

NuDIMM-Gang User Manual

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1 OVERVIEW

NuDIMM-Gang is a tool developed specially for ISP(In-System-Programming) process of Nuvoton DIMM modules. It can program up to 5 slots (1 on control board and 4 on socket board) of DIMM modules at once and has separate status LEDs. The NuDIMM-Gang offers I2C interface, and voltage supply options include 5V DC or USB. Additionally, the board is equipped with an OLED display and a control joystick, providing users with an interactive interface for selecting modes and displaying items.

In addition to hardware tool, Nuvoton also provides corresponding ISP PC software tool, features include allowing simultaneous connection and completion of up to 5 sets of IC flash programming on DIMM modules, checksum verification and display of basic information for the DIMM modules.

Overall, by using the NuDIMM-Gang, the ISP process for Nuvoton DIMM module is easy to accomplish.



Figure 1-1 NuDIMM-Gang

2 HARDWARE INTRODUCTION

2.1 Front View



Figure 2-1 Front View of NuDIMM-Gang

Figure 2-1 shows the main components and connectors from the front side of NuDIMM-Gang. The following lists components and connectors from the front view:

- 4 sets of DIMM Modules (CON1, CON2, CON3, and CON4)
 - DIMM-A, DIMM-B, DIMM-C, and DIMM-D
- OLED display(J2)
- 4 sets of I2C connector(TBD)
- 4 sets of status light (DIMM-A, DIMM-B, DIMM-C, and DIMM-D)
 - PASS/BUSY/FAIL
- USB PWR Connector ()
- DC 5V()
- Joystick (J1)
- Start Button ()
- Reset Button (SW1)
- Power LED (D13)
-

2.2 Rear View

Figure 2-2 shows the main components and connectors from the rear side of NuDIMM-Gang.

The following lists components and connectors from the rear view:

- Target chip: M463SGCAE (U1)
- LDO(ICEUP1)

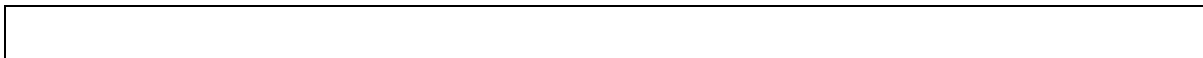


Figure 2-2 Rear View of NuDIMM-Gang

2.3 Programming Unit

NuDIMM-Gang supports programming up to 4 slots of DIMM modules simultaneously. The 4 independent units are designated as DIMM-A, DIMM-B, DIMM-C, and DIMM-D, each with identical functionality.

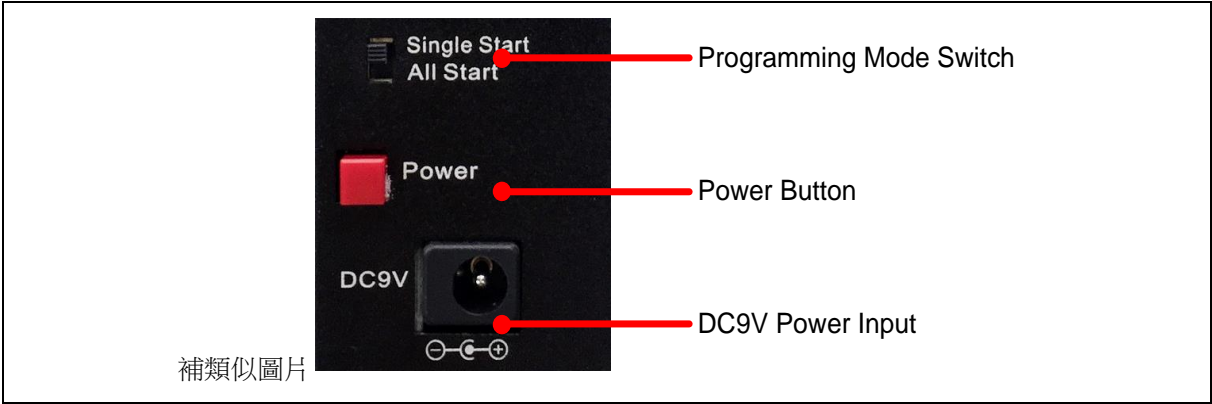
Programming unit		DIMM-A	DIMM-B	DIMM-C	DIMM-D
補圖片	DIMM port	CON1	CON2	CON3	CON4
	I2C connector	I2C0_SCL I2C0_SDA VSS	I2C1_SCL I2C1_SDA VSS	I2C2_SCL I2C2_SDA VSS	I2C4_SCL I2C4_SDA VSS
補圖片	Status LED	PASS BUSY FAIL	PASS BUSY FAIL	PASS BUSY FAIL	PASS BUSY FAIL

Table 2-1 Programming Unit's Component List

2.4 Power Supply

There are 2 approaches for power supply of NuDIMM-Gang. The voltage for target chip is 3V, and for DIMM module is 5V. While connecting the power, the power LED will blink.

