NuTool – ClockConfigure
User Manual

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1 INTRODUCTION

The **NuTool - ClockConfigure** is used to configure system and peripheral clocks of Nuvoton NuMicro® Family. Its features are listed below:

- **Configuring by the ClockTree**: All the supported modules are collected and listed in the ClockTree. The user can manipulate the tree to configure system and peripheral clocks easily.
- **Configuring by module diagram**: Configuring clocks by module diagram is allowed. The user can complete his operation more intuitively and efficiently.
- **Configuring by editing the register value directly**: The user can utilize this feature to inspect the accuracy of the register value.
- **Generation of code**: After doing the above actions, the user can generate code. The generated code can be included into the developing projects. It also comprises all the configuration information.

Through the application, the user can configure system and peripheral clocks of the NuMicro® Family correctly and handily.

1.1 Supported Chips

To see the list of supported chips, please refer to C:\Program Files (x86)\Nuvoton Tools\NuTool-ClockConfigure\resources\assets**Supported_chips.htm** (default installation path). The alternative way is to click the **Read User Manual** button on the toolbar.

2 SYSTEM REQUIREMENTS

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

- Windows 7 or later operating system.

Or you can run it on the network:

- https://opennuvoton.github.io/NuTool-ClockConfigure/

3 RUNNING THE NUTOOL - CLOCKCONFIGURE

To run the **NuTool - ClockConfigure**, double-click **NuTool – ClockConfigure.exe**.

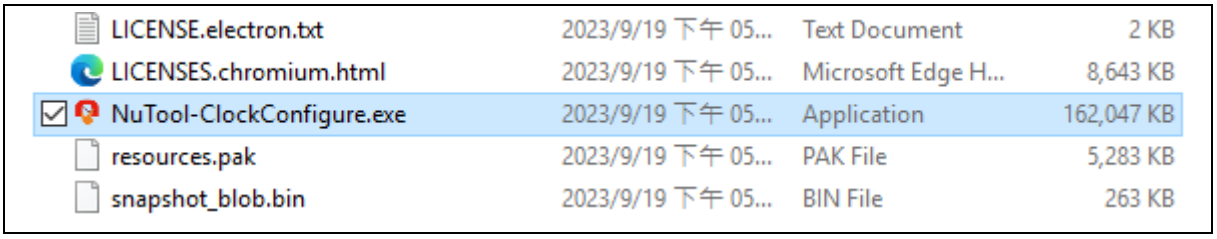

Figure 3-1 NuTool - ClockConfigure.exe and Related Folders

4 USER INTERFACE GUIDE

4.1 GUI Overview

The ClockConfigure Window includes a variety of components. The name of each component is described in Figure 4-1

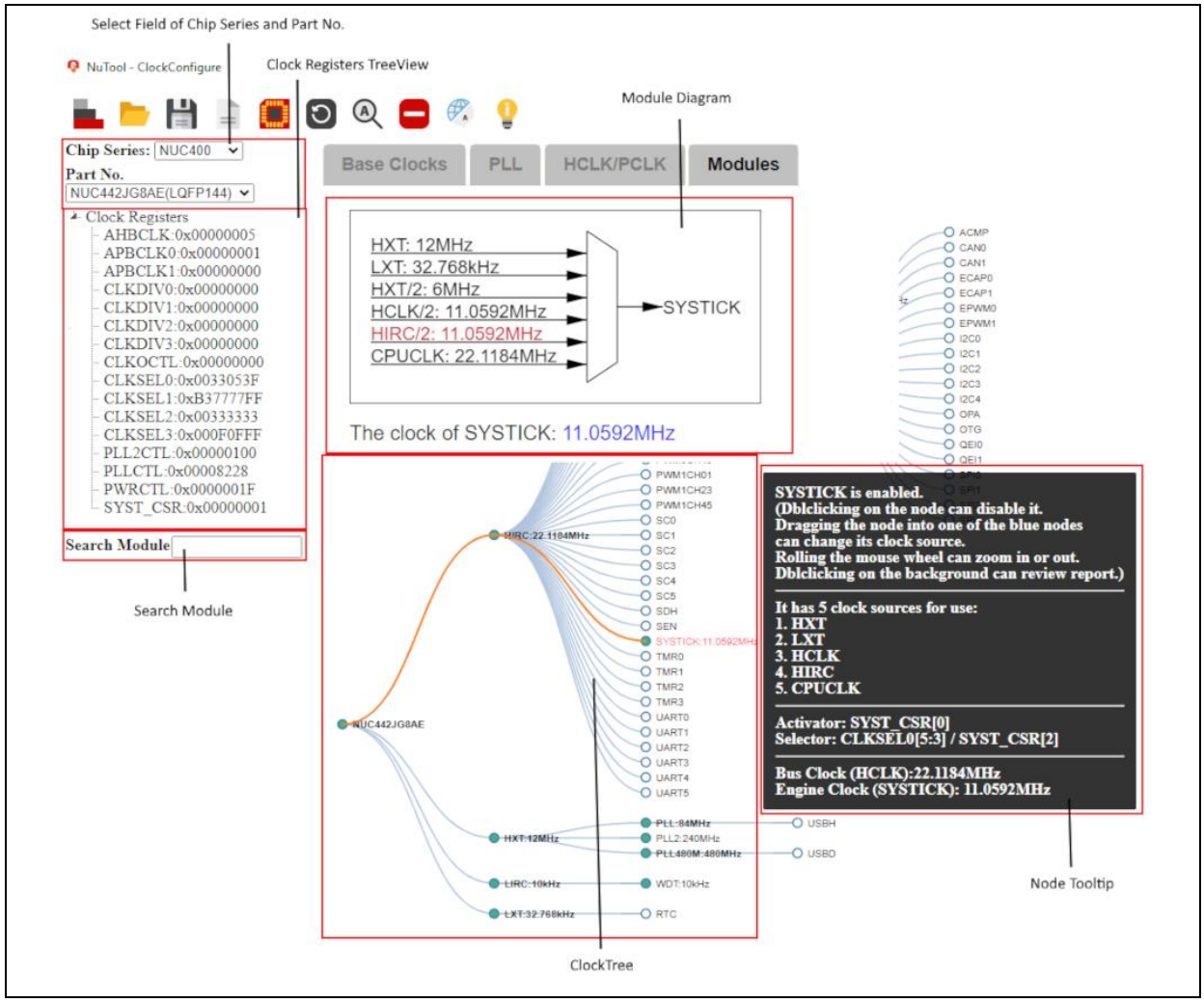

Figure 4-1 ClockConfigure Window

4.2 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 Figure 4-2). If the select field and the Clock Registers TreeView are hidden, please click the **Switch the Left Panel** to show them.

