Smart Configurator for RZ

User's Guide

Introduction

This application note describes the basic usage of the RZ Smart Configurator (hereafter called the Smart Configurator)

Target Device

Refer to the following URL for the range of supported devices and compilers:

https://www.renesas.com/software-tool/rz-smart-configurator

Contents

1. Overview

1.1 Purpose

This application note describes the basic usage of the Smart Configurator tool for the RZ device family.

1.2 Features

The Smart Configurator is a utility for configuring pin multiplexing settings, resolving conflicts, and generating pin initialization code.

2. Creating a Smart Configurator project

The following describes the procedure for creating a Smart Configurator project.

(1) Launch the Smart Configurator and select [**File**] → [**New**].

(2) Select a device, e.g. **R8A77450** from the left panel of the [**New Smart Configuration File**] dialog box. Specify the [**File name**] and click [**Finish**] button as shown below.

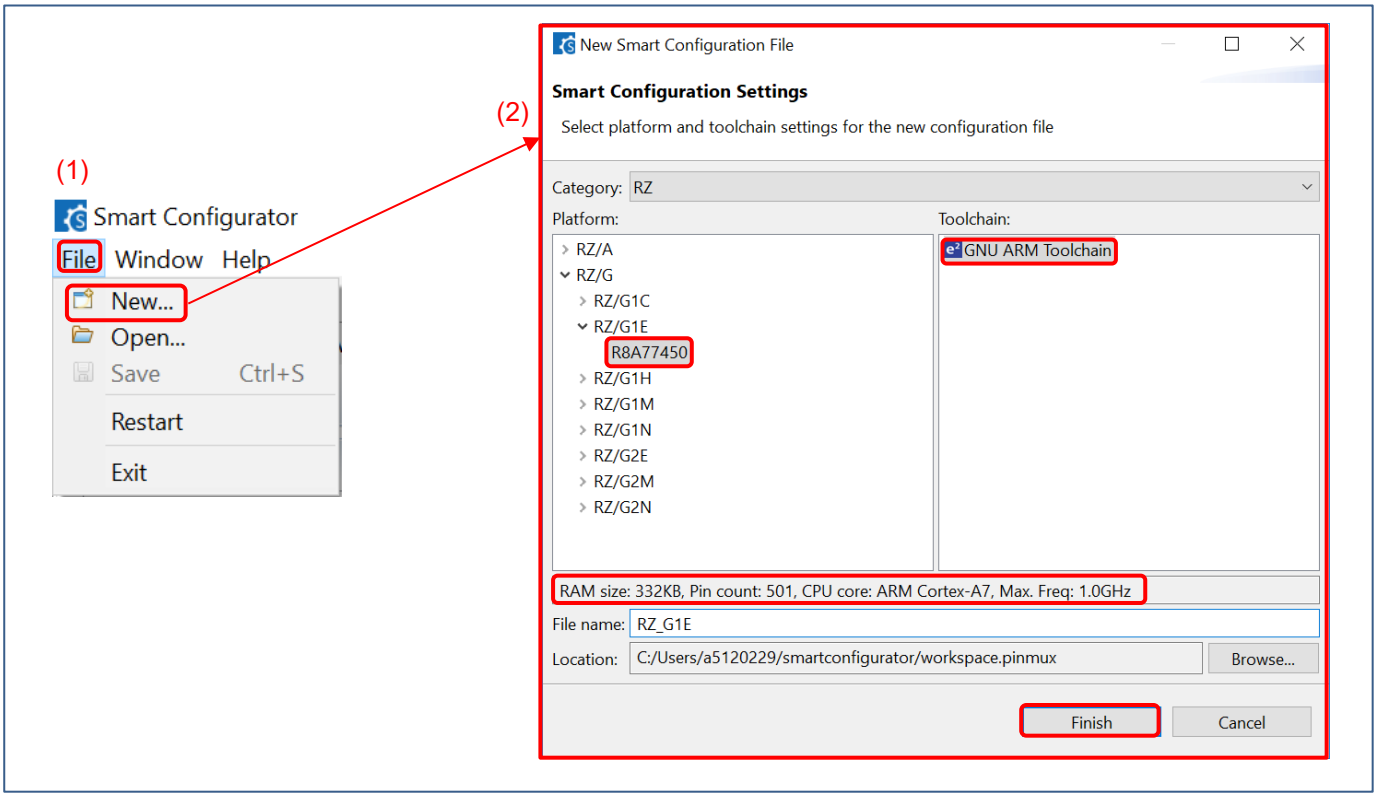


Figure 2-1 Creating a New Smart Configurator File

3. Operating the Smart Configurator

3.1 Procedure for Operation

Figure 3-1 shows the procedure for using the Smart Configurator to set up pin and DDR parameter settings, generating source code and report.

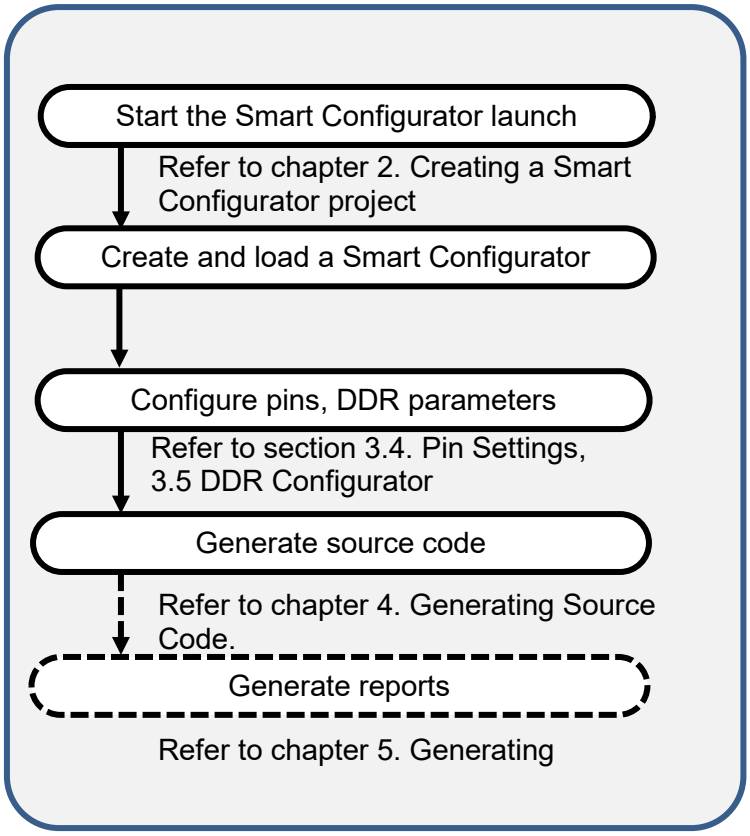


Figure 3-1 Procedure for Operations

3.2 File to be saved as Project Information

The Smart Configurator saves the setting information such as the target MCU for the project, build tool, peripheral modules, and pin functions in a project file (*.scfg), and refers to this information. The project file from the Smart Configurator is saved in this following format “<project name>.scfg”.

3.3 Window

The configuration of the Smart Configurator perspective is shown in **Figure 3-2 Smart Configurator Perspective**.

