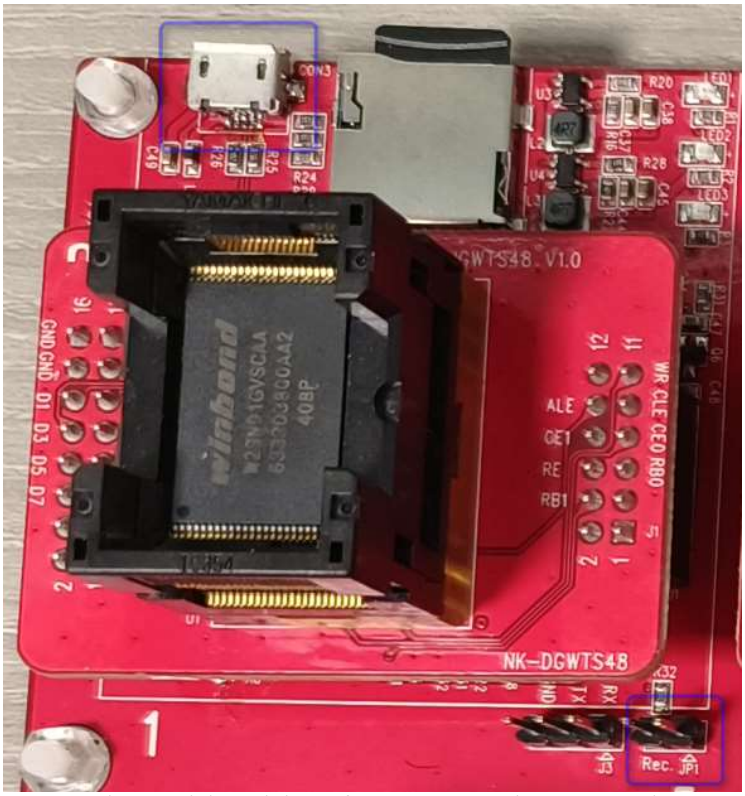
There are three LEDs on each module to show the NAND flash writing progress.

The LED behavior is defined in the table below.

Interface	GPIO Pins	Description
Yellow LED for RUN	PB0	Flash: Programming NAND flash memory OFF: Program completed
Green LED for PASS	PB1	OFF: Programming NAND flash memory ON: Program PASS
Red LED for FAIL	PB2	OFF: Programming NAND flash memory ON: Program FAIL

The MPU Gang Writer G1 can also turn on the FAIL LED if the NAND programming cannot be completed within the timeout interval. The timeout interval can be defined by the keyword "**[TIMEOUT SECOND]**" in the configuration file MPUGangWriterG1.ini.

Please note the special module 1 which has one USB connector and some pins for UART Tx/Rx and switching between Normal mode and Recovery mode. It can be used to write MPU Gang Writer G1 firmware to Micro SD card by TurboWriter.



The Special Module 1 of MPU Gang Writer G1 Board

2. Check List before Operation

2.1. Develop Stage

When product development is completed, the customer should already have the following files. Please prepare them before using the MPU Gang Writer G1.

Items	Source	Description
TurboWrite.ini	Nuvoton	The configuration file of TurboWriter for **target CPU**.
NandLoader.bin	Nuvoton / Customer	The NAND Loader firmware for **target CPU**. The original firmware is provided by Nuvoton. However, it could be modified by the customer.
Logo.bin	Customer	(Optional) The Logo image displayed on the panel when booting.
NVTLoader.bin	Nuvoton / Customer	The NVT Loader firmware for **target CPU**. The original firmware is provided by Nuvoton. However, it could be modified by the customer.
/NAND1-1/	Customer	The firmware or any data files for product.
/NAND1-2/	Customer	Any data files for product.

2.2. Mass Production Stage

Please prepare following files or tools before using the MPU Gang Writer G1 for mass production.