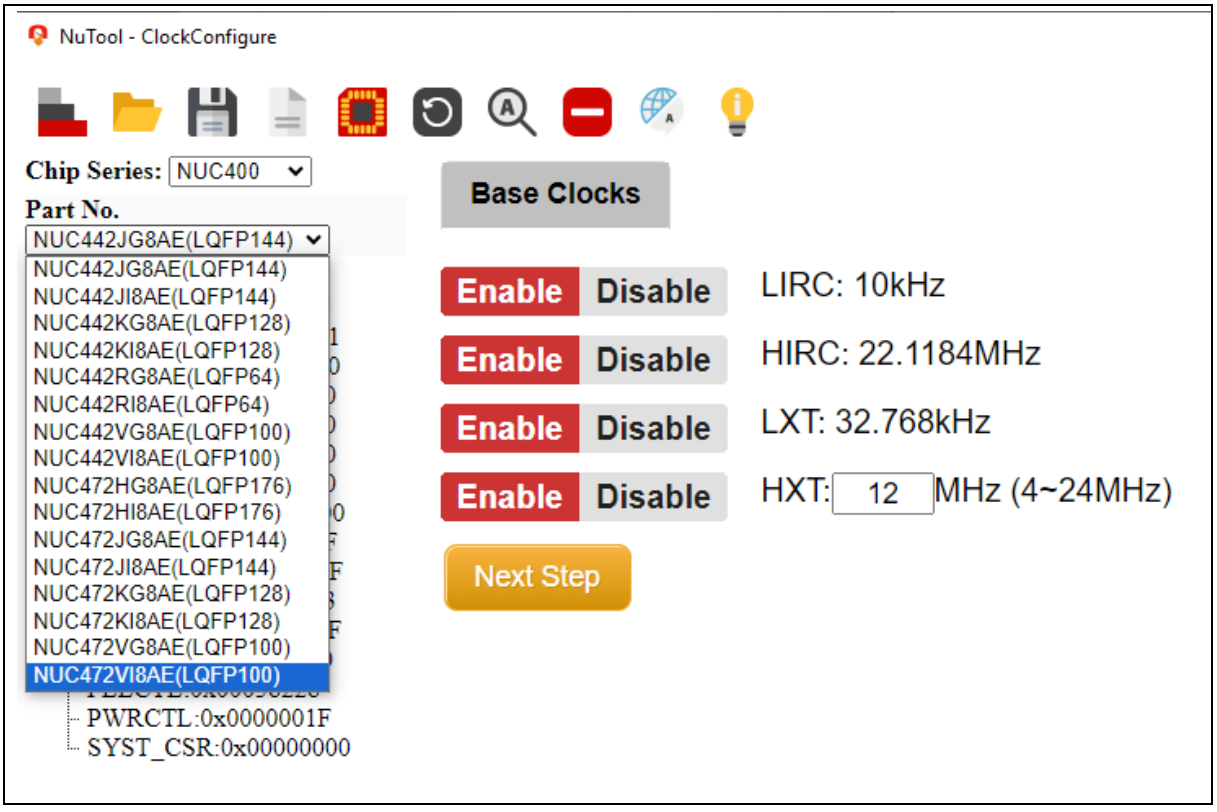

Figure 4-2 Selecting Part Number

4.3 Clock Registers TreeView

The current values of clock registers are displayed in the upper-left TreeView. Moreover, the user can edit them directly by double-clicking on the expected one and enter a new value (referring to Figure 4-3). After editing, the corresponding result will be updated immediately.

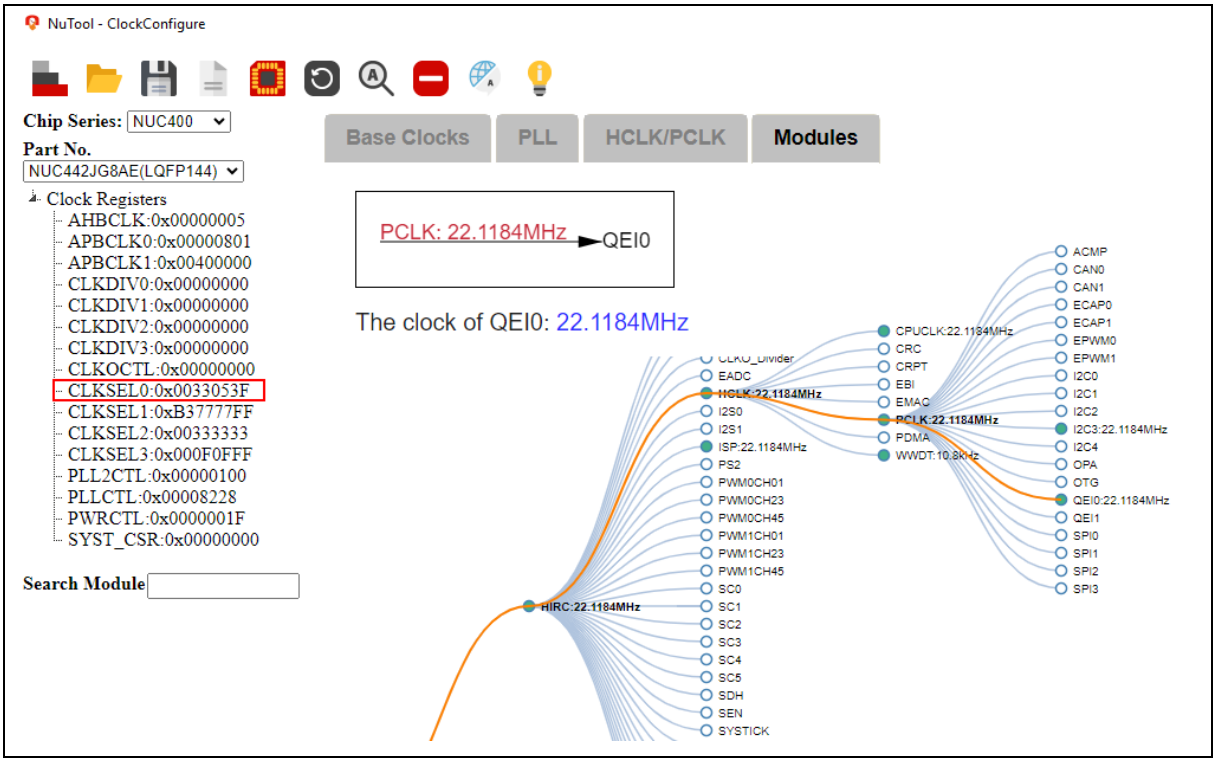

Figure 4-3 Editing a Clock Register

4.4 Search Module

To search a specific module in the ClockTree, the user can input the expected module name in the search field. After input, the matched node will be emphasized with an orange path from the root.