- 1. Use DC 5V/?A power adapter with DC tip polarity: internal positive (+), external negative (-).
- 2. Use USB connector



2.5 Characteristic of Voltage and Current

Symbol	Description	Min	Max	Unit
V _{DD} - V _{SS}	DC power supply	TBD	TBD	V
TBD	Operation current	TBD	TBD	mA

2.6 Reset Button and Start Button

Component	Description
Reset Button	Press to reset the whole system.
Start Button	Press the start button to confirm the menu selection.

Table 2-2 Button

2.7 OLED Display and Joystick

The OLED screen will display related contents, including function menu, programming status, and the selected DIMM module's information. Use the joystick to control the menu selection on OLED display.

Contents	配上圖	Description
I2C PORT: PORT 1 I2C PORT: PORT 2 I2C PORT: PORT 3 I2C PORT: PORT 4 I2C PORT: ALL PORT		Use the joystick to navigate left and right and press down to select the target port.
I2C CMD: PROGRAM I2C CMD: BIN INFO I2C CMD: SPD READ I2C CMD: DIMM INFO I2C CMD: SPD INFO		Use the joystick to navigate up and down and press down to select the desired information to display or the programming process.
		While selecting the BIN INFO/SPD INFO/DIMM INFO, the OLED will display the corresponding contents.

Table 2-3 Contents of OLED Display

3 NUDIMM-GANG TOOL

3.1 Overview

NuDIMM-Gang offers two methods for programming the DIMM. With the NuDIMM-Gang PC Tool, users can program their code in Online Programming Mode or save their code to the NuDIMM-Gang flash for programming in Offline Programming Mode.

3.2 PC Tool Installation

The NuDIMM-Gang Tool is offered in both source code and executable formats. The executable version can be used immediately without installation, eliminating the need for users to install any Python libraries or scripts.

To utilize the tool from its source code, a Python script, certain necessary packages must be installed. The source code is designed for Python 3 and might not operate correctly with Python 2. As such, installing Python 3 is crucial for running the ISP Python Tool source code. Windows users can obtain the Python 3 package from the official Python website at <https://www.python.org/downloads/windows/>.

Once Python 3 is installed, execute the following command to install the necessary modules for the NuDIMM-Gang Tool:

```
$ pip3 install ctypes hidapi PyQt5
```

3.3 PC Tool Introduction

When using the NuDIMM-Gang Tool, users must connect the NuDIMM-Gang board to the PC via a USB connection. The tool comprises three main pages: the Connection & Information Page, the SPD Information Page, and the Programming Setting Page. Each page offers distinct settings for the NuDIMM-Gang Tool.

The tool's menu bar features three options. The Project option allows users to load and save their configuration parameters, facilitating quick setup based on previous settings. Another feature of Project option is to open the Serial Checker. The SPD Info option enables users to import or export .spd files for the SPD Information Page and edit the SPD information through a configuration dialog. The Help option shows the User Manual and the version of the NuDIMM-Gang PC Tool.

On the Connection & Information Page, users are required to click the "Connect" button within the USB Connection group box to ensure the NuDIMM-Gang board is correctly connected to the tool. Once the connection is established, the "Check Connection" button in the DIMM Connection group box can be clicked to display information about each slot if a DIMM board is attached.