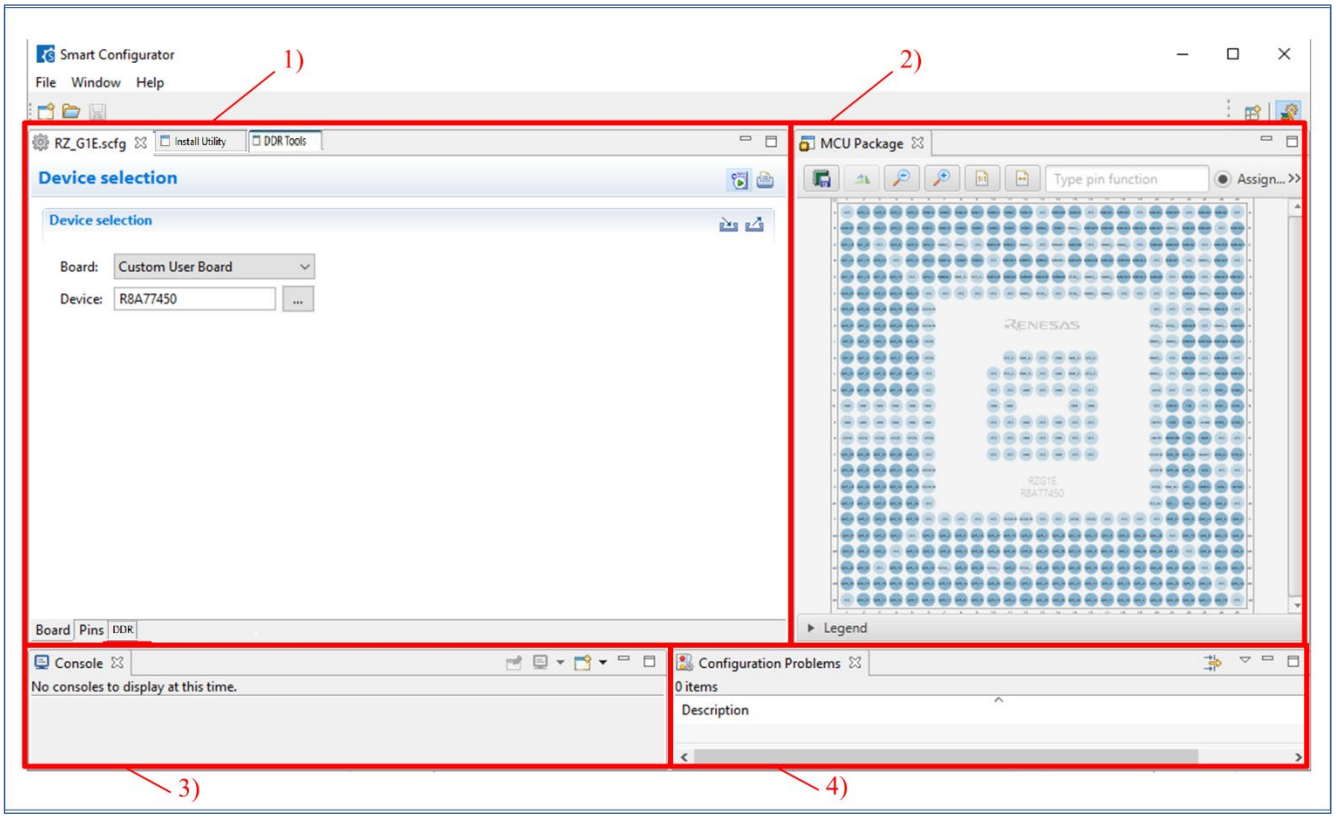


Figure 3-2 Smart Configurator Perspective

1) Smart Configurator editor with Board, Pins and DDR page, along with Install Utility and DDR Tools editors
2) MCU Package view
3) Console view
4) Configuration Problems view

3.3.1 MCU Package view

The states of pins are displayed on the figure of the MCU package. The settings of pins can be modified from here.

Two types of package view can be switched between [Assigned] and [Default Board]. [Assigned] displays the assignment status of the pin setting, and [Default Board] displays the initial pin setting information of the board. The initial pin setting information of the board is the pin information of the board selected by [Board:] on the [Board] page (refer to "3.3.4 Selecting the board").

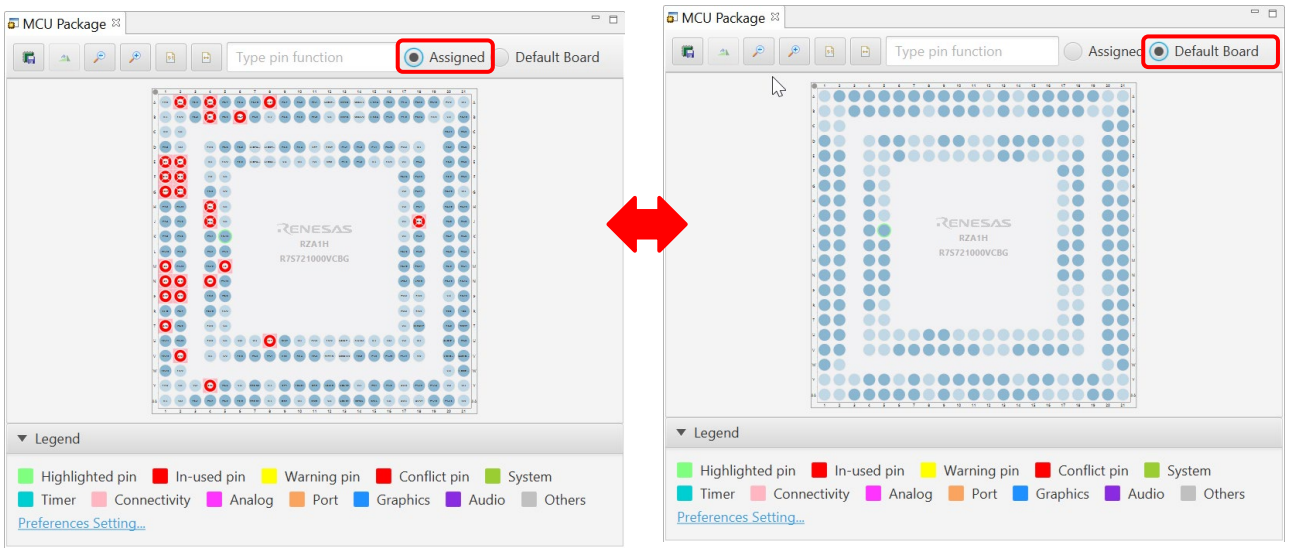


Figure 3-3 MCU Package View

Select [Window] → [Show View] → [Smart Configurator] → [MCU Package] to open the MCU Package View.

3.3.2 Console view

The Console view displays details of changes to the configuration made in the Smart Configurator or MCU Package view.

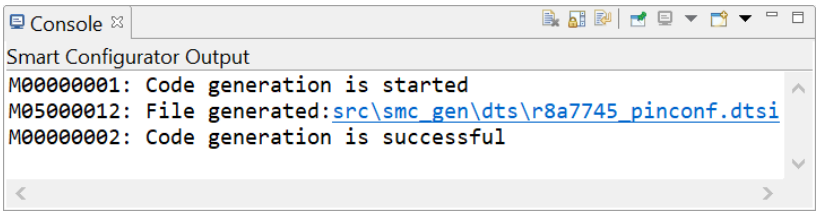


Figure 3-4 Console View

Select [Window] → [Show View] → [General] folder dropdown menu and→ [Console] from the [Show View] dialog box in the Smart Configurator to open the Console View.

3.3.3 Configuration Problems view

The Configuration Problems view displays the details if there's any problem related to pin assignment.

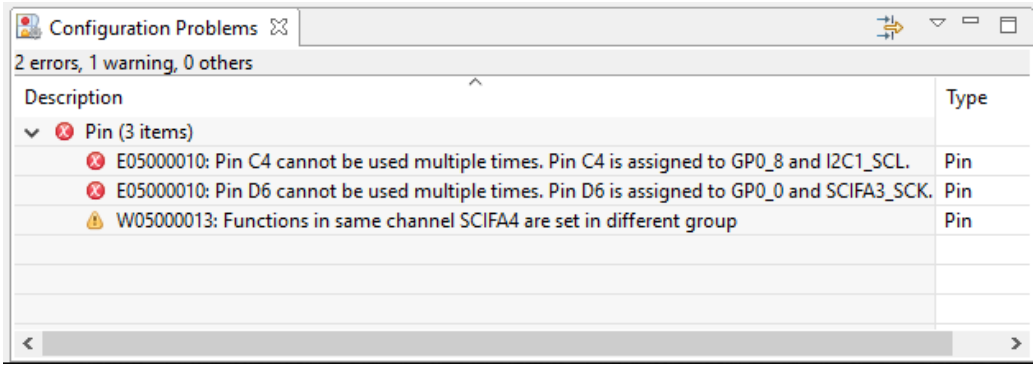


Figure 3-5 Configuration Problems View

Select [Window] → [Show View] → [Smart Configurator] folder dropdown menu and → [Configuration Problems] from the [Show View] dialog box in the Smart Configurator to open the Configuration Problems view.

Note: To change the device, perform from "3.8 MCU migration feature".

3.3.4 Selecting the board

By selecting a board, the following settings can be changed at one time.

- Pin assignment (Initial pin setting)
- Target device

The board setting information is defined in the Board Description File (.bdf).

The .bdf file of Renesas made board (e.g. Renesas Starter Kit) can be downloaded from website and imported.

In addition, by downloading the .bdf file provided by the alliance partner from website and importing it, it is possible to select alliance part boards.