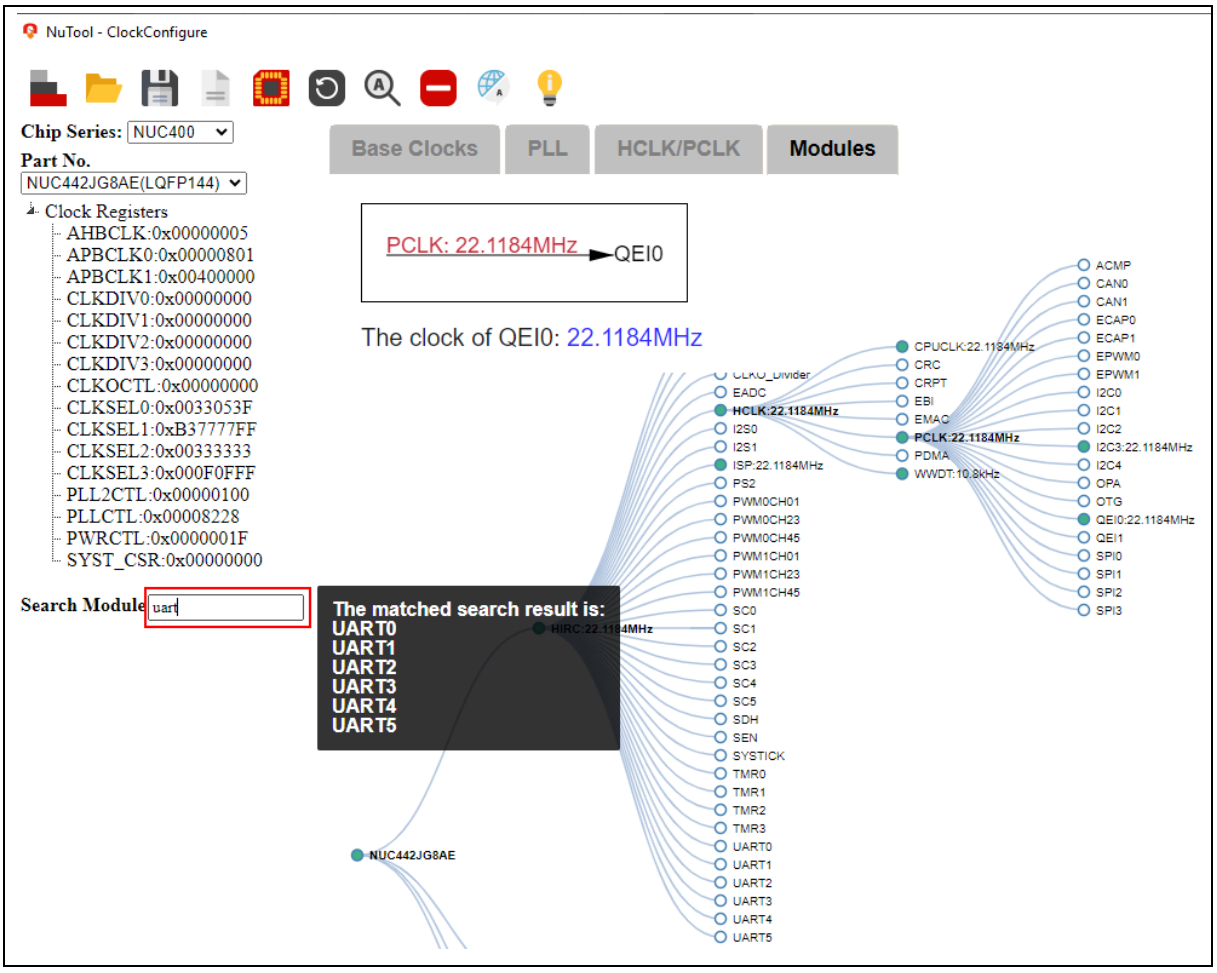

Figure 4-4 Matched Search Result

5 FLOW OF CONFIGURATION

5.1 Overview

At first, the user should decide the chip series and part number. The corresponding clock registers will be loaded into the upper-left TreeView region. In the following discussion, we presume the chip series is NUC400 and Part No. is NUC472VIBAE. Other chip may have a slight difference in the flow, but the basic logic is the same. For NCU400, there are four steps to complete the flow of configuration, i.e., Base Clocks, PLL Clocks, HCLK/PCLK and Modules.

5.2 Step 1: Base Clocks

In step 1, the user can enable or disable the base clocks of LIRC, HIRC, LXT and HXT (referring to Figure 5-1). When step 1 is completed, push the button of “Next Step” to jump to step 2 and so forth.