Items	Source	Description
SDLoader.bin	Nuvoton	The N32926 SD Loader firmware.
MPUGangWriterG1.bin	Nuvoton	The MPU Gang Writer G1 firmware.
MPUGangWriterG1.ini	Nuvoton / Customer	The configuration file of MPU Gang Writer G1. The original firmware is provided by Nuvoton. However, it could be modified by the customer.
N32926 TurboWriter	Nuvoton	The N32926 TurboWriter tool. **Please note that** this TurboWriter may be different from the TurboWriter used during development stage. For development stage, it is TurboWriter for target CPU. For mass production stage, it is TurboWriter for N32926.
MPU Gang Writer G1 board	Customer	The hardware for MPU Gang Writer G1 board.
Micro SD card	Customer	The Micro SD card as a mass production tool.
Micro SD card reader	Customer	The Micro SD card reader is used to copy files from PC to Micro SD card.

NAND flash IC	Customer	The NAND flash IC as a part of product.

3. Operation

3.1. Modify MPU Gang Writer G1 Configuration File

The MPU Gang Writer G1 configuration file, **MPUGangWriterG1.ini**, should be modified by the customer to match the requirements of product. When the MPUGangWriterG1.ini modification is completed, please copy it to the root folder of the Micro SD card. MPU Gang Writer G1 will read it from the Micro SD card root folder.

The MPUGangWriterG1.ini file provides some sections as below:

```
[TurboWriter INI]
// Please copy the tag from TurboWriter.ini for target CPU
N3292 USER_DEFINE

[NAND1-1 FAT FILE]
// -1 to skip NAND1-1 copy, 0 to use DiskImage without MBR,
// 1 to Use FAT file, 2 to use DiskImage with MBR
1

[NandLoader File Name]
// All file name length MUST <= 511 bytes
// Unavailable if [NAND1-1 FAT FILE] is -1
NANDLoader.bin

[Logo File Name]
// Unavailable if [NAND1-1 FAT FILE] is -1
Logo.bin

[NVTLoader File Name]
// Unavailable if [NAND1-1 FAT FILE] is -1
NVTLoader_NAND.bin

[System Reserved MegaB]
// Unit : Mega Byte
2

[NAND1-1 DISK SIZE]
```

```
// Unit : Mega Byte (default : 16MB)
```

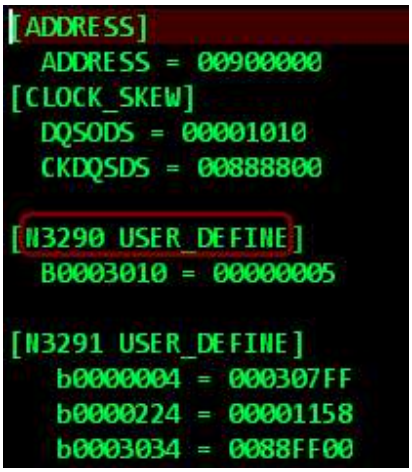
```
// This specify Nand1-1 partition size, total capacity - Nand1-1 = Nand1-2 parition size
// Unavailable if [NAND1-1 FAT FILE] is 2
32

[NAND1-2 FAT FILE]
// Unavailable if [NAND1-1 FAT FILE] is 2
// -1 to skip NAND1-2 copy, 0 to use DiskImage without MBR, 1 to Use FAT file
1

[NANDCARD FAT FILE]
// -1 to skip NANDCARD copy, 0 to use DiskImage without MBR,
// 1 to Use FAT file, 2 to use DiskImage with MBR
-1

[TIMEOUT SECOND]
// -1 to disable TIMEOUT feature. Other positive integer for TIMEOUT seconds.
-1
```

Due to its limited parsing ability of MPUGangWriterG1.bin, there are some constraints in MPUGangWriterG1.ini as below:

- No space is allowed to precede the option for each line.
- Only "//" comment is allowed at the beginning of each line
- String in "[ ]" is not allowed to changed.
- Only "[Logo File Name]", "[NVTLoader File Name] and "[System Reserved MegaB]" section is option for its setting. The others are must.

