ARM® Cortex®-M
32-bit Microcontroller

NuTool - PinConfigure
User Manual

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NUTOOL – PINCONFIGURE USER MANUAL

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1 Introduction

The **NuTool - PinConfigure** is used to configure GPIO multi-functions of Nuvoton NuMicro®
Family. Its features are listed below:

- **Configuring by the TreeView**: All the supported modules are collected and listed in the
  TreeView. The user can manipulate the tree to configure GPIO multi-functions easily.

- **Configuring by individual pins**: Configuring GPIO multi-functions by individual pins is allowed.
  The user can complete their operation more intuitively and efficiently.

- **Configuring by editing the register value directly**: The user can utilize this feature to inspect
  the accuracy of the value.

- **Generation of code or report**: After configuring GPIO multi-functions, the user can generate
  code or print a report. The generated code can be included into the developing projects. The
  report comprises all the configuration information.

Through the application, the user can configure GPIO multi-functions of the NuMicro® Family
correctly and handily.

2 Starting to Use the NuTool - PinConfigure

2.1 System Requirements

The following table lists system requirements for the user to run **NuTool - PinConfigure**.

	Minimum Requirements	**Recommended Specifications**
Operating System	Windows®XP with latest service pack	Windows®7 with latest service pack
Internet Explorer	Internet Explorer 8	Internet Explorer 10
Input	Keyboard and mouse required	

Note: To have a fully usable and pleasant experience with the application, it is strongly recommended that the version of the installed Internet Explorer (IE) be higher than 8.

2.2 Supported Chips

To see the list of supported chips, please refer to **Supported_chips.htm** in the folder of user manual. The alternative way is to click the **Read User Manual** button on the toolbar.

2.3 Running the NuTool - PinConfigure

To run **NuTool - PinConfigure**, double-click the **NuTool - PinConfigure.exe**. Note that the .exe file and the related folders, such as the content folder, should stay in the same directory; otherwise, the application will not work properly.
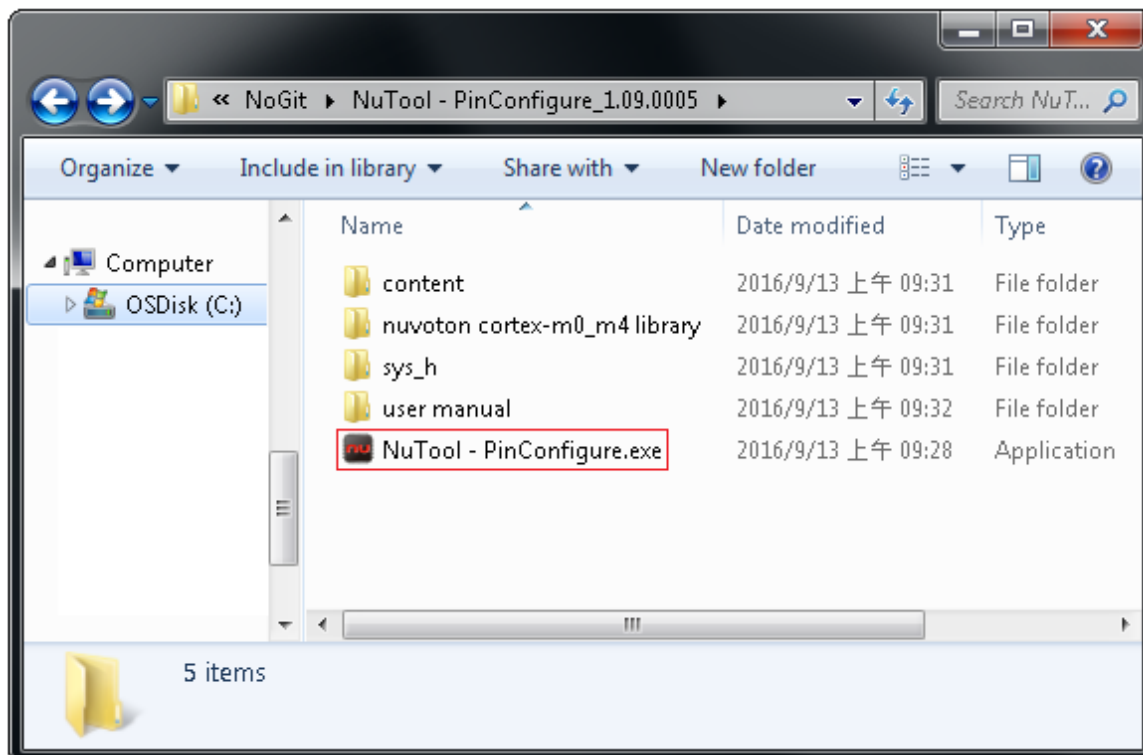

Figure 2-1 NuTool - PinConfigure.exe and Related Folders

3 User Interface Guide

3.1 GUI Overview

The PinConfigure Window includes a variety of components. The name of each component is described in the following figure.
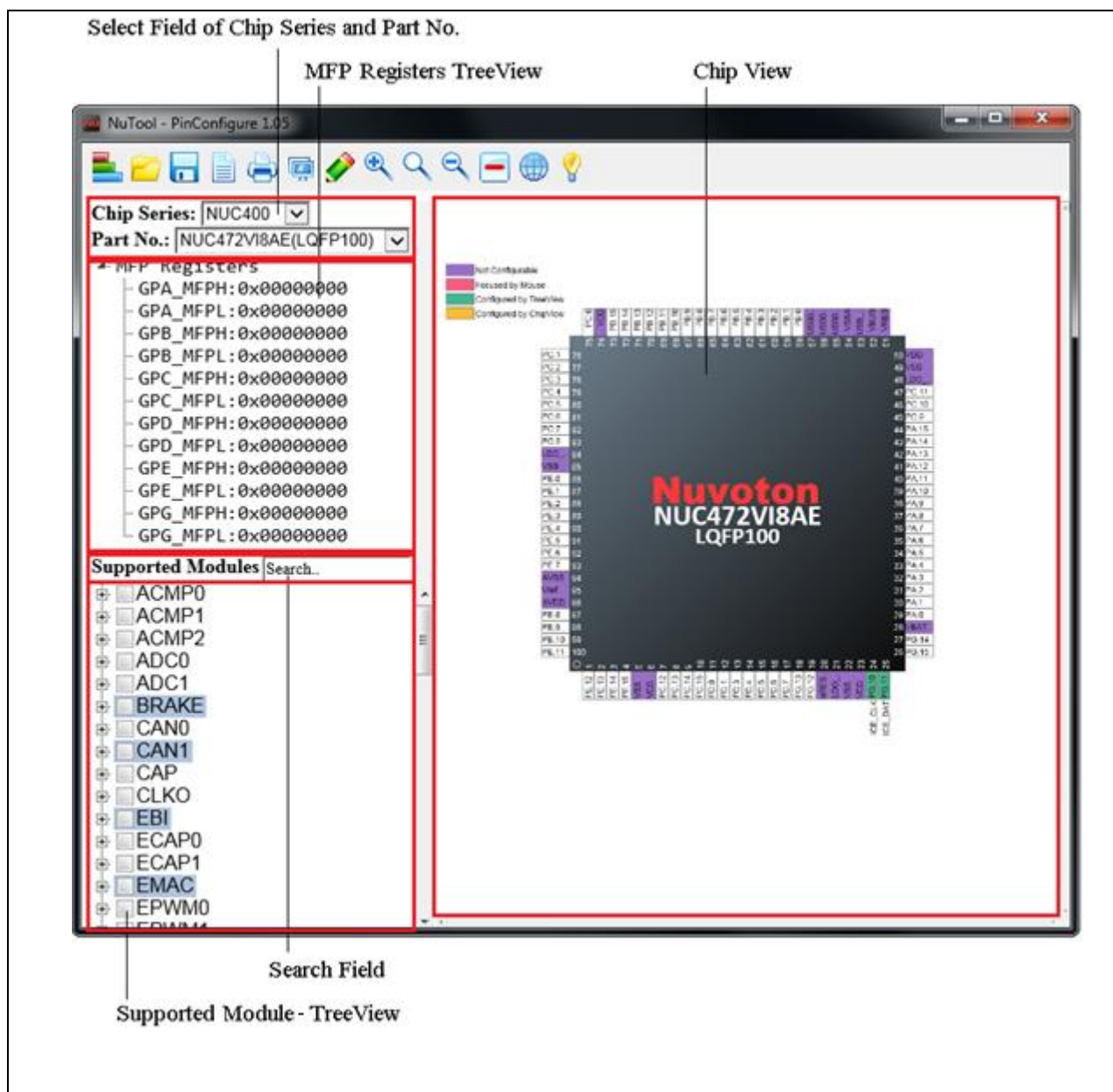