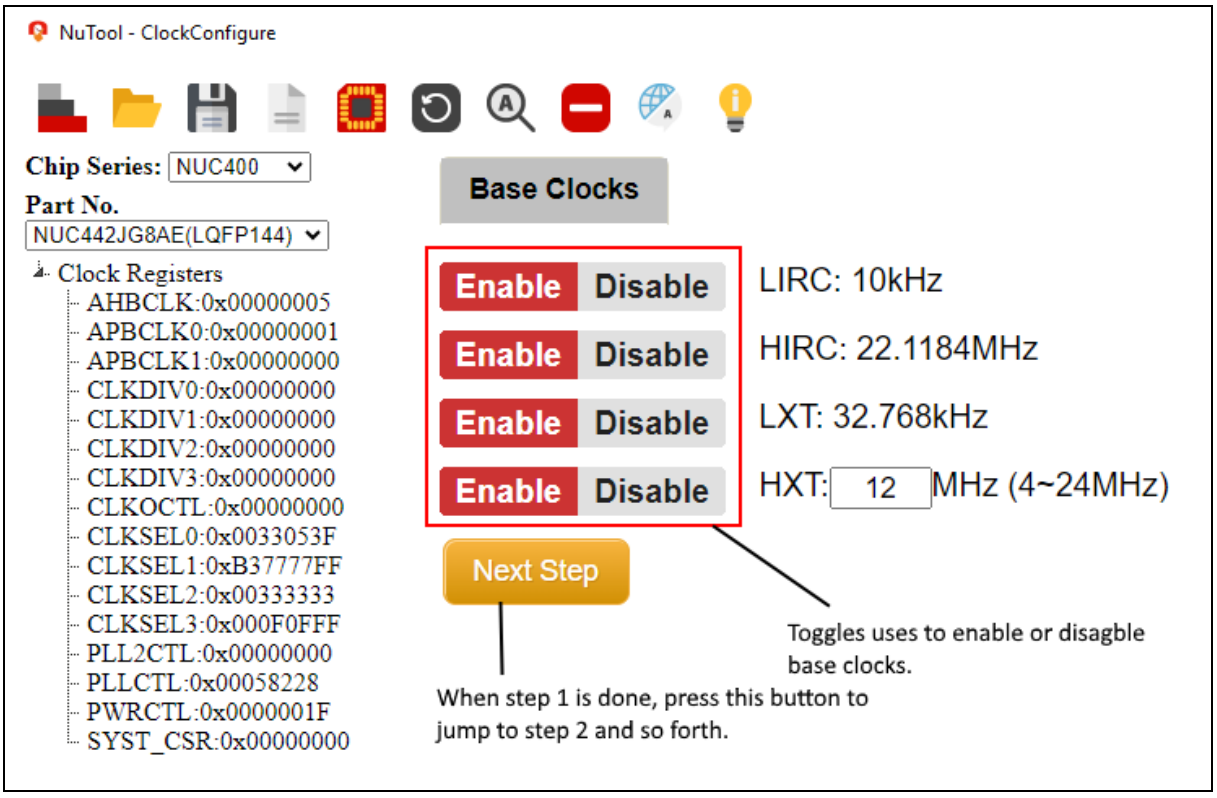

Figure 5-1 Step 1: Base Clocks

5.3 Step 2: PLL Clocks

In step 2, there are PLL and PLL2 available to be configured.

5.3.1 PLL Part

The user can input his expectation value to PLL frequency. All the possible candidates sorted by the inaccuracy will be listed in the table. If the expected clock input is not in the table, please **increase the inaccuracy** or change the expectation value of PLL frequency to another value. Move the mouse into the table and choose one of checkboxes. The clock of PLL will be shown below the table. Note that all the manipulations will update the content of clock registers simultaneously (referring to Figure 5-2).

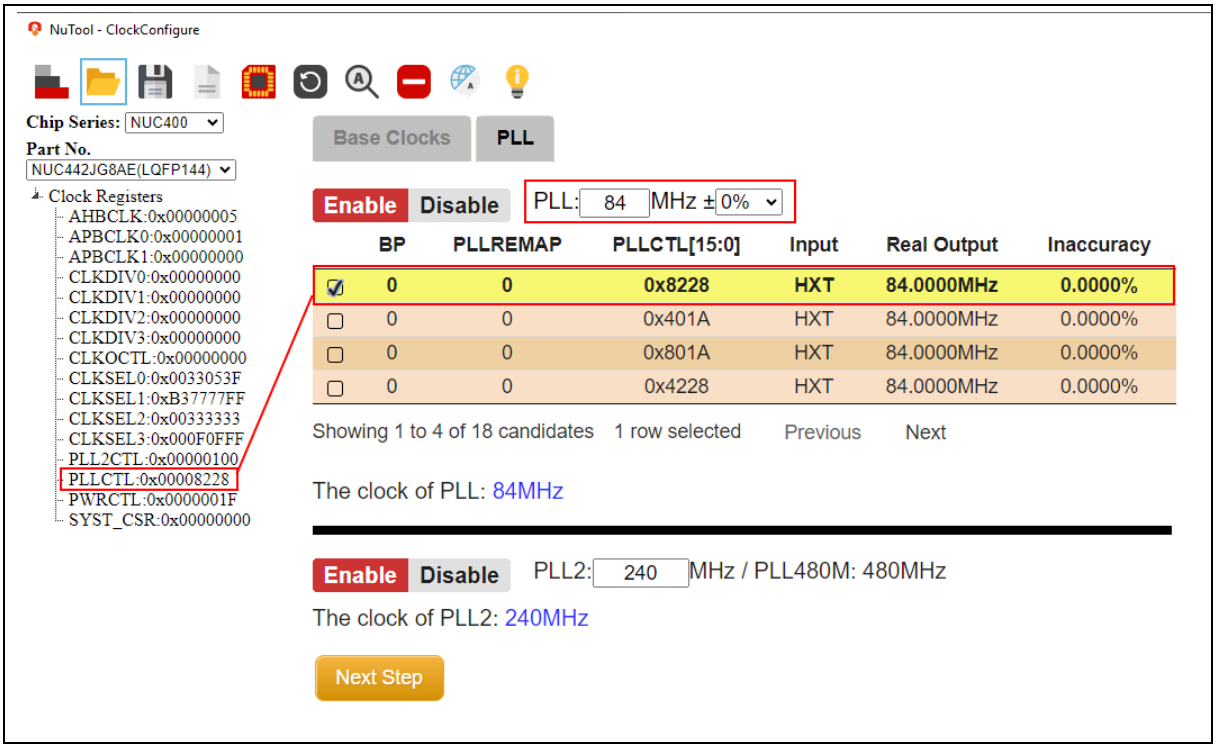

Figure 5-2 Step 2: PLL Clocks (PLL Part)

5.3.2 PLL2 Part

The user can input his expectation to PLL2. The clock of PLL2 will be calculated and shown below the input of PLL2 (referring to Figure 5-3).