[TurboWriter INI]

Please copy the tag from TurboWriter.ini for target CPU to here. For example, if the target CPU is **N32905**, the tag should be "**N3290** USER DEFINE". If the target CPU is **N32915**, the tag should be "**N3291** USER DEFINE".



[NandLoader File Name] / [NVTLoader File Name]

It allows changing the firmware file name for burning. Below sample changes the file name from NandLoader.bin to Nuvoton.bin for "[NandLoader File Name]" section. Please note that the file name length MUST less than or equal to 31 bytes.

```
[NandLoader File Name]
Nuvoton.bin
```

[Logo File Name]

If the logo file is not necessary for the MPU Gang Writer G1, below two methods are all to skip burning Logo.dat into the Nand flash.

```
[Logo File Name]
//Logo.dat
```

or

```
[Logo File Name]

```

[System Reserved MegaB]

If the "[System Reserved MegaB]" section is not provided, the default reserved size is **8** Mega Bytes for it.

[NAND1-1 FAT FILE] / [NAND1-2 FAT FILE] / [NANDCARD FAT FILE]

Regarding the copy for Nand1-1, Nand1-2, Nand2, and Nandcard, it provides 4 options for it.

- Option "-1": Skip to check the Nand1-x folder.
- Option "0": MPU Gang Writer G1 copy file **content.bin** on Nand1-x folder in SD card through GNAND to Nand1-x partition. It gets the best performance but it need to prepare the disk image by **NRomMaker** tool or Linux
- Option "1": MPU Gang Writer G1 copy those files on Nand1-x folder in SD card through FAT to Nand1-x partition.
- Option "2": Like option "0" but the disk image must include partition table (MBR, Master Boot Record).

Please note that the value [NAND1-1 FAT FILE] could influence the action of other options.

- If NAND1-1 is -1 (skip), MPU Gang Writer G1 do nothing at first NAND on CS0 interface. It includes all files in System Reserved Area and NAND1-2.
- If NAND1-1 is 2 (disk image with MBR), the options [NAND1-1 DISK SIZE] and [NAND1-2 FAT FILE] are unavailable since they are decided by MBR within disk image, not by MPU Gang Writer G1.

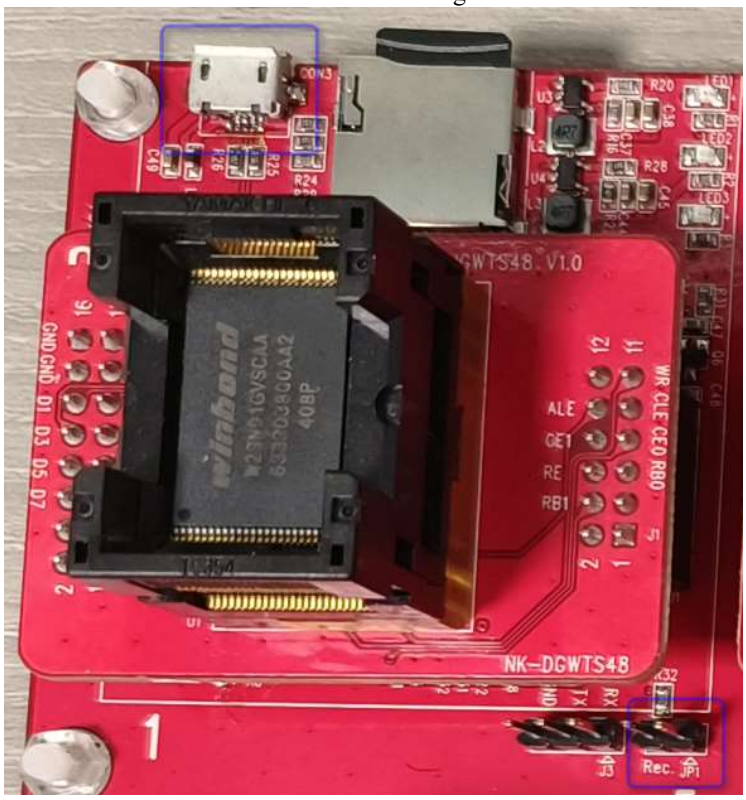
[TIMEOUT SECOND]