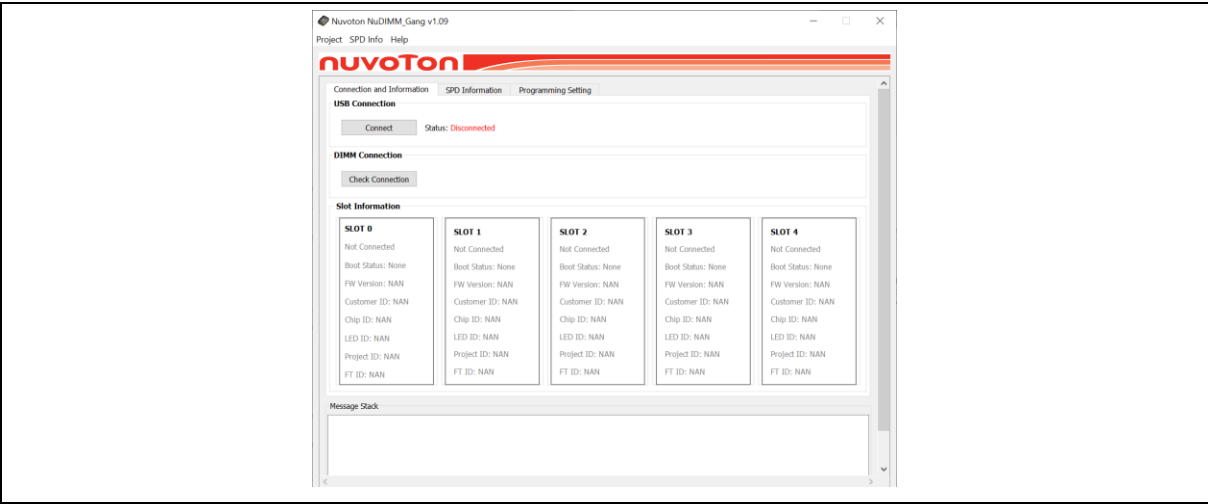


Figure 3-1 Connection & Information Page

The SPD Information Page helps users to set and check their DIMM configurations into their DIMM boards using SPD data loaded or edited from the menu bar. This page features an SPD table displaying 512 bytes of SPD data at a time, and a “Show SPD Information” button to reveal basic settings information from the SPD file. Users have three methods for modifying their SPD configuration: directly importing an SPD Information file, using the configuration dialog to set values, or editing values in the SPD table directly. Press “Read from Board” button will read the SPD information store in the NuDIMM-Gang Board. When user click the radio button in SLOT Selection, NuDIMM-Gang Tool will try to read the SPD Information on the DIMM board.

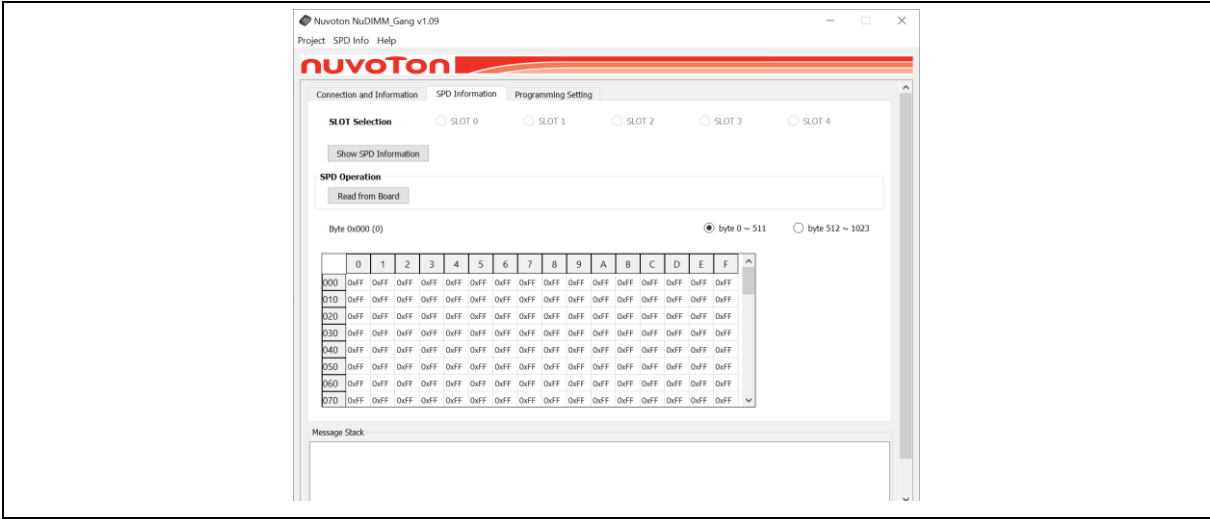


Figure 3-2 SPD Information Page

The Programming Setting Page is mainly about online programming and offline programming processes. Users can upload their DIMM firmware and/or SPD file to the NuDIMM-Gang Tool and select between Online Programming Mode and Offline Programming Mode for writing file data to the DIMM board or the NuDIMM-Gang board. Detailed explanations of these programming methods are provided in chapters 3.4 and 3.5.