Figure 3-1 PinConfigure Window

3.2 Select Field of Chip Series and Part No.

The user can select the expected chip series and part No. from the upper-left select field (referring to the following figure). If the select field and the MFP Registers TreeView are hidden, please click the **Switch Select Field and MFP-Registers TreeeView** to show them.
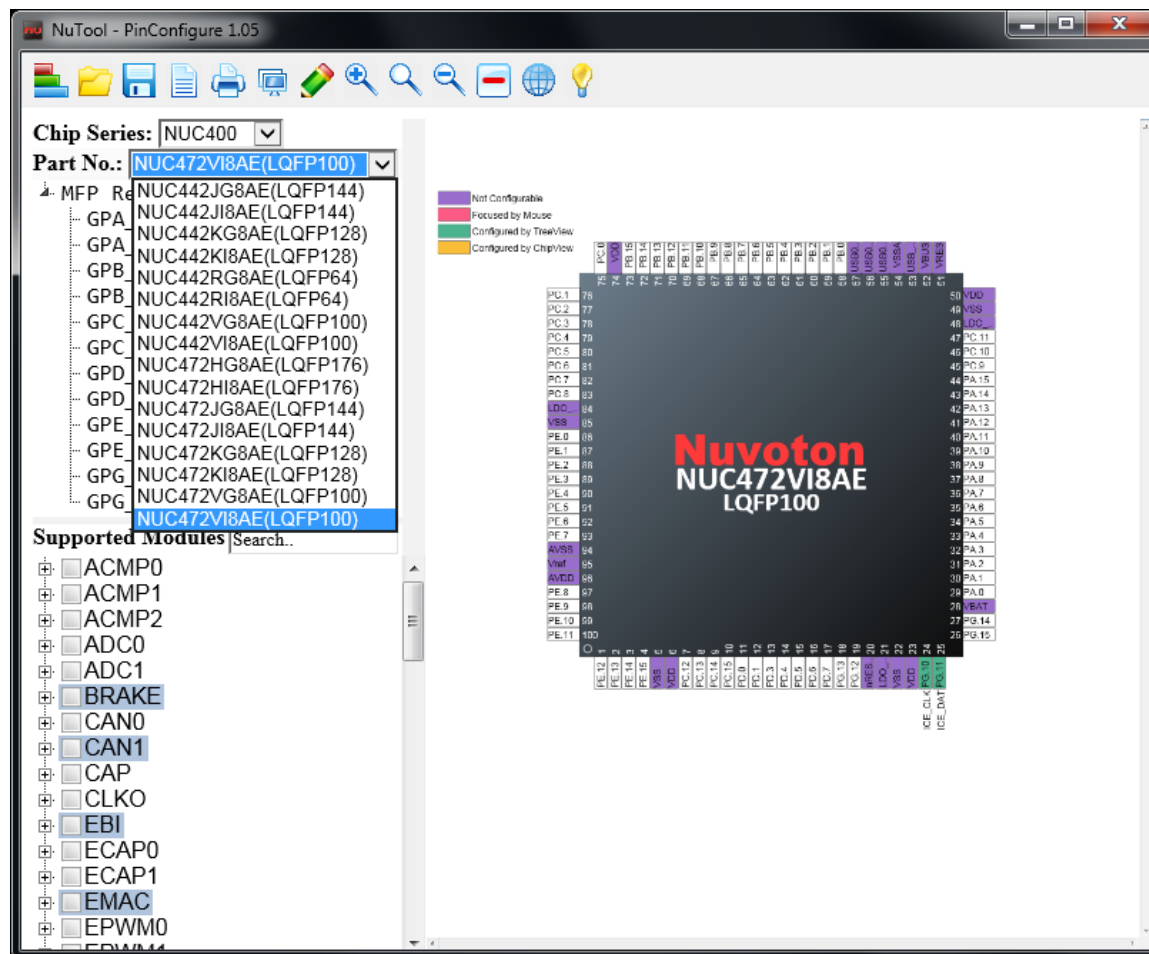

Figure 3-2 Selecting Part Number

3.3 MFP Registers TreeView

The current values of MFP registers are displayed in this TreeView. Moreover, the user can edit them directly by double-clicking on the expected one and enter a new value (referring to the following figure). After editing, the corresponding check boxes of the supported modules - TreeView and the chip view will be updated immediately. Some chips require two different MFP registers to configure GPIO multi-functions, and thus the user cannot edit the values of MFP registers by double-clicking these chips.
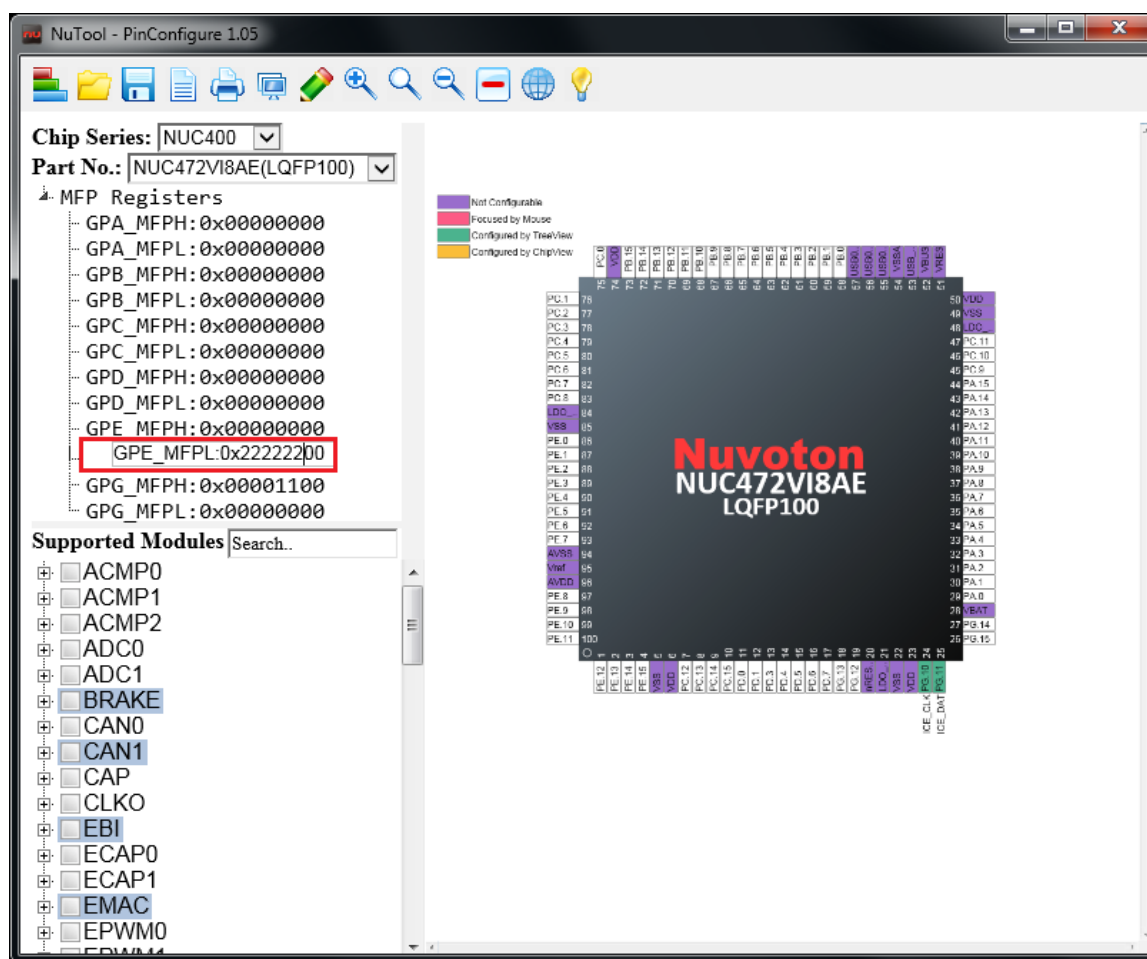