Set the timeout time for MPU Gang Writer G1 in seconds. The MPU Gang Writer G1 will turn on the FAIL LED if the NAND programming cannot be completed within this timeout time. -1 to disable timeout feature.

3.2. Prepare Micro SD Card

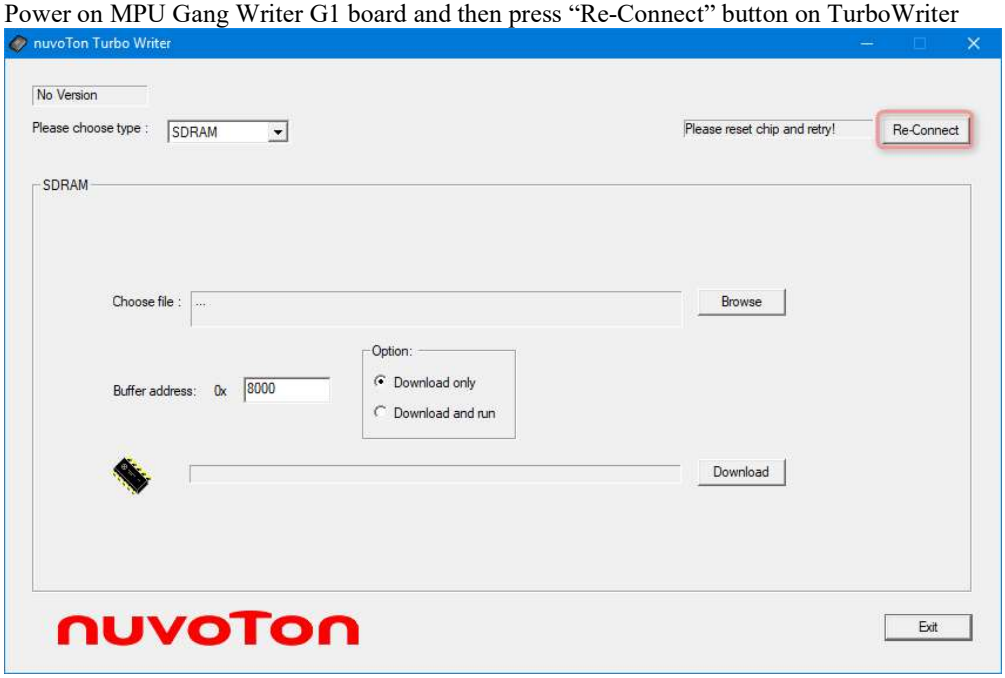
The first step to execute MPU Gang Writer G1 is to prepare a Micro SD card with MPU Gang Writer G1 firmware, configuration file, and the content of NAND flash. The Micro SD card must reserve some space to store the **SDLoader.bin** and **MPUGangWriterG1.bin** before usage. The procedure is as below step:

1. Short jumper "**Rec.**" on the MPU Gang Writer G1 board module 1 to become **Recovery mode**.
2. Connect USB cable between the MPU Gang Writer G1 board module 1 and PC