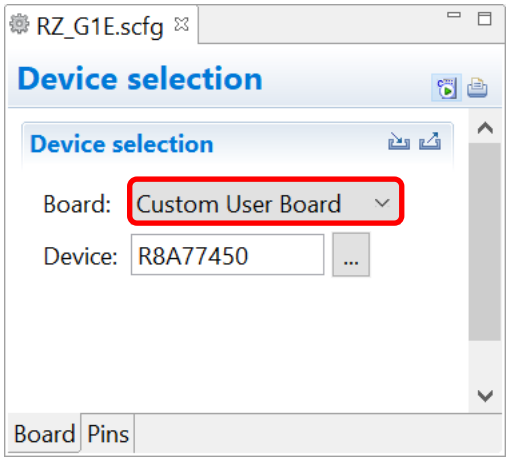


Figure 3-6 Selecting the Board

Note: Depending on the board selected. If there is a change in the device, change the device suitable for that board from "0 MCU migration feature".

3.3.5 Exporting board settings

Follow the procedure below to export the board settings.

(1) Click the [(Export board setting)] button on the [Board] tabbed page.

(2) Select the output location and specify a name (Display Name) for the file to be exported.

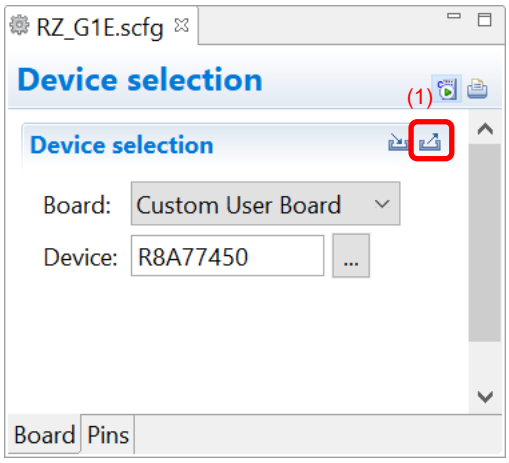


Figure 3-7 Exporting Board Settings (bdf Format)

3.3.6 Importing board settings

Follow the procedure below to import board settings.

(1) Click on the [(Import board setting)] button and select a desired bdf file.

(2) The board of the imported settings is added to the board selection menu.

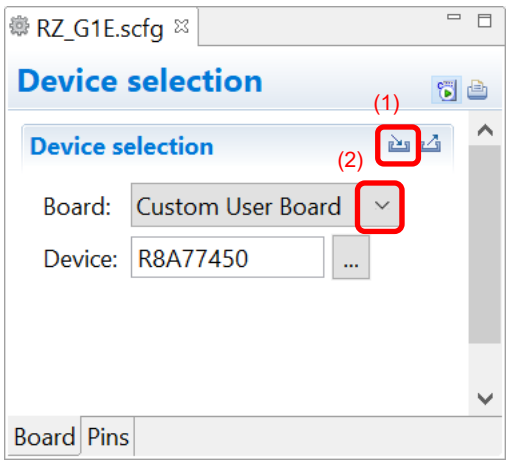


Figure 3-8 Importing Board Settings (bdf Format)

Once a board setting file is imported, the added board is also displayed in the board selection menu of other projects for the same device group.

3.4 Pin Settings

The [Pins] page is used for assigning pin functions. Click on the [Pin Function] and [Pin Number] tabs to switch between the 2 pages. The [Pin Function] list shows the pin functions for each of the peripheral functions, and the [Pin Number] list shows all pins in order of pin number.

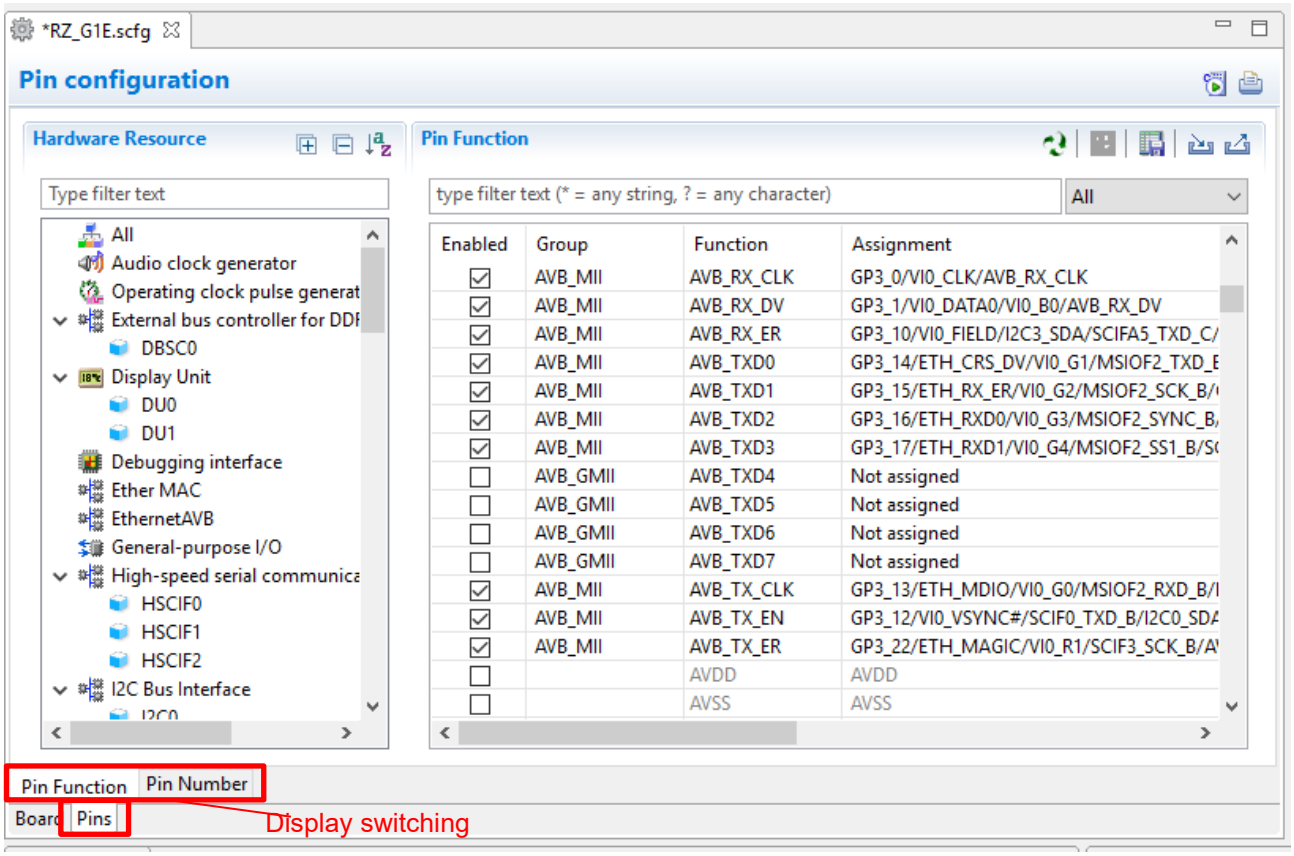


Figure 3-9 [Pins] Page ([Pin Function])