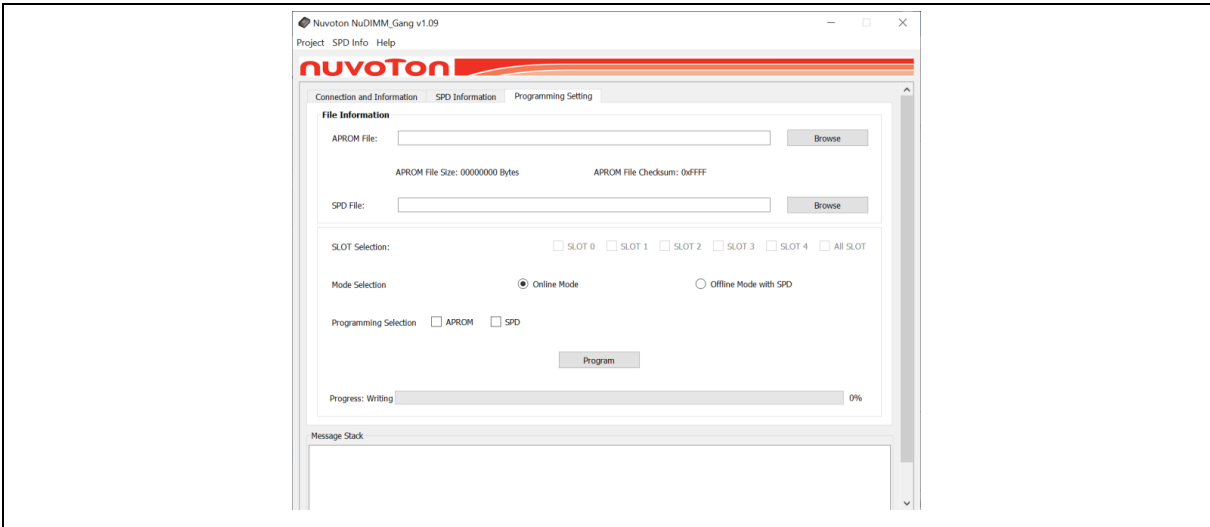


Figure 3-3 Programming Setting Page

3.4 Programming Process

Before beginning the online programming process, users must first import their APROM binary file and/or SPD file if needed. This is done by clicking the “browse” button at the top of the Programming Setting Page to select their file. Users can use the Programming Selection checkboxes to choose to program APROM binary file and/or SPD file.

If the NuDIMM-Gang Tool recognizes that a slot is connected to a DIMM board, it will activate the checkbox for slot selection. Once the desired slot is selected, users can initiate the online programming process by choosing the "Online Mode" option.

If the user selects the "Offline Mode with SPD" option, since offline mode needs both APROM binary file and SPD file, the Programming Selection checkboxes will be disabled. NuDIMM-Gang Tool will transfer APROM data and SPD information data to the NuDIMM-Gang board, rather than directly to the DIMM board. This data will be stored in the dataflash of the NuDIMM-Gang's M463 chip.

Press the “Program” button and the progress will start. To monitor the progress, a progress bar and a log box are available at the bottom of the window.