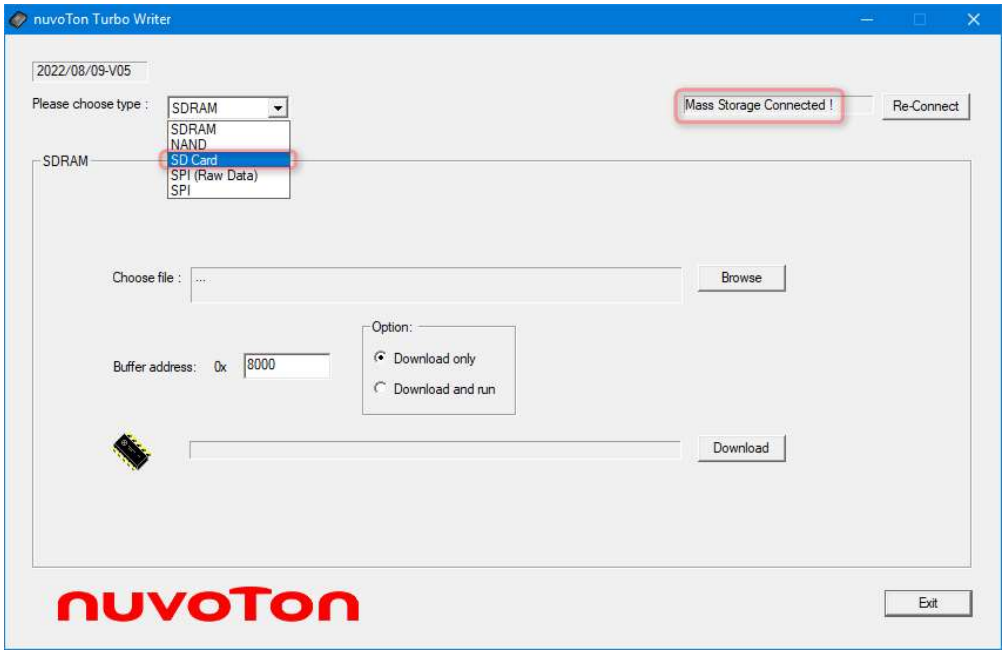


3. Launch N32926 TurboWriter on PC

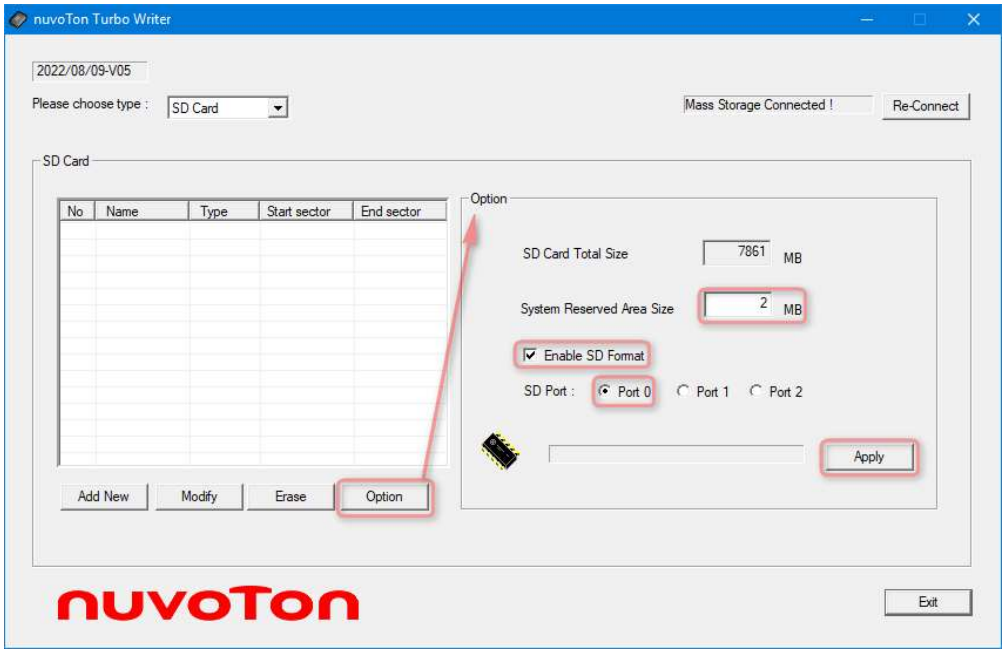
4. Power on MPU Gang Writer G1 board and then press “Re-Connect” button on TurboWriter