Figure 3-3 Editing a MFP Register

3.4 Supported Module - TreeView

3.4.1 Usage

With the supported module - TreeView, the user can configure the peripheral pin(s). Each time a module or its individual GPIO multi-function is checked in the check boxes, the chip view shown in the right window will display the new state of the pin(s). Besides, the corresponding value of MFP register will be updated at the same time. For example, the user configures ACMP0 and the results are shown as the following figure.
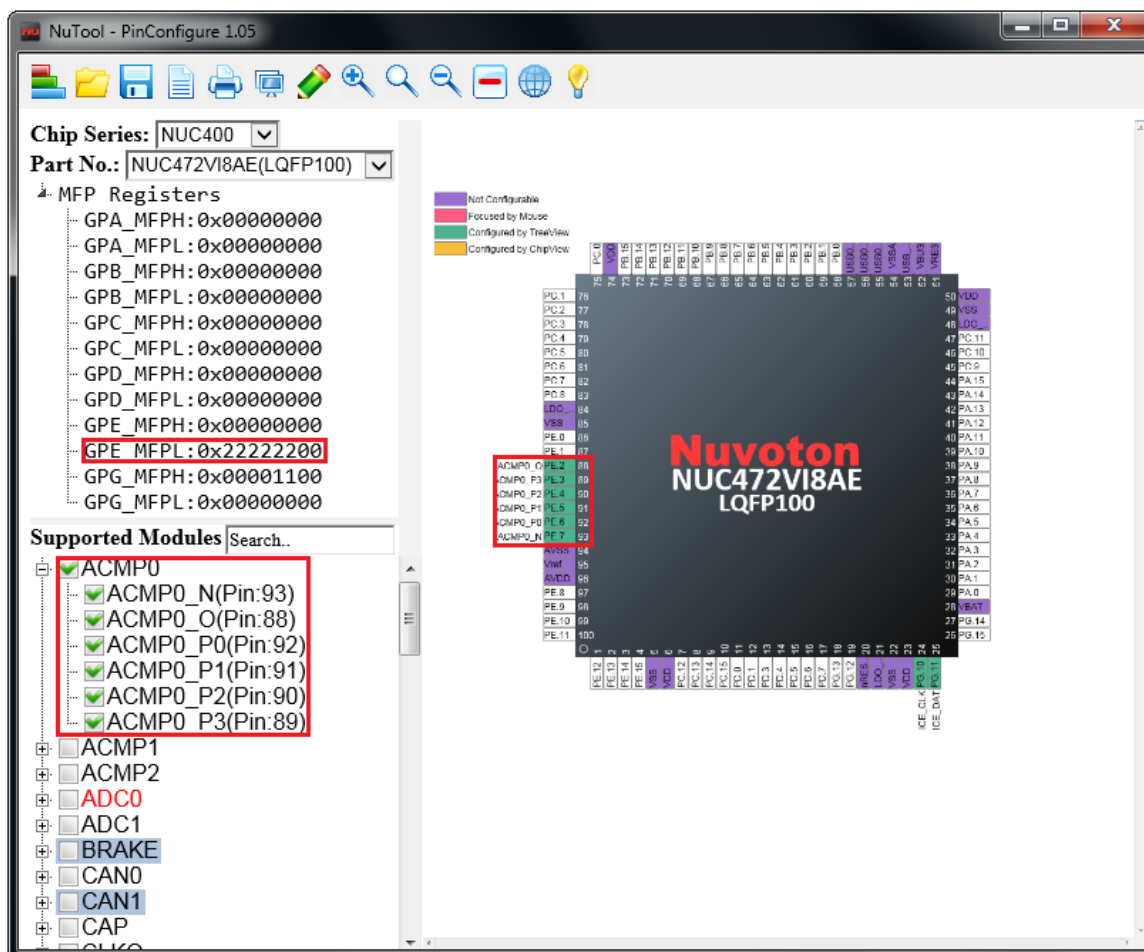

Figure 3-4 Results of Configuring ACMP0 by the TreeView

3.4.2 Conflict

When the pins have been configured to a module, the related texts in the check boxes will be marked in red. If the user obliviously wants to configure the pins again through the TreeView, this case is called as a conflict. A dialog box which lists the relevant pins and their configured modules will be invoked (referring to the following figure). It offers two options to decide the next step. Clicking the Yes button, the tool will make the **adjustment of conflicts**. Clicking the No button, the tool will only configure the remaining pins.

Figure 3-5 "Conflict Occurred" Dialog Box

3.4.3 Adjustment of Conflicts

To resolve conflicts, the tool recursively adjusts configured modules if possible. For instance, if the user wants to configure EPWM1_0, the tool will try to adjust BRAKE01 to another pin (Pin 72). However, Pin 72 is occupied by EMAC_MII_MDC. Fortunately, EMAC_MII_MDC has a configurable pin (Pin 70) to configure.
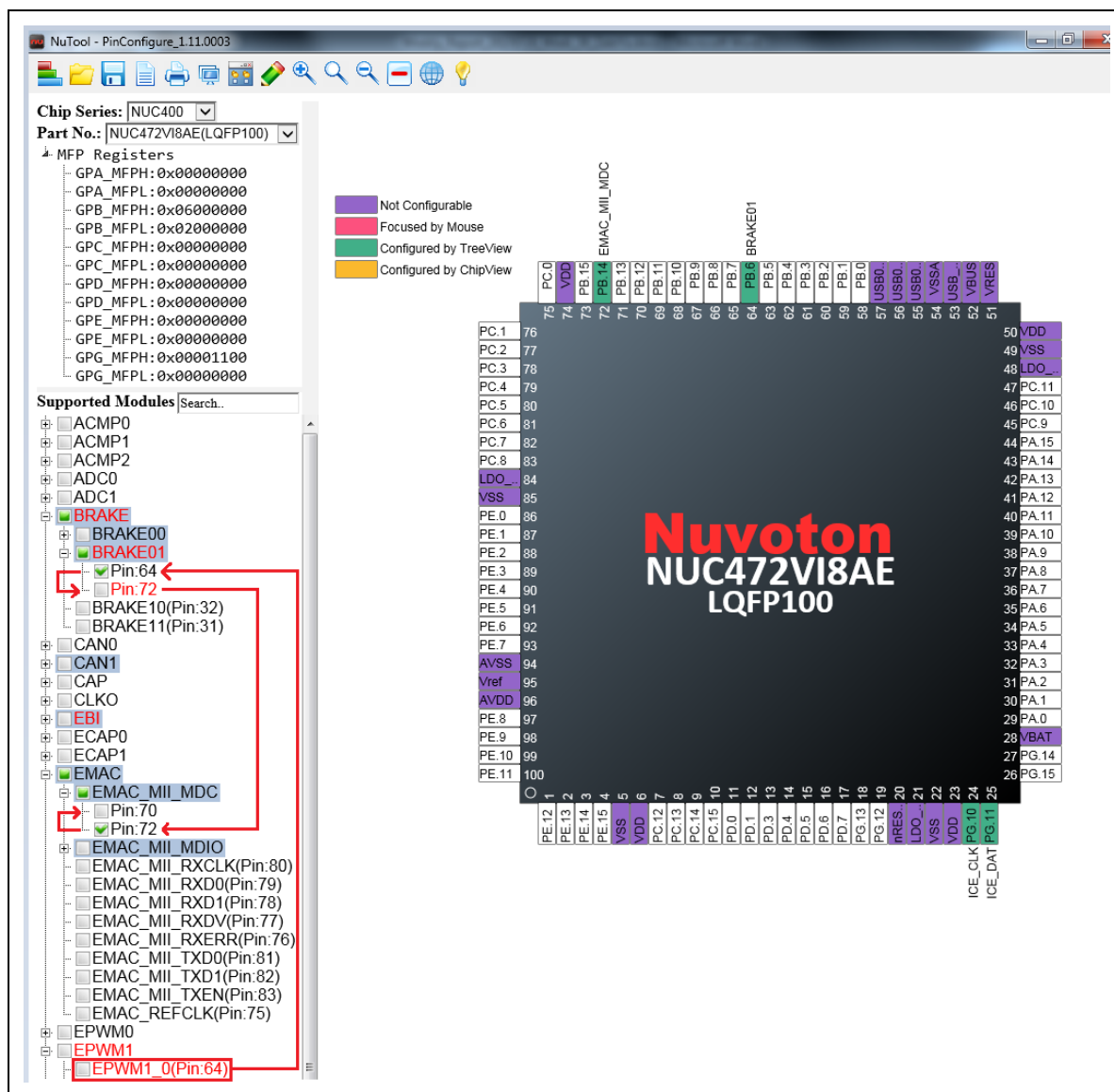