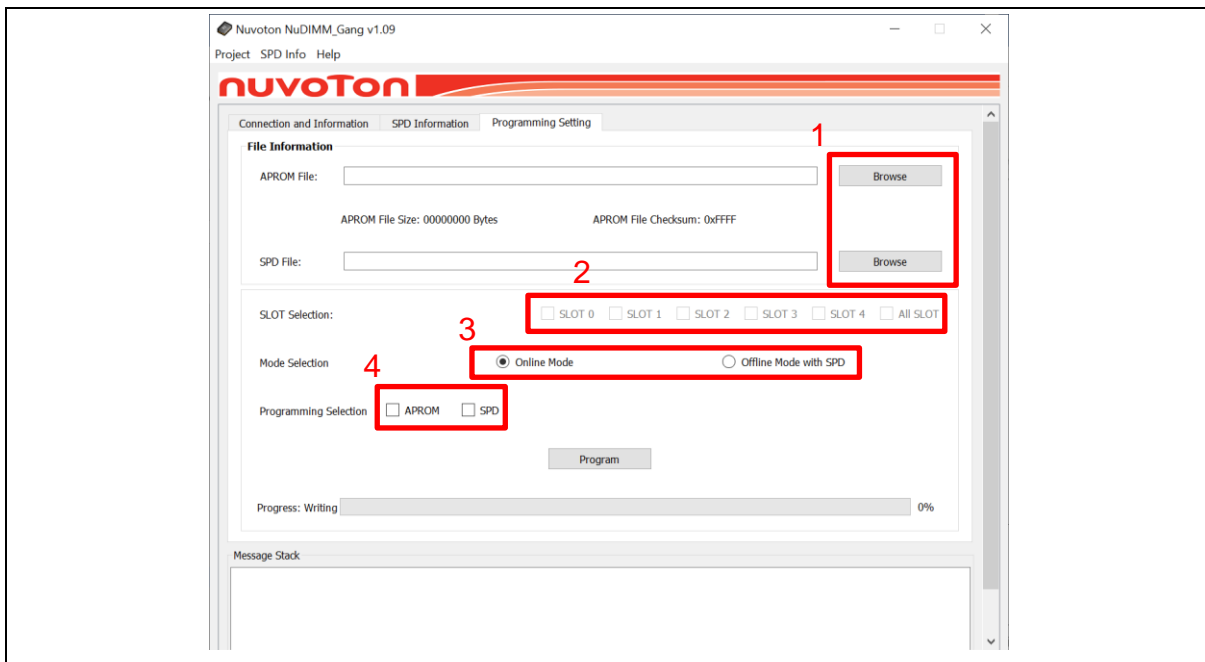


Figure 3-4 Online Programming Step

3.5 SPD Information

When the NuDIMM-Gang board is connected to a DIMM board that is in the APROM boot state, the NuDIMM-Gang Tool can read the SPD information from the DIMM board by clicking the "Read SPD" button. The SPD information will be displayed in the table below. As the table presents 512 bytes at a time, users can use the page index spin box to navigate through different sections of the data. The SPD table is editable, and any edited values will turn red if they differ from the previously read values.