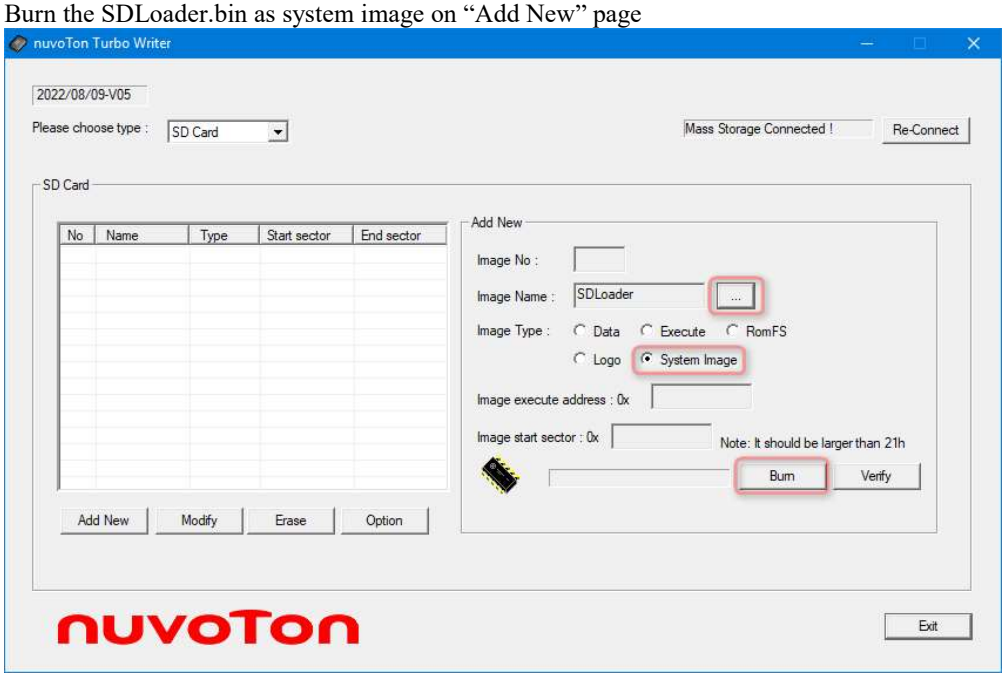
5. After connected, insert Micro SD card to MPU Gang Writer G1 board and select “SD Card” on TurboWriter