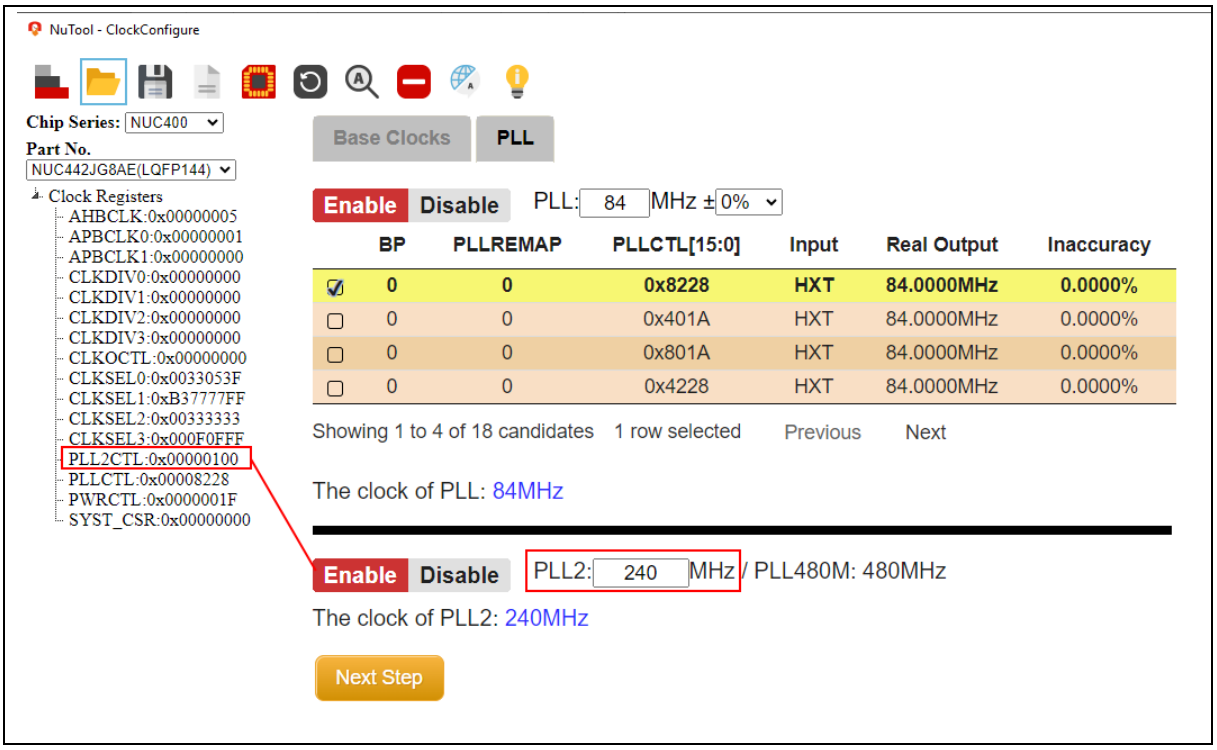

Figure 5-3 Step 2: PLL Clocks (PLL2 Part)

5.4 Step 3: HCLK/PCLK

In step 3, the feasible clock sources and HCLK's divider will be drawn in the diagram used to configure HCLK. The user can choose one of clock sources by moving the mouse into the diagram and directly clicking on the expected clock source (referring to Figure 5-4). The chosen one will be highlighted with an India red color.

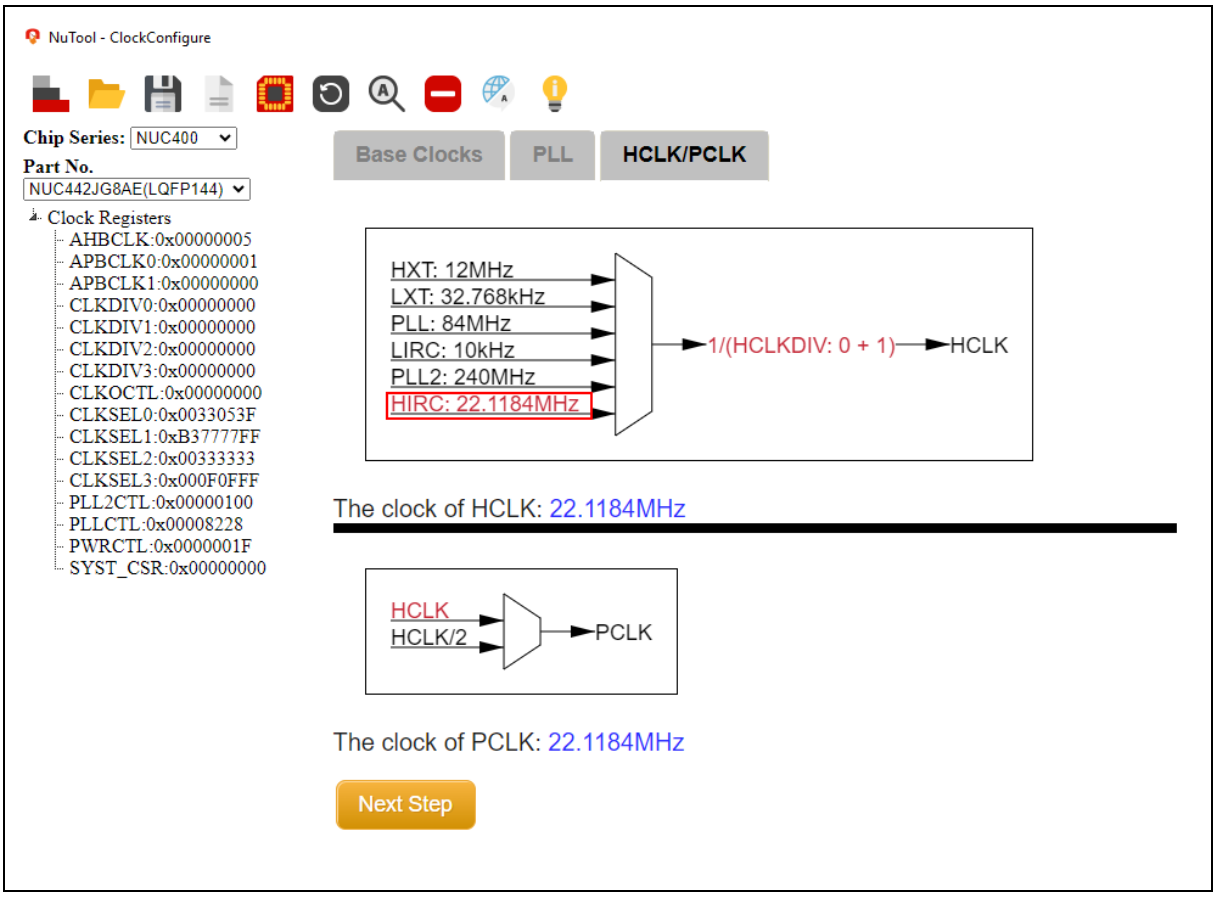

Figure 5-4 Step 3: Choosing the Clock Source of HCLK

To configure the value of HCLK's divider, move the mouse into the diagram and click on the divider region. A dialog will pop up to allow the user to input a value to HCLK's divider (referring to Figure 5-5). For instance, we input 0 to HCLKDIV. After pressing the confirm button, the clock of HCLK will be calculated and shown below the diagram. In this case, it would be 22.1184MHz.