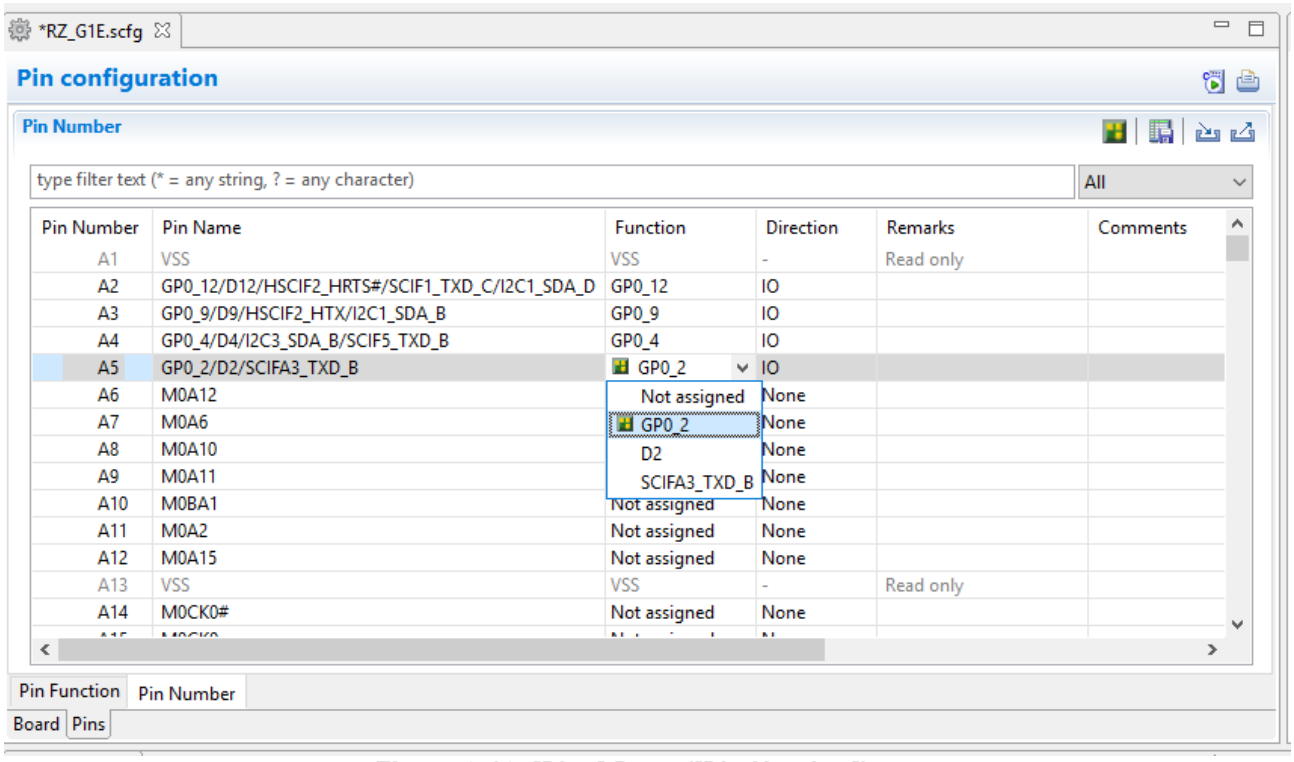


Figure 3-10 [Pins] Page ([Pin Number])

When you select a board on the [Board] page, the initial pin setting information of the board is displayed in [Default Function]. In addition, the [] icon displayed in the [Function] selection list indicates the initial pin function of the board.

3.4.1 Assigning pins using the MCU Package view

The Smart Configurator visualizes the pin assignment in the MCU Package view. You can save the MCU Package view as an image file, rotate it, and zoom in to and out from it.

Follow the procedure below to assign pins in the MCU Package view.

(1) Zoom in to the view by clicking the [(Zoom in)] button or scrolling the view with the mouse wheel.

(2) Right-click on the target pin.

(3) Select the signal to be assigned to the pin.

(4) The color of the pins can be customized through [Preference Setting...].

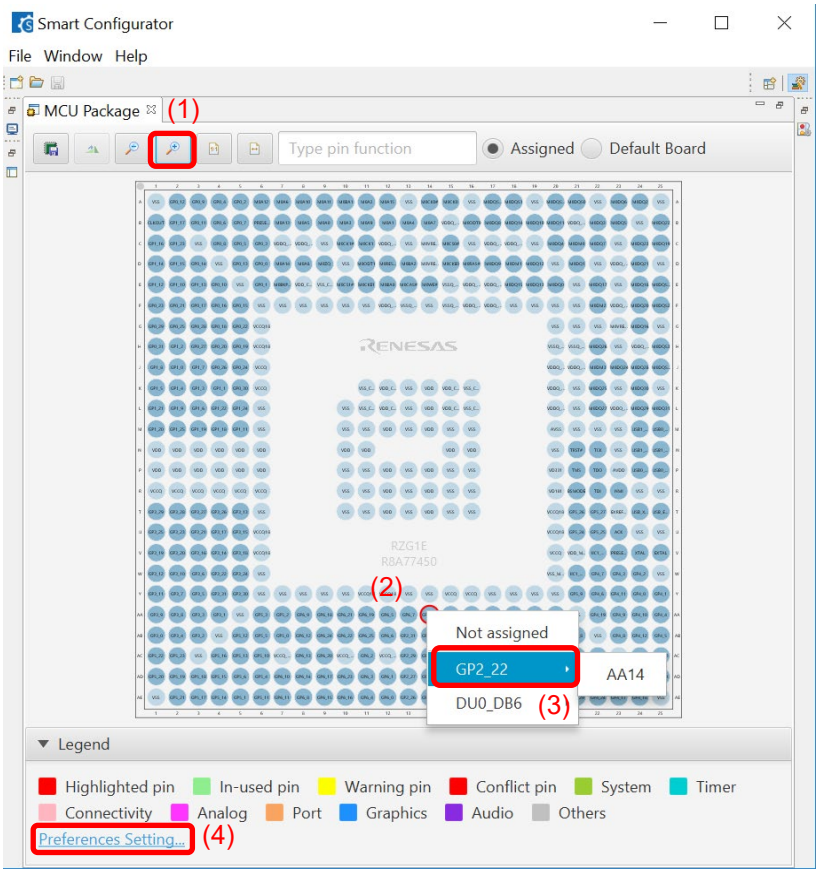


Figure 3-11 Assigning Pins Using the MCU Package View

3.4.2 Exporting pin settings

The pin settings can be exported for later reference. Follow the procedure below to export the pin settings.

(1) Click on the [(Export board setting)] button on the [Pins] page.

(2) Select the output location and specify a name for the file to be exported.

The exported XML file can be imported to another project having the same device part number.

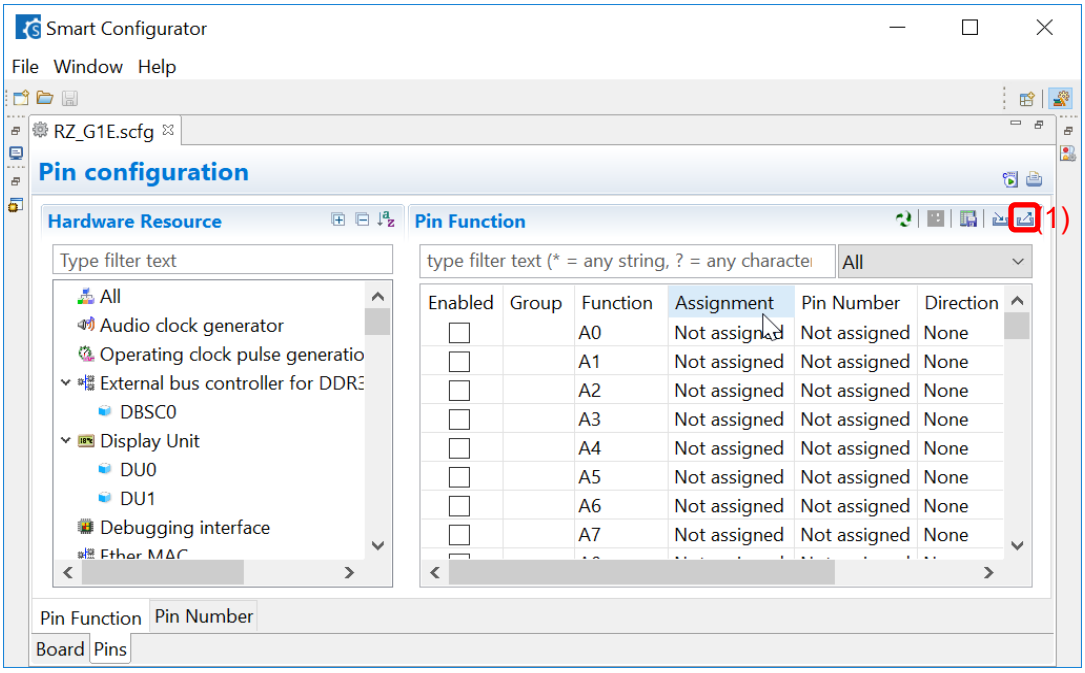


Figure 3-12 Exporting Pin Settings to an XML File

The Smart Configurator can also export the pin settings to a CSV file. Click on the [(Save the list to .csv file)] button on the [Pins] page.

3.4.3 Importing pin settings

To import pin settings into the current project, click on the [(Import board setting)] button and select the XML file that contains the desired pin settings. After the settings specified in this file are imported to the project, the settings will be reflected in the [Pin configuration] page.