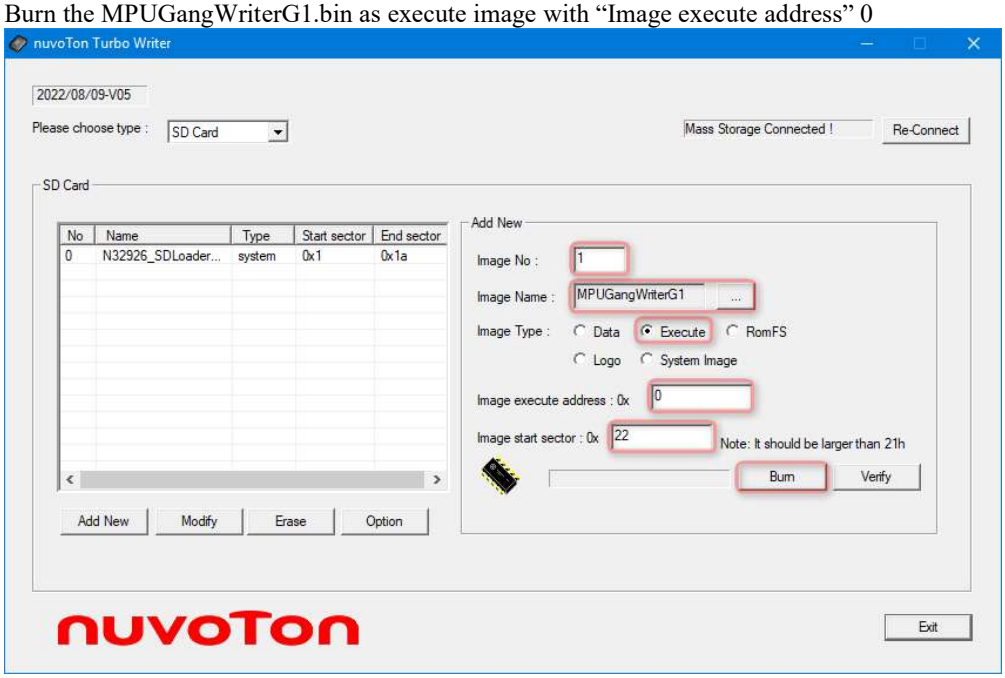
6. Set the “System Reserved Area Size” and “Enable SD Format” on “Option” page.
Please note to check the “Enable SD Format” option to format Micro SD card. If you format Micro SD card under Windows system, it does not reserve System Reserved Area Size on Micro SD card and cannot as booting Micro SD card in N32926 system.



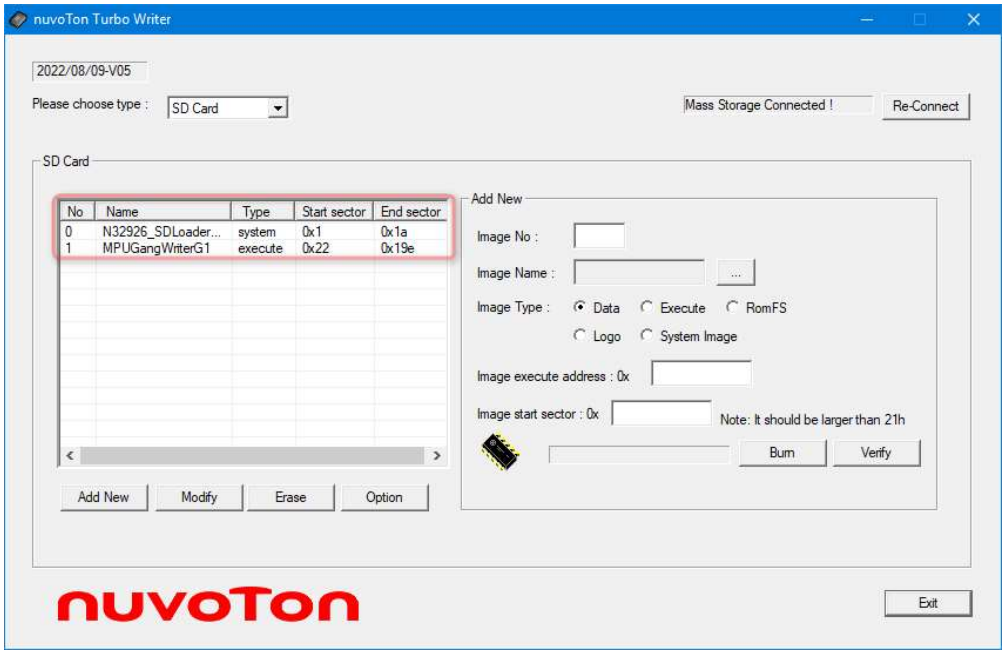
7. Burn the SDLoader.bin as system image on “Add New” page