Figure 3-6 Recursive Adjustment

As a result, the tool finds the way to adjust the conflict. EPWM1_0 is configured. At the same time, BRAKE01 and EMAC_MII_MDC are kept. A dialog shows up to tell the adjustment details. If the user wants to undo the adjustment of the conflicts, please click the Undo button.
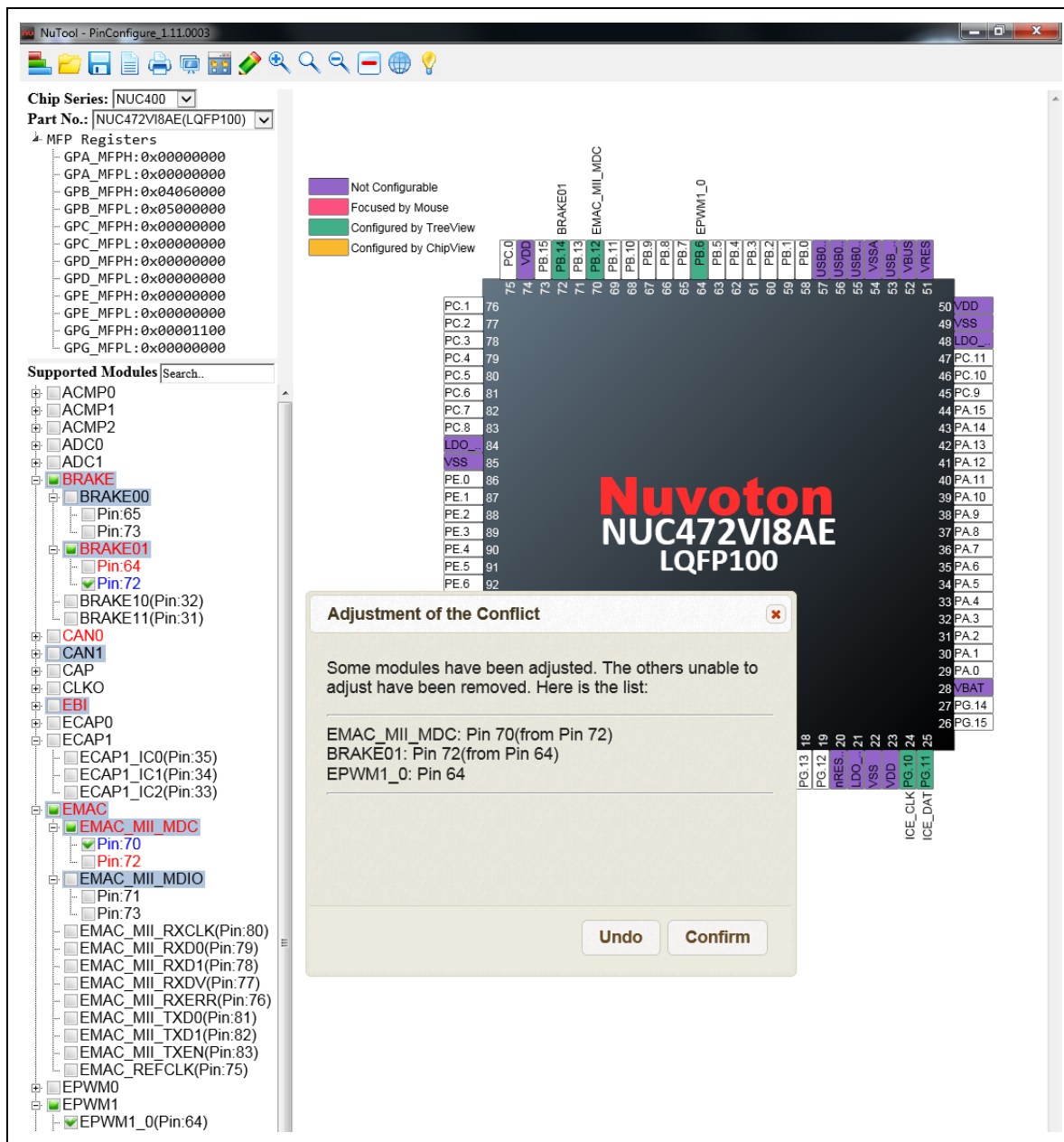

Figure 3-7 "Adjustment of the Conflict" Dialog Box

Sometimes, the tool could find several modules unable to adjust. For instance, Pin 93 is occupied by ACMP0_N. ACMP0_N has only one option (Pin 93). Thus, if the user wants to configure ADC0_7, the tool is unable to adjust ACMP0_N. That is why when configuring ADC0_7, ACMP0_N has to be removed.
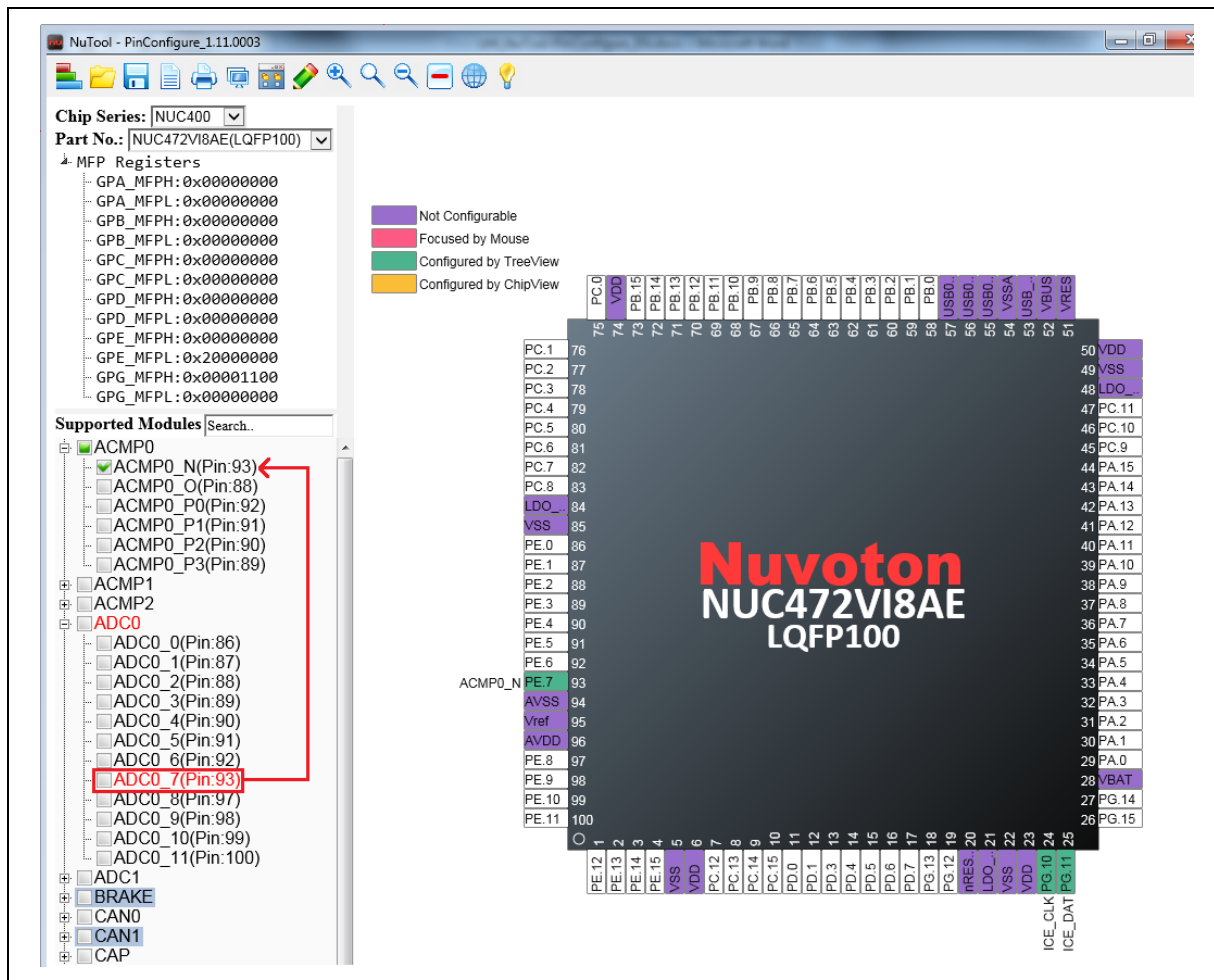