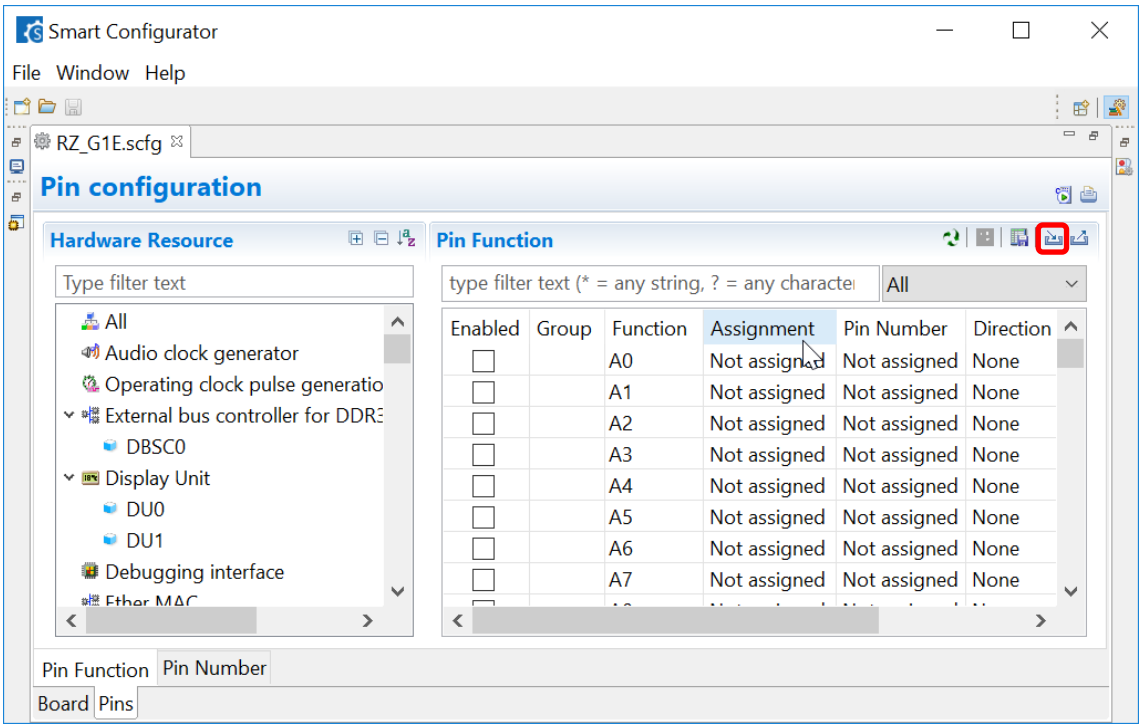


Figure 3-13 Importing Pin Settings from an XML File

3.4.4 Pin setting using board pin configuration information

The initial pin configuration of the board can be set in a single operation. The following describes the procedure for collective setting of pins.

(1) Select [Default Board] in the MCU Package. (The initial pin configuration of the board can be referred.

(2) Open the [Pin Configuration] page and click the [Assign default board pins] button.

(3) When [Assign default board pins] dialog opens, click [Select all].

(4) Click [OK].

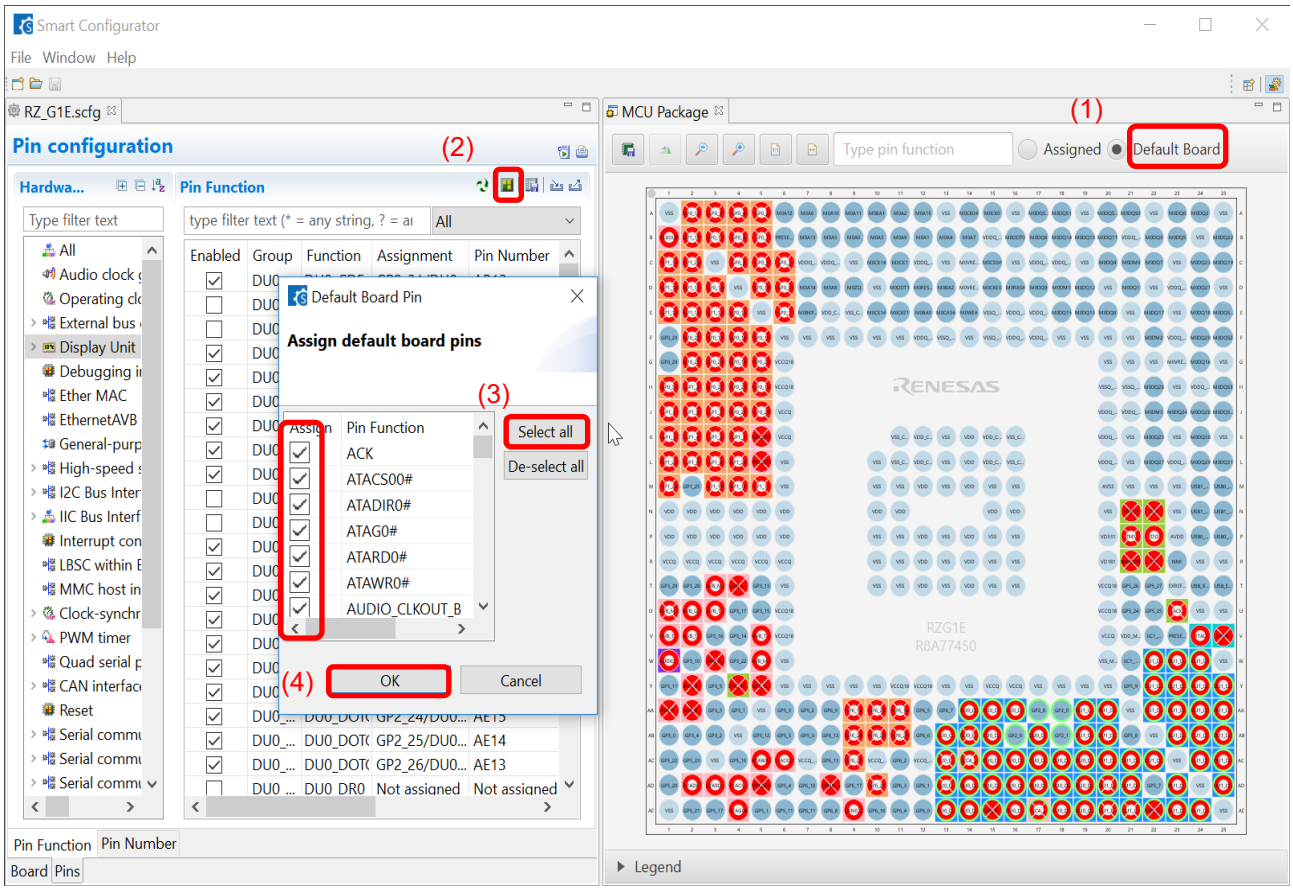


Figure 3-14 Setting for initial pin configuration

Pin settings maybe selected all at once, or specified individually in procedure (3).

3.4.5 Pin filter feature

The filter range on the [Pin Function] tab and [Pin Number] tab on the [Pins] page can be used to filter out pin functions for easy search.

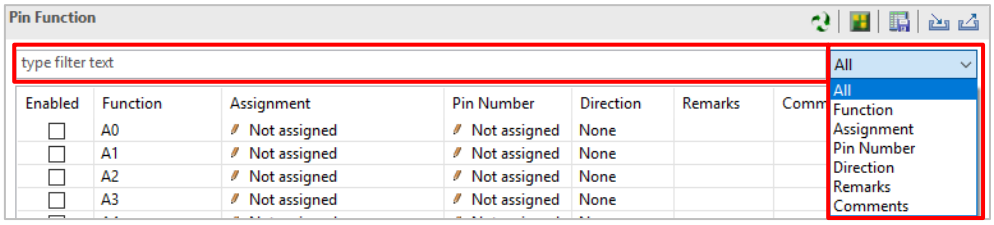


Figure 3-15 Filter for [Pin Function] tab

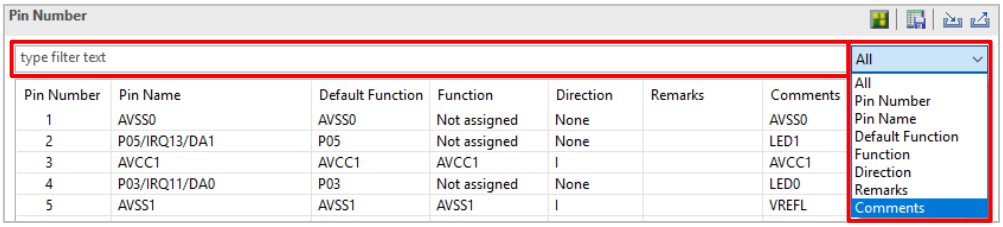


Figure 3-16 Filter for [Pin Number] tab

3.5 DDR Configurator

The Smart Configurator provides feature to configure DDR parameters and pin function assignments.

3.5.1 Setting parameters and pin assignment of DDR

The [DDR] page is used for configuring DDR parameters and pin function assignments.

(1) Configuration of DDR parameters allows to change manually Device Information, Mode Setting, and Analog Setting

(2) Configuration of DDR pin function allows flexible assignment of pins for data, address, command, and control signals.