8. Burn the MPUGangWriterG1.bin as execute image with “Image execute address” 0



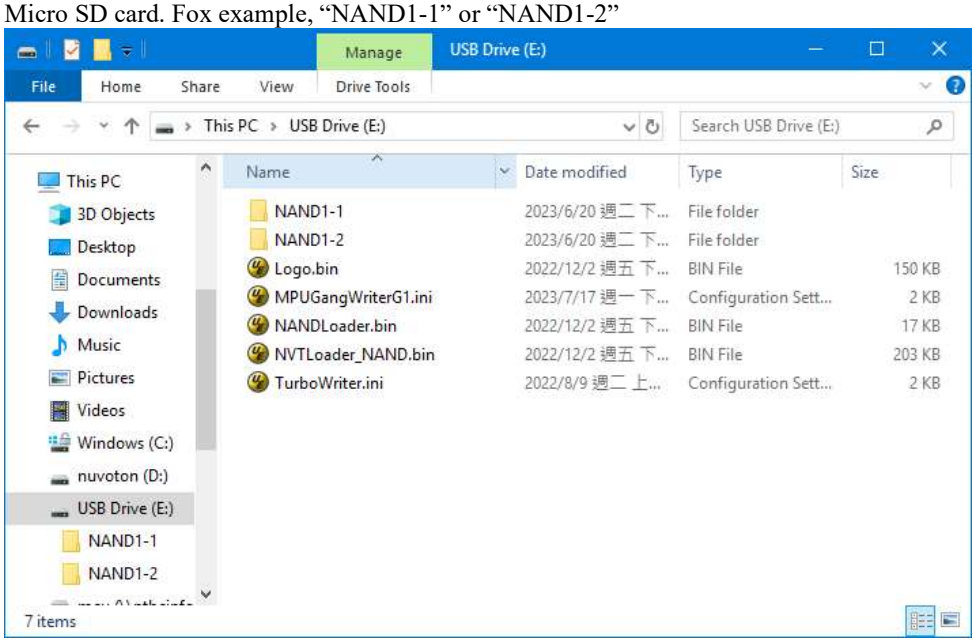
9. Micro SD card system reserved area ready.
Please note that these two bin files are burned in system reserved area of Micro SD card and unreadable from normal Micro SD card reader.



10. After program system reserved area of Micro SD card by TurboWriter, please put this Micro SD card to Micro SD card reader on PC and copy MPUGangWriterG1.ini and content files that are burn to NAND flash from PC to this Micro SD card. Typically, the content file on the Micro SD card should be as follow.
    - /NAND1-1/ folder that include customer’s application bin file
    - /NAND1-2/ folder that include customer’s data file

- MPUGangWriterG1.ini
- TurboWriter.ini
- NandLoader.bin
- Logo.bin (optional)
- NVTLoader.bin

Please note that the disk volume label of Micro SD card cannot be the same as any folder name in Micro SD card. Fox example, “NAND1-1” or “NAND1-2”



3.3. Execute MPU Gang Writer G1

When the Micro SD card is prepared successfully, please open jumper “Rec.” on the MPU Gang Writer G1 board module 1 to become Normal mode, insert Micro SD card into socket, and power on to booting system. The MPU Gang Writer G1 will begin to program NAND flash and show the NAND flash burning status on the LED.

The first step to execute MPU Gang Writer G1 is to prepare a Micro SD card with MPU Gang Writer G1 firmware, configuration file, and the content of NAND flash. The Micro SD card must reserve some space to store the **SDLoader.bin** and **MPUGangWriterG1.bin** before usage.

The MPU Gang Writer G1 can program up to 8 NAND flash at the same time. Each module need one Micro SD card. When all Micro SD card are ready, follow below step to program NAND flash.

1. Open jumper “**Rec.**” on module 1 to become back to the **Normal mode**.
2. Insert the Micro SD card into Micro SD card socket on each module.
3. Put NAND flash chip into NAND flash socket on each module.
4. Power on or reset MPU Gang Writer G1 board to begin to program NAND flash.
5. Check the LED for program result.

4. Revision History

Version	Date	Description
V1.0	Oct., 2023	● Created

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