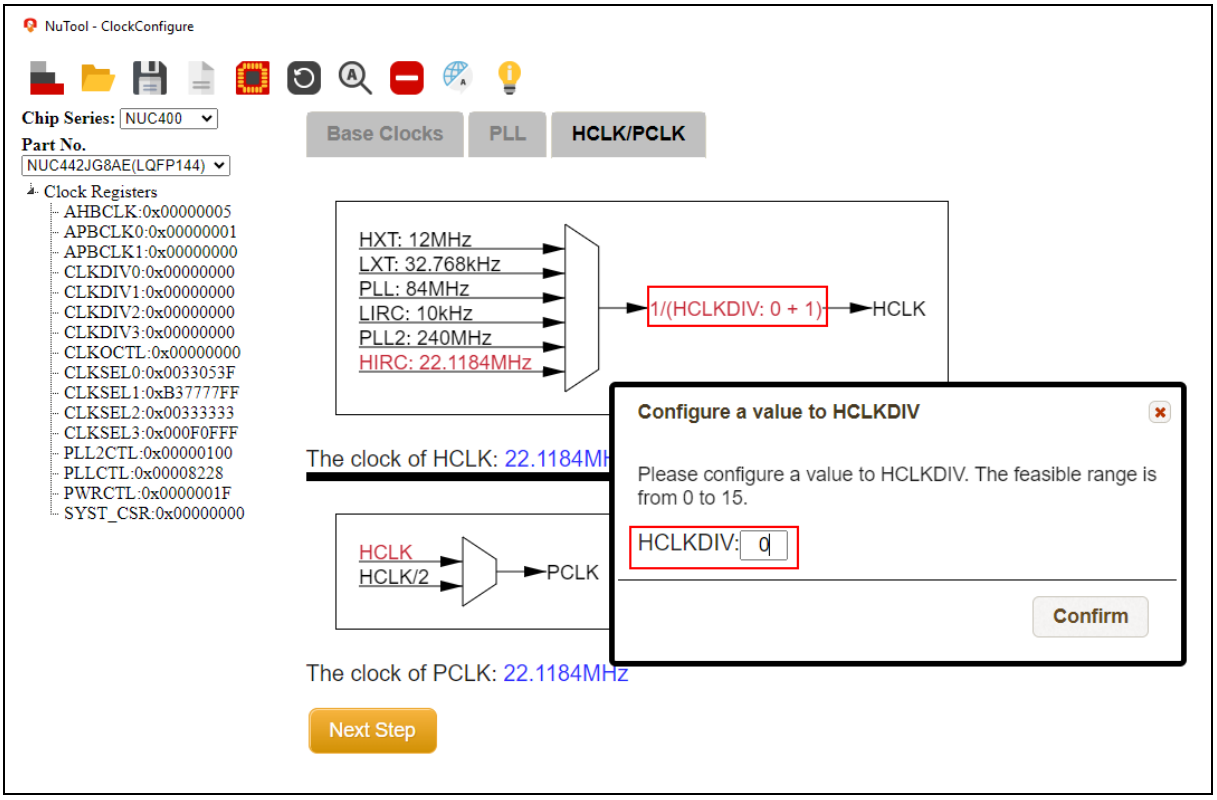

Figure 5-5 Step 3: Setting a Value to HCLK's Divider

Similarly, the process of configuring PCLK requires the user's decision for its clock source, such as HCLK or HCLK/2. For instance, we choose HCLK. The clock of PCLK will be shown below the PCLK's diagram. In this case, it would be 22.1184MHz.

5.5 Step 4: Modules

In the final step, there are two ways to configure modules, i.e. ClockTree and Module Diagram.

5.5.1 ClockTree

In ClockTree, the user can enable or disable modules by double-clicking on the corresponding nodes of the ClockTree. In addition, dragging a node into one of the blue nodes can change its clock source (referring to Figure 5-6). The red connection line means that the module belongs to the target clock source. Only when the red connection line appears, the new change of the clock source could happen after dropping the node. However, the user is unable to configure the divider of any module here. The operation is allowed in the Module Diagram. Besides, double-clicking on the background of ClockTree can review the configured report mentioned in Section 6.4.1.