Figure 3-8 Adjustment Based on Removal

3.4.4 Multiple Selections

There are some modules whose GPIO functions have multiple selections of pins to the same function. In this case, the related check boxes are highlighted with the steel blue color. The user is only permitted to select one of pins. For example, in the BRAKE module, its GPIO function of BRAKE00 has two options, pin 65 and 73, but only one of them can be occupied by BRAKE00 (referring to the following figure).
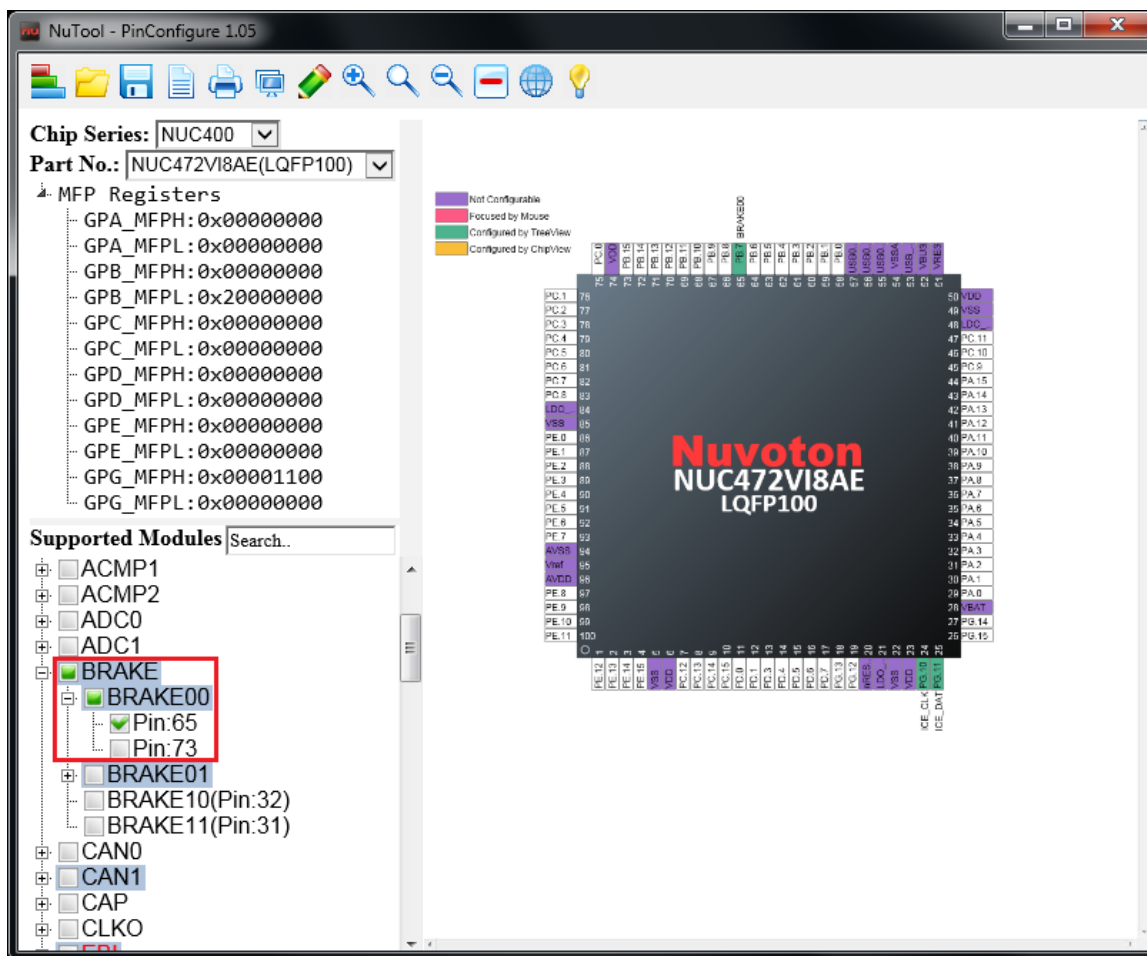

Figure 3-9 Multiple Selections of BRAKE00

3.4.5   Search

To find a specific module in the supported modules - TreeView, the user can input the expected module name in the search field. After input, the matched texts in the check boxes will be marked in bold and italics. Note that the search adopts the partial match, not exact match (referring to the following figure). The minimum number of input characters is two.
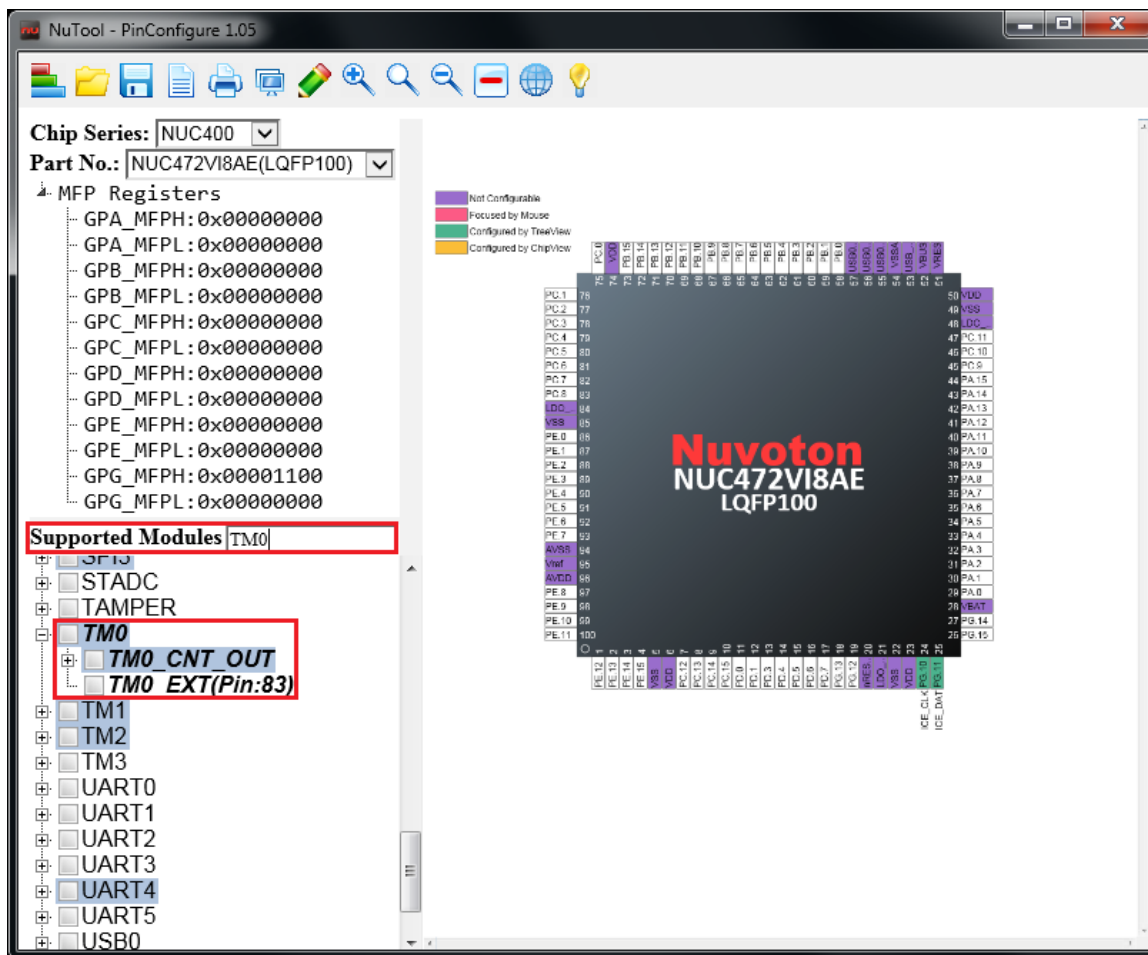