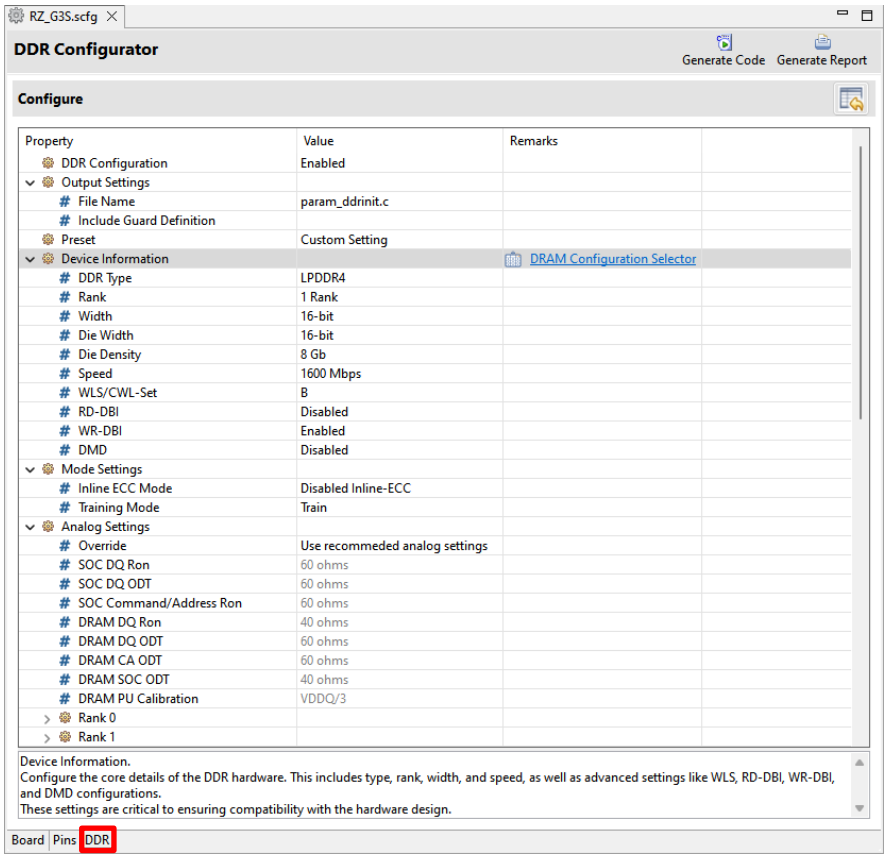


Figure 3-17 [DDR] Page (DDR Parameters configuration)

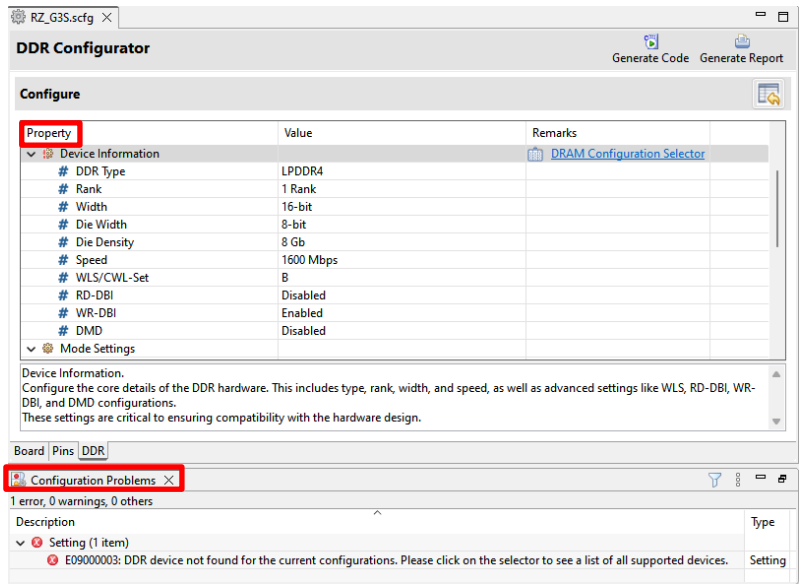


Figure 3-18 [DDR] Page (DDR Pin Function assignment)

3.5.2 Validating DDR Parameter configuration

The [DDR] page includes a built-in conflict checker,

When a parameter configuration conflicts with another parameter:

(1) For conflicts outside the Device Information, errors are shown with a red '!' over a yellow gear in the Property column and a white 'X' within a red circle in the Value column.

(2) For conflicts within the Device Information, errors are shown only with a red '!' over a yellow gear in the Property column.

All Errors are also listed in the Configuration Problems view, making them easy to identify and address.

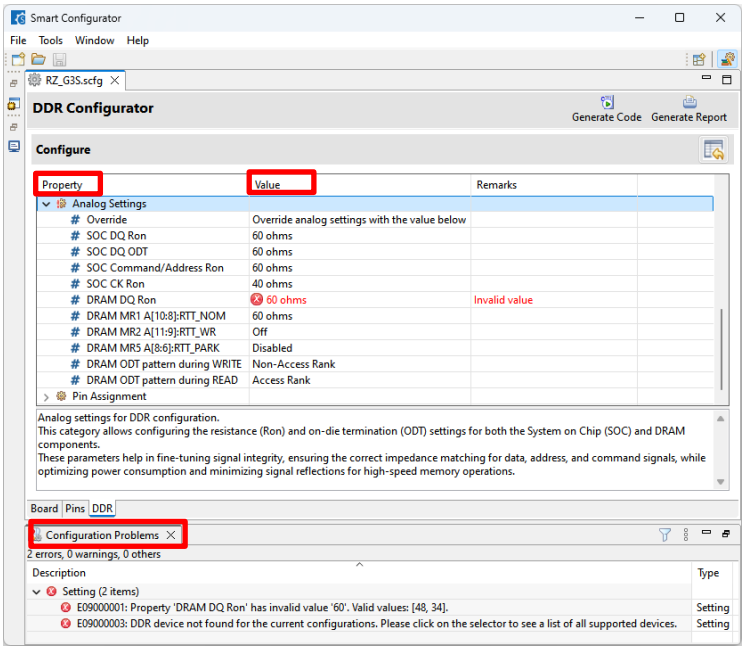


Figure 3-19 Validating DDR Parameter configuration (Outside Device Information)

Figure 3-20 Validating DDR Parameter configuration (Within Device Information)

3.5.3 Configuring the DDR Configurator Packages

Follow the procedure below to configure the location of a specific DDR Configurator Packages.

(1) Click [Browse…] of [DDR Configurator Packages] and navigate to the folder on the PC that contains the specific DDR Configurator Packages.
(2) Click [Apply and Close] to apply the selected package path.

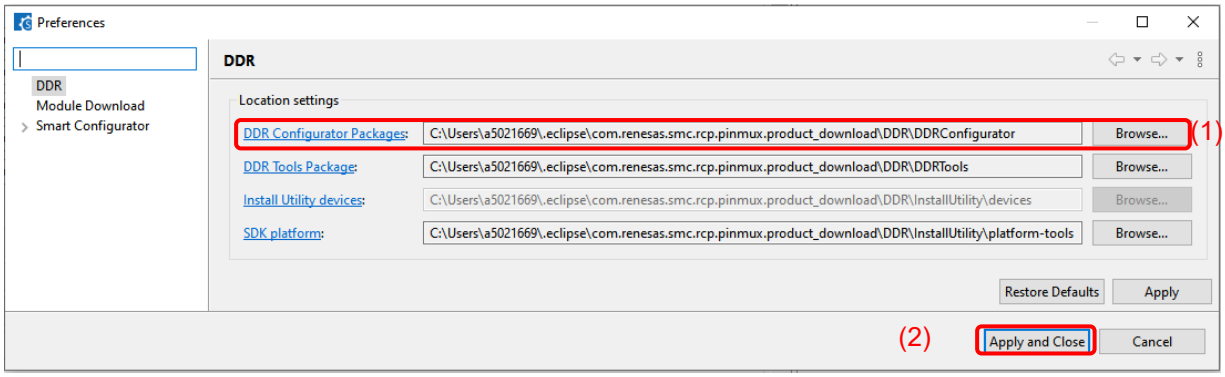


Figure 3-21 Configuring DDR Configurator Packages

Select [Window] folder dropdown menu and → [Preferences] in the Smart Configurator to open the [DDR] settings.

3.6 Install Utility

The Smart Configurator provides feature to automated fundamental step which flashs bootloader and operation system disk image onto the targeted RZ/G board.

3.6.1 GUI-Based Flashing Procedure for RZ/G Board

Follow the procedure below to flash bootloader files and operating system disk image to RZ/G board.