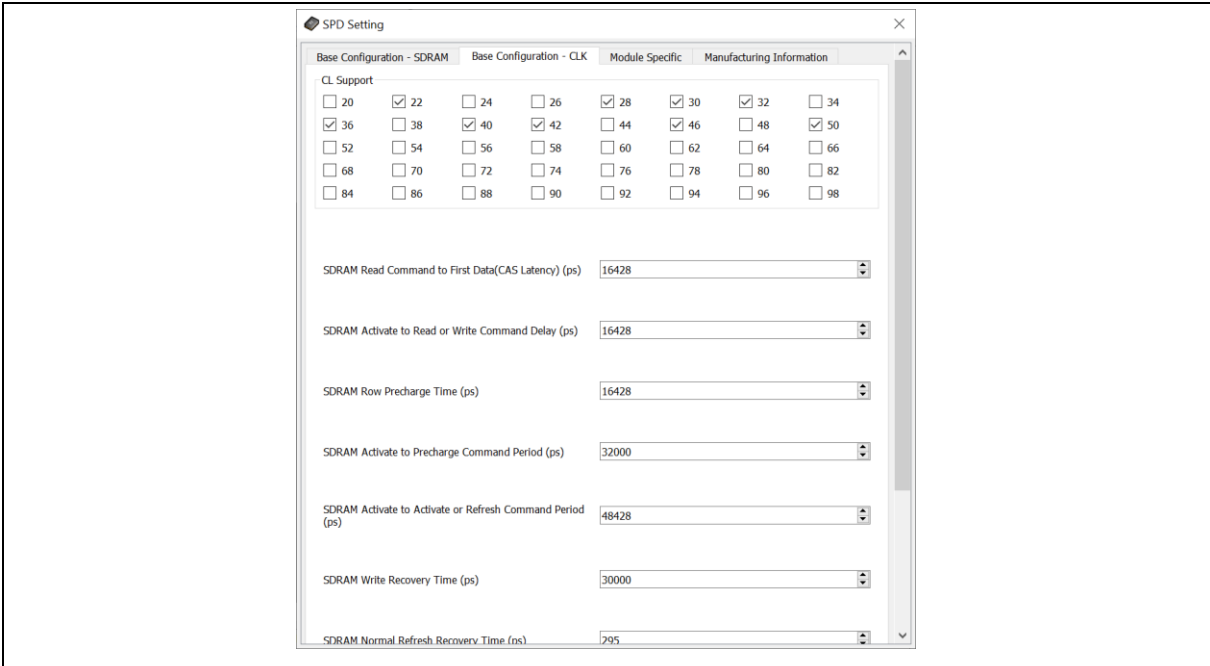


Figure 3-5 Edit SPD Information Dialog

Choosing the "Edit SPD Information" option on the menu bar opens a dialog window that includes parts of the DIMM setting configuration. If users have edited the table or imported their SPD information before opening this dialog, the default values within the configuration will update to reflect these changes. Upon closing the dialog, the values in the SPD table will adjust according to the dialog's settings.

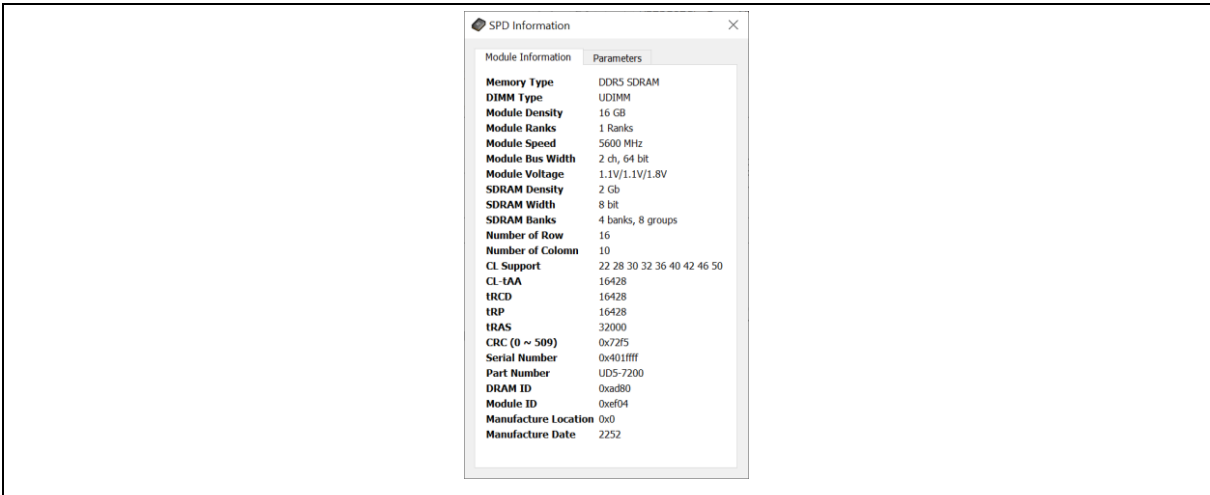


Figure 3-5 Show SPD Information Dialog

Clicking the "Show SPD Information" button will show the SPD information dialog. The SPD Information data displayed on the SPD table is considered temporary local data. Therefore, users must use the Export SPD file option at the menu bar to save the SPD file, which can be use at the online and offline programming at the Programming Setting Page.

4 NUDIMM-GANG BOARD COMMAND

4.1 Overview

The NuDIMM-Gang Board includes multiple commands to facilitate offline programming operations. These Offline Programming Mode commands are inaccessible while the board is connected to the NuDIMM-Gang Tool and become available only once the USB connection is disconnected.

Information and status indicators will be displayed on the NuDIMM-Gang Board's panel. To navigate through the commands, use the joystick left and right. To select a target slot, move the joystick up and down. Once the desired command and slot are selected, press the START button to initiate the operation.

4.2 Command Introduction

The NuDIMM-Gang Board currently supports six distinct commands: PROGRAM, BIN INFO, SPD READ, DIMM INFO, SPD INFO and SPD PROGRAM. Except for BIN INFO and SPD INFO, each command requires selecting a target, which can be one of the DIMM ports or all ports simultaneously when executing the PROGRAM type command.

The PROGRAM command writes the APROM file and SPD information to the targeted DIMM Board. Users must ensure the target DIMM Board is in LDROM mode and that the offline data has been previously written using the NuDIMM-Gang PC Tool before executing this command.

The BIN INFO command displays the file size and checksum of the offline programming APROM data stored in the NuDIMM-Gang Board's dataflash.