Figure 3-10 Matched Search Results

3.5 Chip View

The chip view, which is in the right pane of the window, depicts a graphical chip involving its pins. Each pin possesses its own information of the current pin assignment. The pins which are highlighted with the purple color denote that they do not belong to the configurable pins. If a pin is being configured to a GPIO multi-function, the corresponding function name will emerge in the vicinity of the pin. Meantime, the pin will be highlighted with the green color if it is configured by the TreeView, or with the orange color if it is configured by the individual pin.

To configure by the individual pin, follow the steps below:

1. Move the mouse cursor to the expected pin and click on the left button of the mouse. Then the list of all the related GPIO multi-functions will emerge in the vicinity of the pin (referring to Figure 3-8).

2. Move the mouse cursor into the list and select the expected GPIO function and click on it. Configuring by the individual pin is accomplished. At the same time, the TreeView and the value of the MFP register will be updated correspondingly (referring to Figure 3-9).

The difference between configuring by individual pins and TreeView is that the user can arbitrarily configure any pin by the individual pins without considering the occurrence of a conflict. To disable the configured pins by individual pins, move the mouse cursor to the expected pins and left-click. Select the last row of the list which is named as Reset (referring to Figure 3-10). Then the disable operation is completed.
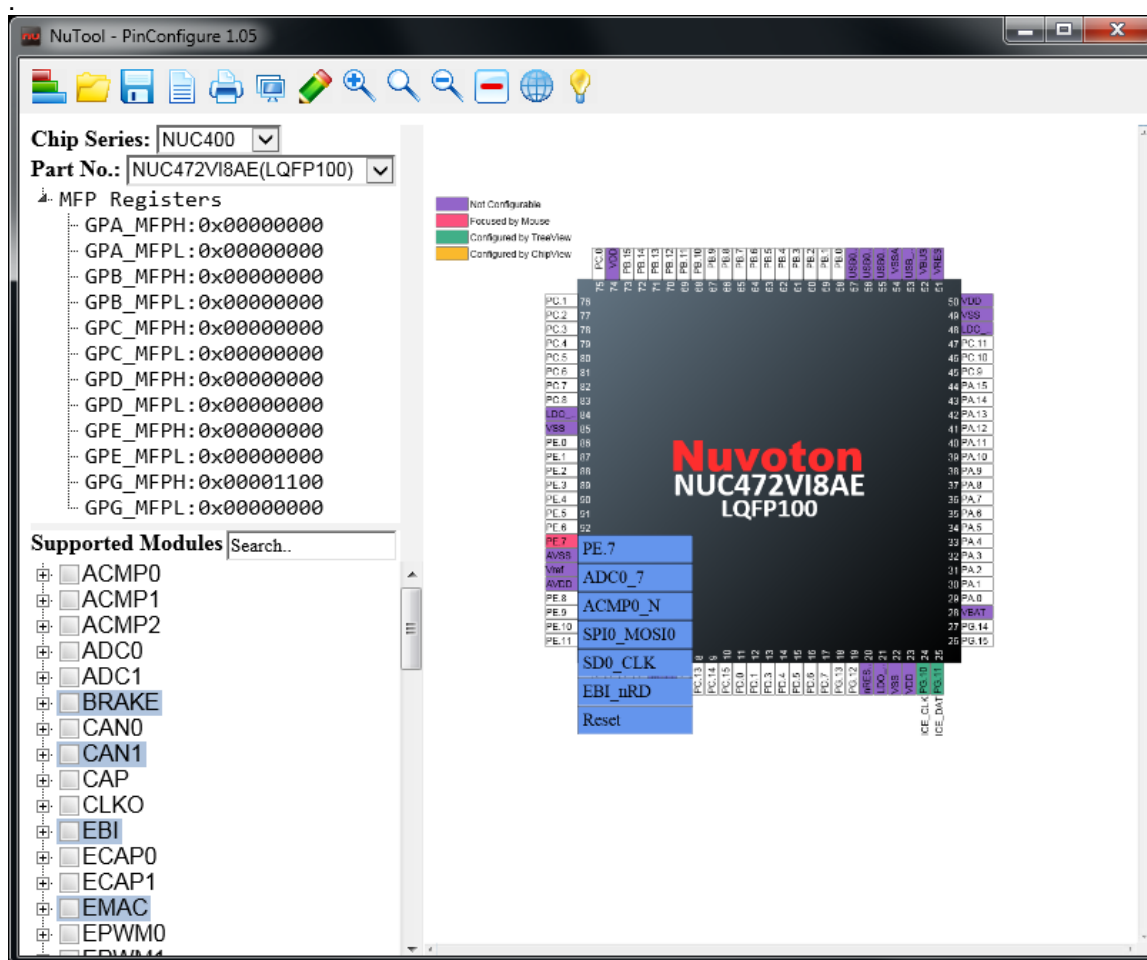
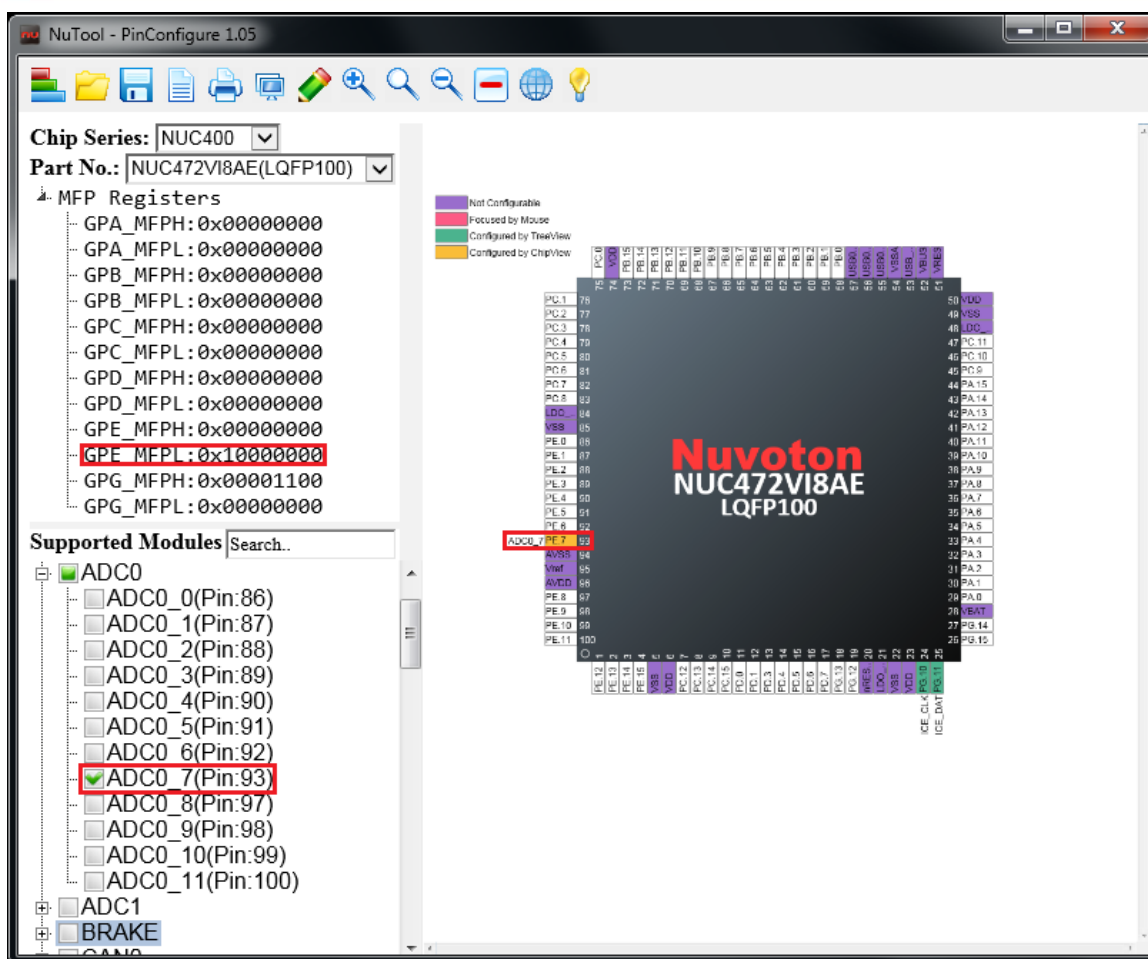Figure 3-11 List of All the Related GPIO Multi-functions