(1) Select a target device, e.g. RZ/G2L and specify the appropriate download mode (Normal or Fallback). Then provide the full paths to the bootloader binaries and the OS disk image file.

(2) Select Flash Writer binary (.mot) which is loaded into the RZ/G board's RAM during bootloader stage.

(3) Select the Motorola S-record files (.srec) containing the bootloader components. BL2 and FIP each have their own .srec file, both of which are necessary for updating critical boot components during development or manufacturing.

(4) Select operating system disk image file (.wic). This image will be written directly to the eMMC storage on the RZ/G board.

(5) Select the appropriate COM port associated with the host PC's connection to the target board.
Note: The GUI-based Install Utility supports simultaneous flashing of up to 8 boards. Ensure that the COM ports selected match the number of connected boards.

(6) Select 'Download" button to start the transfer and flashing of the selected bootloader and disk image files to the board.

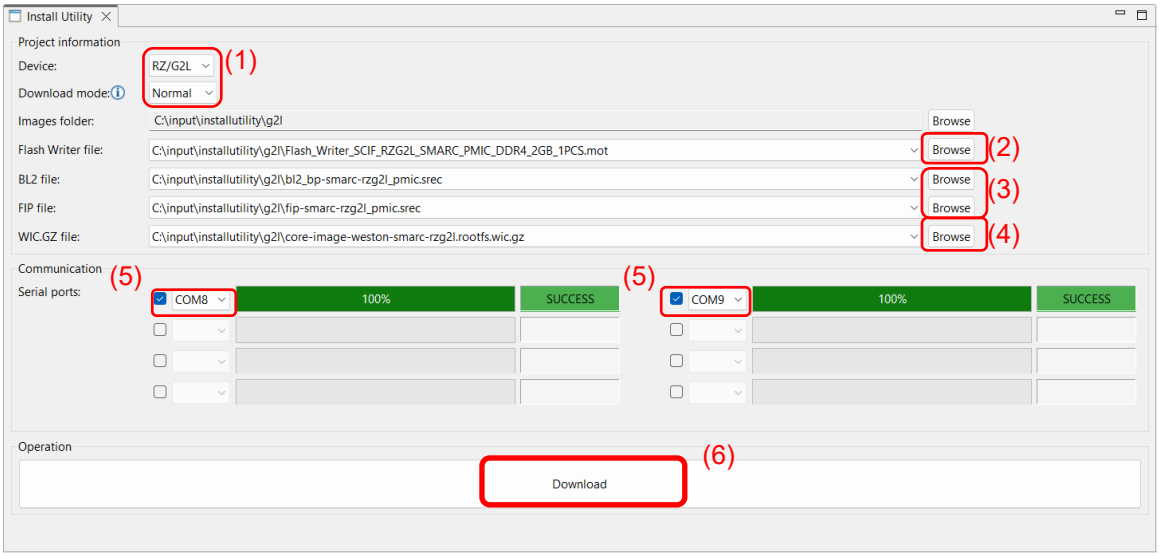


Figure 3-22 GUI-based flashing procedure for RZ/G boards

Select [Tools] folder dropdown menu and → [Install Utility] in the Smart Configurator to open the Install Utility editor.

Note:

- Flashing the ".wic" image requires a U-Boot bootloader that supports the Fastboot protocol, which is part of the Android SDK Platform. For setup instructions, refer to section 3.6.2 Configuring the Android SDK Platform.

- U-Boot also requires USB function recognized as "Android Device" in Device Manager. If "Other devices/USB download gadget" exists, open its properties and install the driver from the folder where you downloaded the Google USB Driver: https://developer.android.com/studio/run/win-usb

3.6.2 Configuring the Android SDK Platform

Follow the procedure below to configure the location of Android SDK Platform on the host PC.

(1) Click [Browse…] of [SDK platforms] and navigate to the directory where the Android SDK Platform is installed on the host machine.
Note: If the Android SDK Platform is not yet installed, download it from the official Android developer website:
https://developer.android.com/tools/releases/platform-tools

(2) Click [Apply and Close] to apply the selected SDK path.

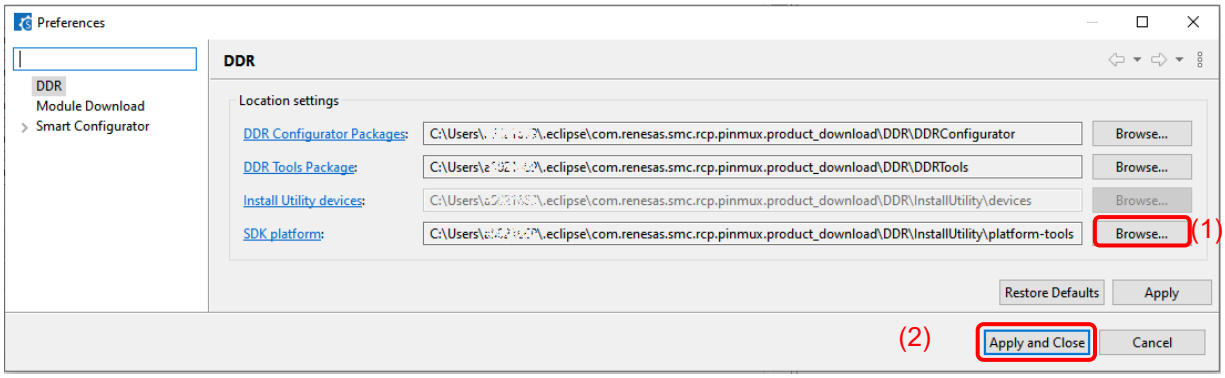


Figure 3-23 Configuring Android SDK Platform

Select [Window] folder dropdown menu and → [Preferences] in the Smart Configurator to open the [DDR] settings.

3.6.3 Console-Based Flashing Procedure for RZ/G Board

Console-Based flashing procedure requires the following prerequisites:

- ❖ Operating System Requirements
  - ➢ Windows, Linux, and macOS:
    - Android SDK Platform Tools: Ensure the latest version are installed for Fastboot Tool and added to the system's environment path.
      For example (Windows): Add the path to the "Android SDK Platform Tools" to the System Environment Variables under the PATH setting.

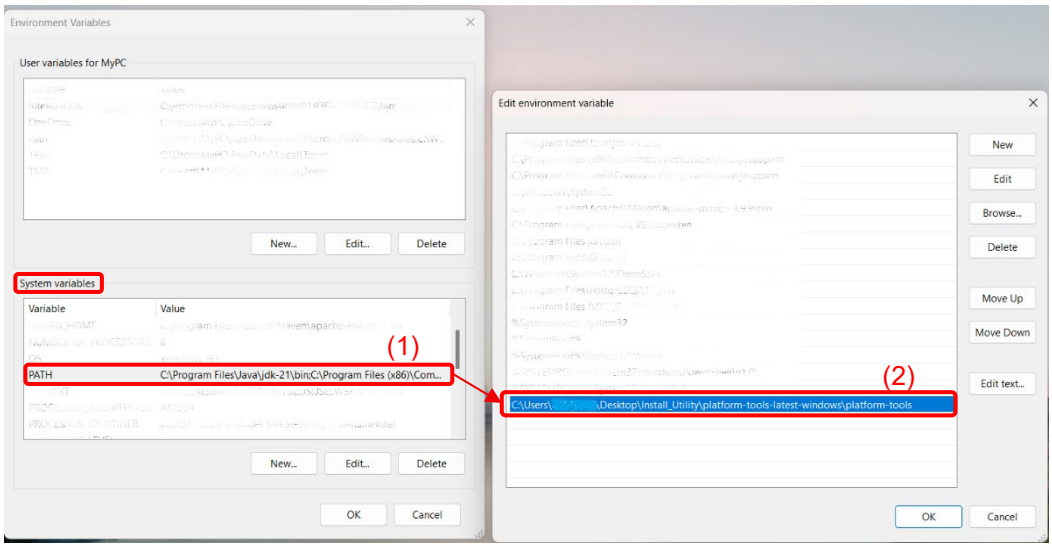


Figure 3-24 Configuring PATH System variables for Android SDK Platform

    - Java SE 21: Required be installed on the PC.
  - ➢ Windows only:
    - Google USB Driver: Required be installed for device detection.