The SPD READ command reads the SPD information from the selected DIMM slot. The output is displayed on the panel across 32 pages, which can be navigated using the joystick left and right.

The DIMM INFO command retrieves and displays various details about the targeted DIMM, including the customer ID, chip ID, LED ID, project ID, and FT ID of the DIMM Board.

The SPD INFO command displays the byte information of the offline programming SPD data stored in the NuDIMM-Gang Board's dataflash.

The SPD PROGRAM command writes the SPD information to the targeted DIMM Board. Users must ensure the target DIMM Board is in APROM mode and that the offline data has been previously written using the NuDIMM-Gang PC Tool before executing this command.

4.3 Offline Programming

The first command on the NuDIMM-Gang Board is "PROGRAM", which programs data into the selected target. This includes each individual port or all ports simultaneously. To initiate the offline programming, users must ensure their data is stored in the data flash of the NuDIMM-Gang Board. Depending on the target option, it is advisable to verify that each target is in LDROM status, although the offline programming process will attempt to switch the target to LDROM mode at the start.

"SPD PROGRAM" command is like "PROGRAM" command, but it only program the SPD part. Similar to the "PROGRAM" command, it is advisable to verify that each target is in APROM status, although the SPD only offline programming process will attempt to switch the target to APROM mode at the start.

4.4 Support Command

The "BIN INFO" and "SPD INFO" commands display information about the offline data stored in the data flash. Users can utilize these commands to verify that the offline data has been correctly saved on the NuDIMM-Gang Board.

The "SPD READ" and "DIMM INFO" commands are used to read data from the selected target. This can assist users in ensuring that the information programmed into the target is accurate.

5.3 DIMM Module

5.4 PCB Placement

Figure 5-2 and **Error! Reference source not found.** show the front and rear placement of NuDIMM-Gang.

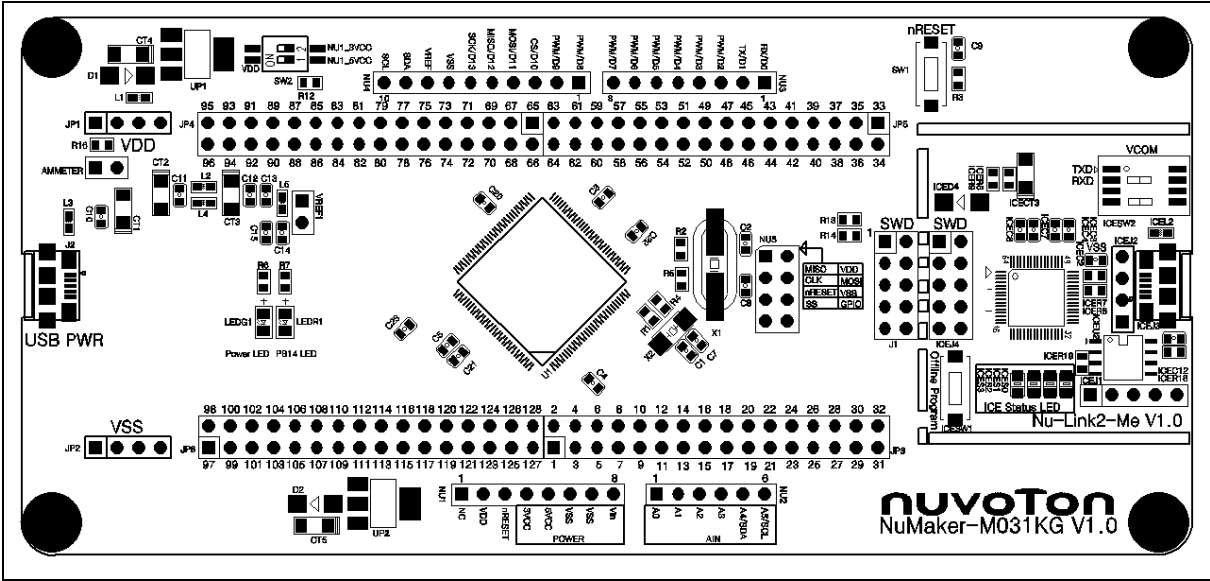


Figure 5-2 Front Placement



Figure 5-3 Back Placement

6 REVISION HISTORY

Date	Revision	Description
2024.05.03	1.00	● Initial version.

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