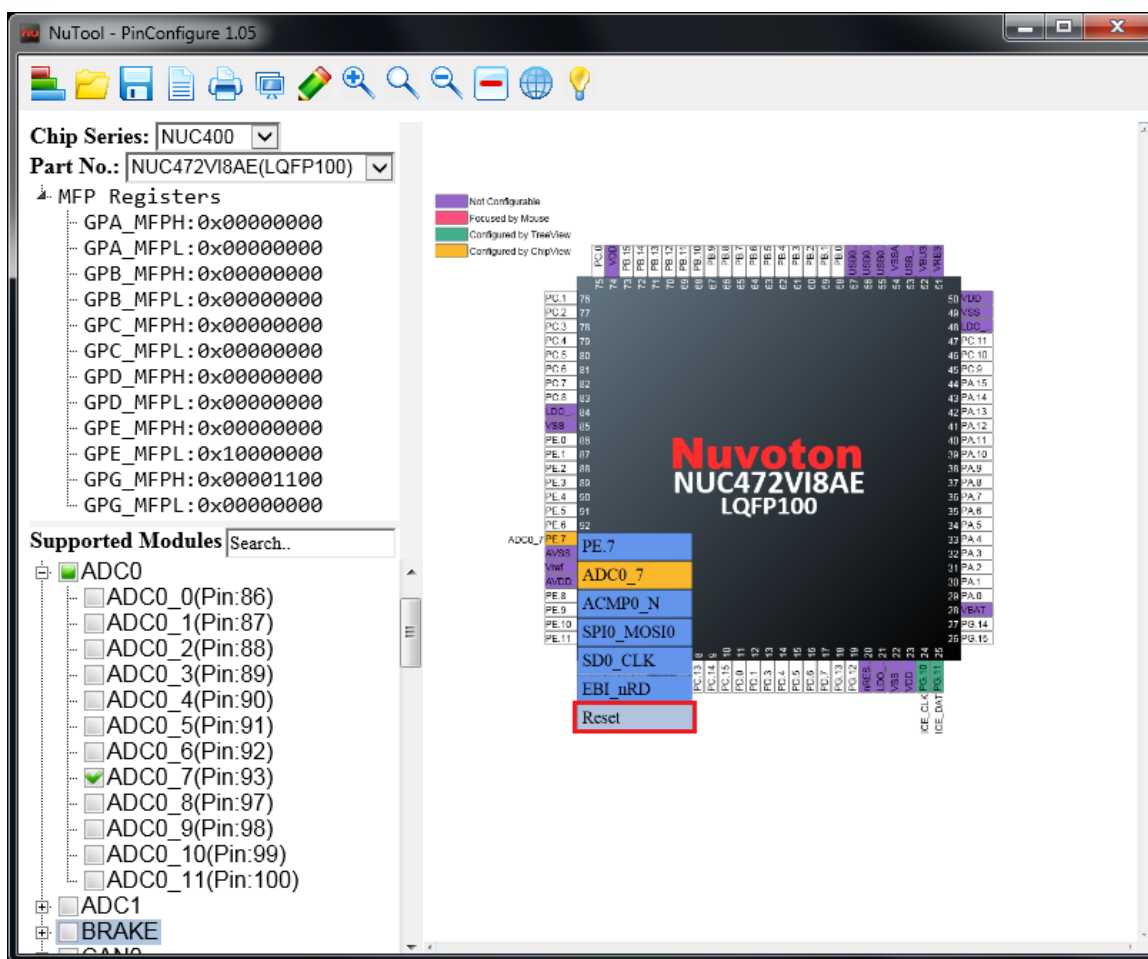Figure 3-12 Results of Configuring ADC0_7 by the Individual Pin

Figure 3-13 Disabling the Configured Pin

4 Toolbar

4.1 Switch Select Field and MFP-Registers TreeView

To show the select field and the MFP Registers TreeView, click the **Switch Select Field and MFP-Registers TreeeView** button on the toolbar.

4.2 Load Configuration

The user can browse the previously saved configuration files (*.cfg) and select one of them to restore the configured MCU chip.

To load the configuration, click the **Load Configuration** button on the toolbar, select the directory preserving the expected configuration file and click the Open button.

4.3 Save Configuration

To save the current configuration, take the following steps:

1. Click the **Save Configuration** button on the toolbar.
2. Browse a user-defined location and give a proper name to the configuration file (*.cfg).
3. Click the Save button. The current configuration will be saved as a .cfg file with a given name. The configuration file can be used to restore the configured MCU chip in the future.

4.4 Generate Code

To generate code to be included into the developing projects, click the **Generate Code** button on the toolbar. The user can determine the criteria by which the configured information is being classified.

4.5 Connect to Target Chip

When debugging within NuEclipse, which is a GUI IDE and designed for cross-platform embedded ARM development, the user can connect to the target chip by clicking the **Connect to Target Chip** button on the toolbar. The connection is successfully made only when the target chip enters the debugging mode and halts. When connecting, the PinConfigure tool reflects the real-time GPIO multi-function configuration. To download NuEclipse, please refer to the Nuvoton website.

4.6 Print Report

To print a report, click the **Print Report** button on the toolbar. After inputting the project name and selecting the expected criteria, click on the Confirm button to print the report.

4.7 **Generate Report of Pin Description**

To generate report of pin description, click the Generate Report of Pin Description 🖥 button on the toolbar.