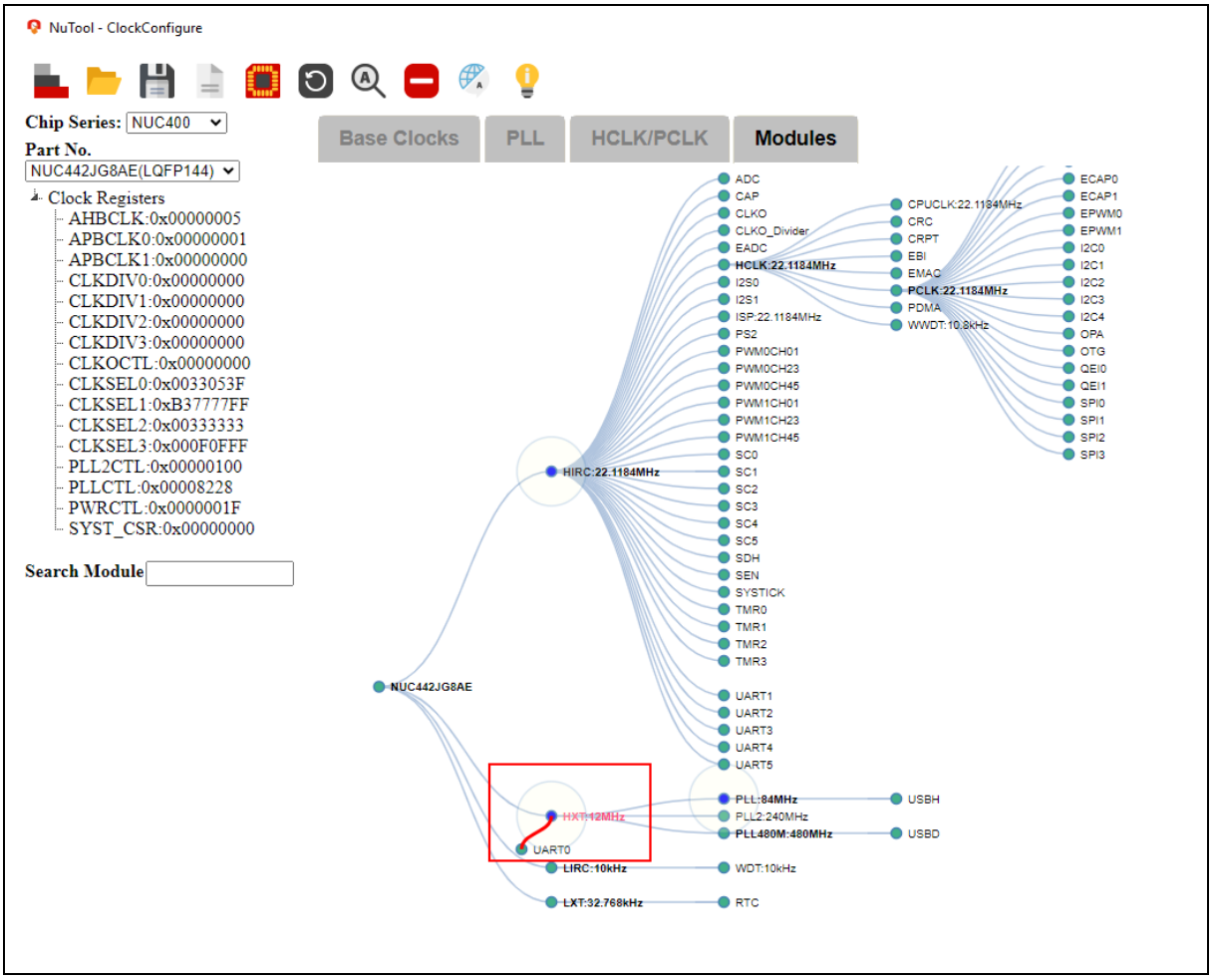

Figure 5-6 Step 4: Dragging UART0 Node into HXT Node

5.5.2 Module Diagram

When the module is enabled, single-clicking on the node can show the module diagram. The manipulation of module diagram is the same as HCLK diagram mentioned in Section 5.4.

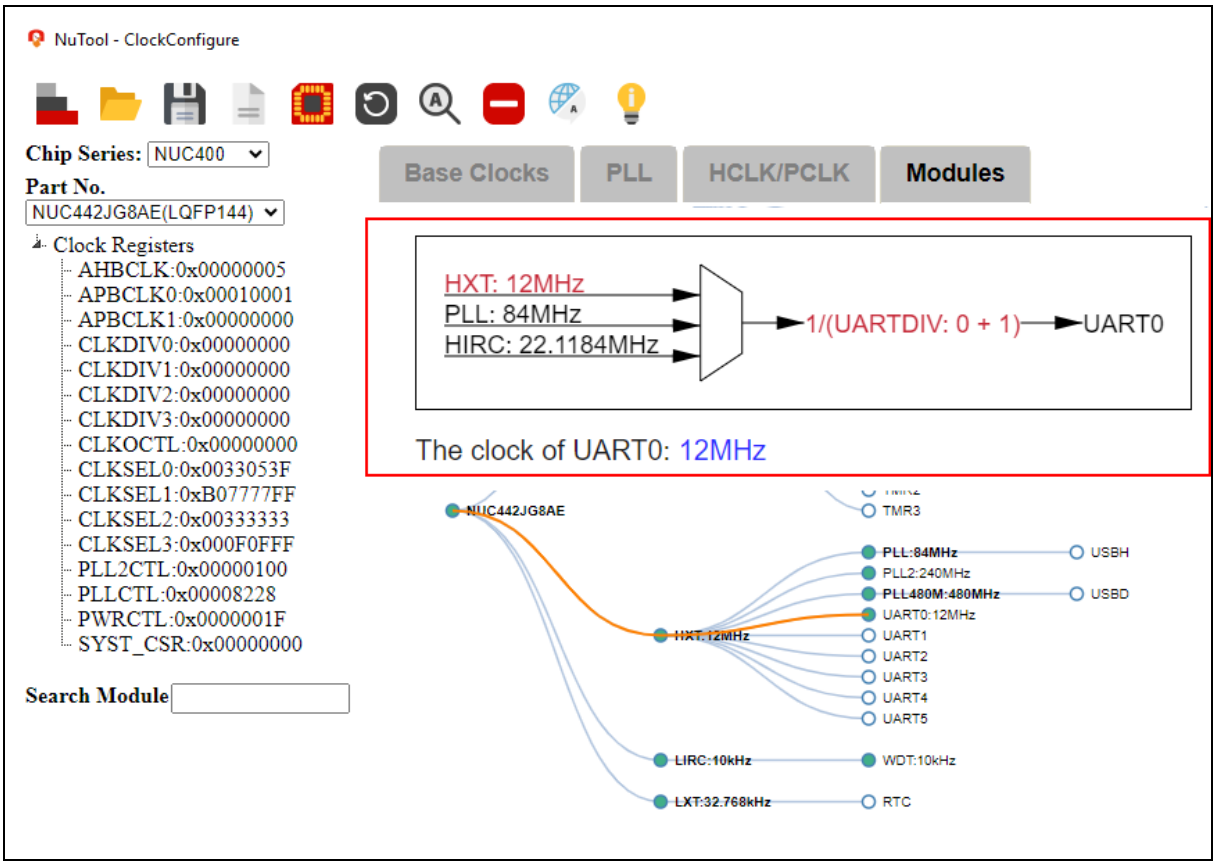

Figure 5-7 Step 4: UART0 Diagram

5.6 Multi-way Configuring

For some reason, the user could want to change prior settings in the middle of making the configuration. For instance, after completing the earlier configuration, suddenly we want to disable HIRC. At the moment, a warning dialog pops up to ask if the user would like to continue it since the modification will influence the entire configuration (referring to Figure 5-8). If the user answers 'No', HIRC will be still enabled. If the user answers 'Yes', all the entire configuration will be updated automatically. When we answer "Yes" and switch to the step 3 and 4, we will find that the clock source of HIRC is disabled in the diagram of HCLK and UART0. The above mechanism is called as "multi-way configuring". It means the user can change the configuration at any time.

Figure 5-8 "Multi-way Configuring" Dialog Box

6 TOOLBAR

6.1 Switch the Left Panel

To show the select field and the Clock Registers TreeView, click the **Switch the Left Panel**  button on the toolbar.

6.2 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.

6.3 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.

   Note: By changing the file extension name from .cfg to .ncfg, you also can load it with the latest tool.

6.4 Generate Code

To generate code to be included into the developing projects, click the **Generate Code** button on the toolbar.

6.4.1 Review Report

To review the configured report in the final step (Modules), click on the check box of Review Reort in the Generate Code dialog. From there, the user can obtain the configured information.