4.8 **Run NuCAD**

To run NuCAD, click the **Run NuCAD** 🔲 button on the toolbar. NuCAD can generate the OrCAD or Protel library file (.OLB or .LIA) to facilitate the schematic design. The OrCAD requirement of the version should be higher than or equal to 16.2. Altium Designer of the version should be higher than or equal to 10. The generated schematic unit will look like the following figure. If the user wants to include the standard library provided by Nuvoton, please refer to the folder of Nuvoton Cortex-M0 M4 Library in the same directory as the .exe file.
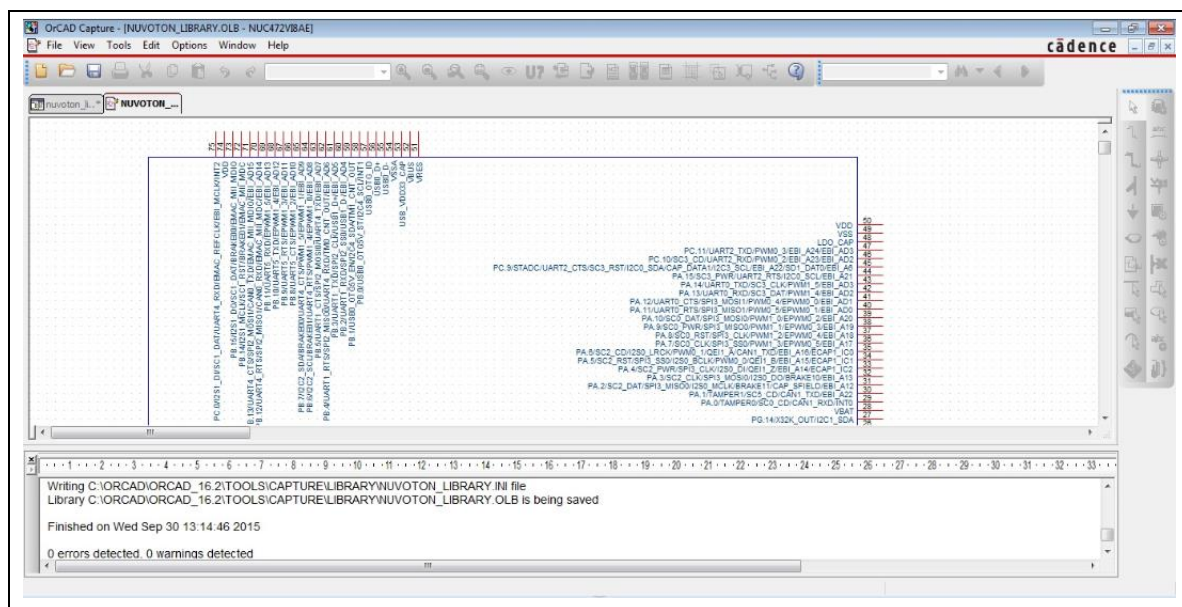

Figure 4-1 Generated Schematic Unit by NuCAD

4.9 Switch Pin Description

To show pin description, click the **Switch Pin Description** button on the toolbar. The whole description will be expanded around the chip (referring to the following figure).
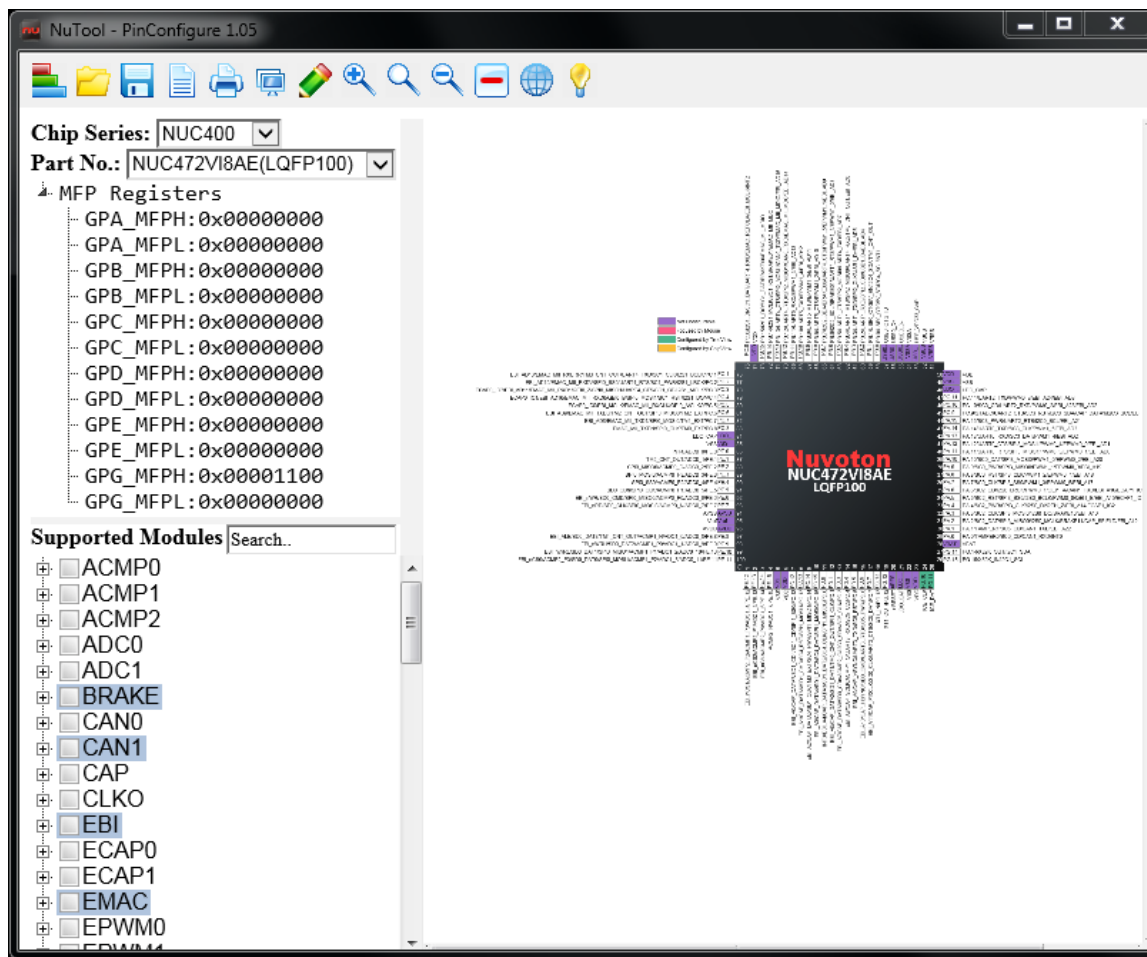

Figure 4-2 Pin Description Expanded around the Chip

4.10 Zoom In

To adjust the chip view to a larger one, click the **Zoom In** button on the toolbar. Besides, the user can do the operation by scrolling the mouse wheel up and holding the Ctrl key on the keyboard simultaneously.

4.11 Best Fit

To adjust the chip view to fit the window, click the **Best Fit** button on the toolbar.

4.12 Zoom Out

To adjust the chip view to smaller one, click the **Zoom Out** button on the toolbar. Besides, the user can do the operation by scrolling the mouse wheel down and holding the Ctrl key on the keyboard simultaneously.

4.13 Disable all Checked Modules

To disable all checked modules, click the **Disable all Checked Modules** button on the toolbar.

4.14   Settings

To select UI language, click the **Settings** 🌐 button on the toolbar. There are three languages supported in the application, including English, Simplified Chinese, and Traditional Chinese. Besides, if the user wants to display a tooltip, please choose "Yes".

Figure 4-3 "Settings" Dialog Box

4.15   Read User Manual

To read this user manual, click the **Read User Manual** 💡 button on the toolbar.

5   Revision History

Date	Revision	Description
2013.10.18	1.00	Initially released.
2013.11.08	1.01	1. Supported IE9. 2. Supported Simplified Chinese and Traditional Chinese.
2014.01.03	1.02	1. Supported IE10. 2. Improved performance and GUI. 3. Added the Search feature. 4. Added the Print Report feature.
2014.01.24	1.03	1. Supported M451 series. 2. Enhanced stability.
2014.11.28	1.04	1. Supported IE11. 2. Supported NUC100, NUC200, NUC505, NUC029, M051, M0518, Mini51, Nano100, NM1500, ISD9100 and ISD9300.
2015.07.01	1.05	1. Supported Mini58 and M0519. 2. Added the Tooltip feature.
2015.11.01	1.06	1. Added the NuCAD feature.
2015.12.01	1.07	1. Added back the Generate Report of Pin Description feature.
2016.02.29	1.08	1. Supported NANO103.
2016.07.22	1.09	1. Added new part numbers. 2. NuCAD supported Protel.
2017.08.01	1.10	1. Supported NUC121, NUC125, NUC126, M0564, and M480.
2017.10.20	1.11	1. Supported the adjustment of conflicts.
2018.06.29	1.12	1. Updated the content of M2351 and M480.
2018.07.29	1.13	1. Supported Mini57, NDA102 and NM1120.
2018.12.28	1.14	1. Supported NUC2201, M251, and ML51. 2. Updated NANO103.

| 2019.04.29 | 1.15 | 1. Supported NUC1261, M05641, M4521, NUC029xDE, NUC029xEE, NUC029xGE, MS51, M031 and M261. |

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