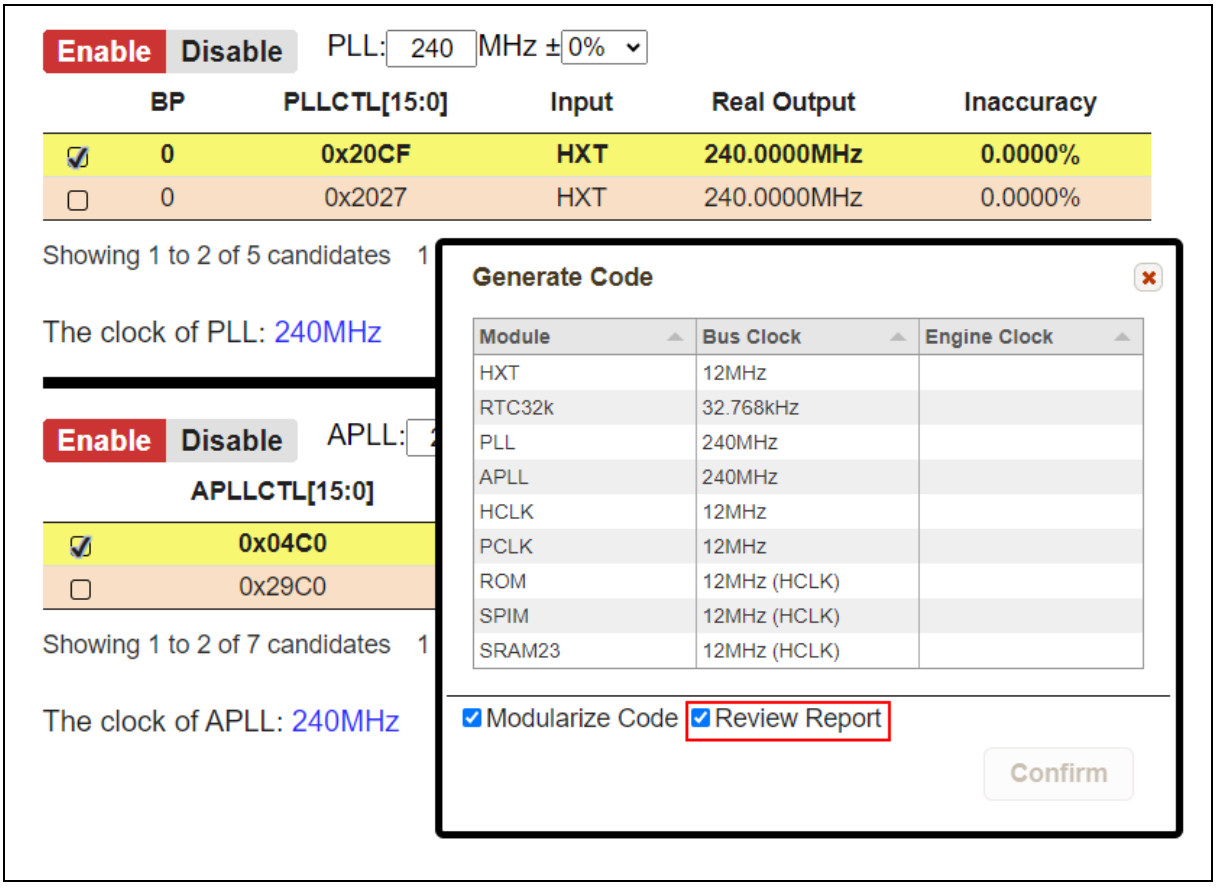

Figure 6-1 Reviewing Report

6.5 Connect to Chip

To automatically complete setting each step by reading values from the chip, please first select the expected chip series and Part No. you want to connect to and click the **Connect to Chip** button on the toolbar after connecting to the target chip by usb,

6.6 Return to Default Settings

To return to Default Settings, click the **Return to Default Settings** button on the toolbar.

6.7 Switch Clock Tree

To show the clock tree which only contains the enabled modules, click the **Switch Clock Tree** button on the toolbar. As a result, a compact tree will show up.

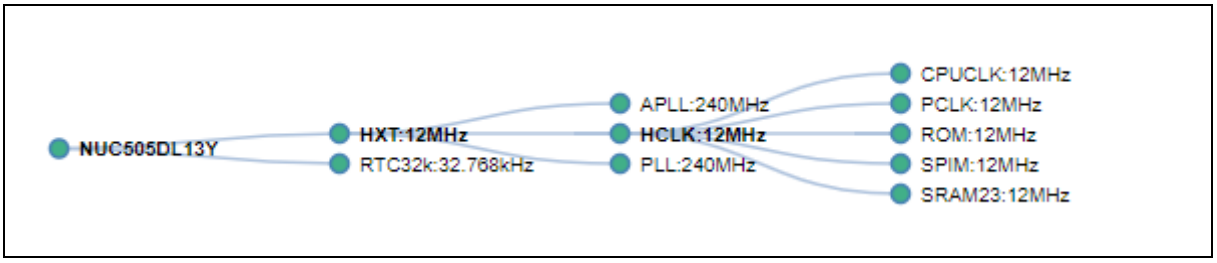

Figure 6-2 Compact Tree

6.8 Disable All Enabled Modules

To disable all enabled modules, click the **Disable All Enabled Modules** button on the toolbar.

6.9 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.

Figure 6-3 “Settings” Dialog Box

6.10 Read User Manual

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

7 REVISION HISTORY

Date	Revision	Description
2016.09.30	1.00	Initially released.
2018.08.03	1.01	1. Supported M480.
2019.04.29	1.02	1. Supported NUC126, M0564, M251 and M2351.
2019.07.01	1.03	1. Supported M031, NUC1261, NUC2201, NUC029xDE, NUC029xEE, NUC029xGE and NUC029TAE.
2019.11.01	1.04	1. Supported NUC029ZAN.
2020.09.30	1.05	1. Supported Mini57, M261, M480LD and M2354.
2021.06.30	1.06	1. Supported NUC1262, KM1M7AF, M030G, M031BT, M031/M032 and M253/M254/M256/M256D/M258/M258G.
2022.05.06	1.07	1. Support KM1M7BF and M460.
2023.09.20	1.08	1. Support Connect to Chip function. 2. Update UI. 3. Supported M2003C.

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.

All Insecure Usage shall be made at customer's risk, and in the event that third parties lay claims to Nuvoton as a result of customer's Insecure Usage, customer shall indemnify the damages and liabilities thus incurred by Nuvoton.