Follow the procedure below to flash bootloader files and operating system disk image to RZ/G board for each OS environment by using command line:

- ❖ On Windows
  - ➢ Open a terminal (Command Prompt)
  - ➢ Navigate to the folder containing InstallUtilityc.exe using the cd command.

```
cd C:\Renesas\Tools\InstallUtility\
```

Note:
- Replace this path with the actual location where InstallUtilityc.exe is installed

  - ➢ Run the following command (e.g: RZG3S):

```
InstallUtilityc.exe -p COM10 -d RZ/G3S -m Normal^
-fw <path_to_flash_writer>\Flash_Writer_SCIF_RZG3S_SMARC_LPDDR4.mot ^
-bl2 <path_to_bl2>\bl2_bp_emmc-smarc-rzg3s.srec ^
-fip <path_to_fip>\fip-smarc-rzg3s.srec ^
-wic <path_to_wic>\core-image-bsp-smarc-rzg3s.rootfs.wic.gz ^
-cfile <path_to_c_file>\G3S_LPDDR_parameters.c
```

Note:
- This is a single command. In Windows, the ^ character allows you to split the command into multiple lines for readability.

❖ On macOS

➢ Open the Terminal

➢ Run the following command (e.g: RZG3S):

```
/<absolute_path_to_installutility>/InstallUtility -p tty.usbserial-0001 -d RZ/G3S -m Normal\
-fw /<path_to_flash_writer>/Flash_Writer_SCIF_RZG3S_SMARC_LPDDR4.mot \
-bl2 /<path_to_bl2>/bl2_bp_emmc-smarc-rzg3s.srec \
-fip /<path_to_fip>/fip-smarc-rzg3s.srec \
-wic /<path_to_wic>/core-image-bsp-smarc-rzg3s.rootfs.wic.gz \
-cfile <path_to_c_file>\G3S_LPDDR_parameters.c
```

Note:
- This is a single command. In macOS, the \ character allows you to split the command into multiple lines for readability.
- Must use the absolute path to the InstallUtility binary. Relative paths will not work.

❖ On Linux

➢ Open a terminal

➢ Run the following command (e.g: RZG3S):

```
./InstallUtility -p ttyUSB0 -d RZ/G3S -m Normal\
-fw /<path_to_flash_writer>/Flash_Writer_SCIF_RZG3S_SMARC_LPDDR4.mot \
-bl2 /<path_to_bl2>/bl2_bp_emmc-smarc-rzg3s.srec \
-fip /<path_to_fip>/fip-smarc-rzg3s.srec \
-wic /<path_to_wic>/core-image-bsp-smarc-rzg3s.rootfs.wic.gz \
-cfile <path_to_c_file>\G3S_LPDDR_parameters.c
```

Note:
- This is a single command. In Linux, the \ character allows you to split the command into multiple lines for readability.

Option descriptions:

- -p <port_name>: USB serial port name:
  - Windows: COM1, COM10, etc.
  - macOS: tty.usbserial-0001
  - Linux: ttyUSB1
- -d <device >: Target RZ device (e.g., RZ/G3S).
- -fw < file path >: Path to Flash Writer .mot file.
- -bl2 < file path >: Path to BL2 .srec file.
- -fip < file path >: Path to FIP .srec file.
- -wic < file path >: Path to WIC image .wic file.
- -cfile <file path>: Path to DRAM parameters .c file.
  Note: This option is only required for RZ/G3S devices. Do not include it for RZ/G2L or other devices.

3.7 DDR Tools

The Smart Configurator provides feature to support the configuration, tuning, and validation of DDR memory interfaces on the RZ/G board. This functionality is essential for ensuring proper DDR initialization and stable operation within defined timing margins - critical during system bring-up and prior to OS boot.

3.7.1 Configuring, tuning, and validating DDR memory

Follow the procedure below to configure, tune, and validate DDR memory.

(1) Select the target device, e.g. RZ/G3S

(2) Specify the full paths for the DDR Tools file (*.mot) and the DDR configuration files (*.c).

(3) Enable “Eye Opening check” to evaluate the timing margin between the DQS and DQ signals, ensuring reliable data capture.

(4) Enable “Stress checker” to verify DDR stability under harsh conditions such as temperature fluctuations, voltage variations, and extended operation. Four test modes are available (selectable individually or in combination).

- Basic Read/Write Check
- Simple Read/Write Check
- Random Data Read/Write Check
- Fixed Data Read/Write Check

(5) Select the correct COM port associated with the host PC's connection to the target board.

(6) Select ‘Start” button to initiate DDR memory validation on the RZ/G board.

(7) Once validation is completed, all logs will be listed as hyperlink in the “Test results” table, making them easy to identify and access.

(8) Upon completion of the “Eye Opening check”, an Eye-Opening chart is generated. This chart is a graphical representation which shows the voltage of digital signals over time, helping engineers evaluate signal clarity and stability during data transmission.
Click “View eye diagrams” to display the Write and Read charts. Refer to **Figure 3-26 Write and Read charts** for an example.

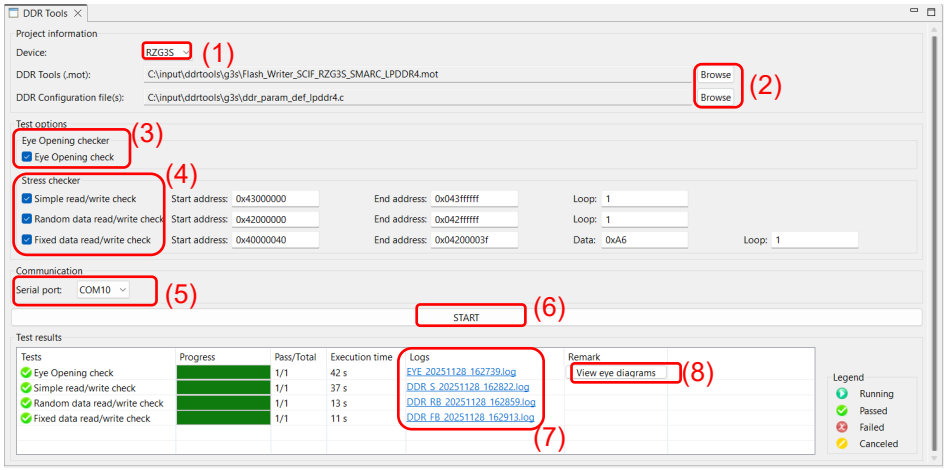


Figure 3-25 Configuring, tuning, and validating DDR memory

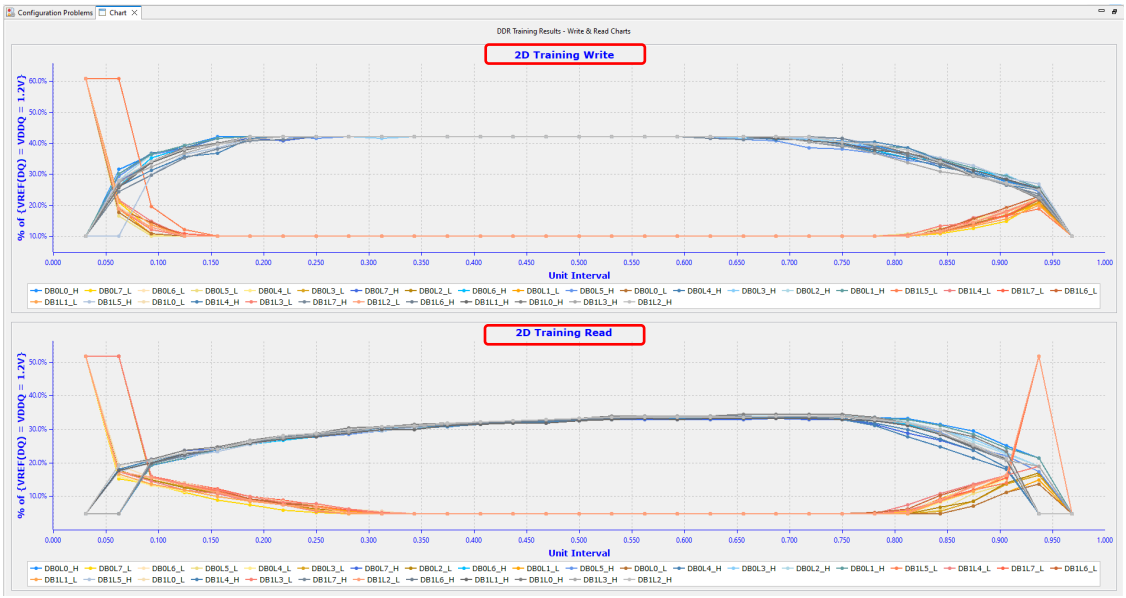


Figure 3-26 Write and Read charts

Select [Tools] folder dropdown menu and → [DDR Tools] in the Smart Configurator to open the DDR Tools editor.

3.7.2 Configuring the DDR Tools Packages

Follow the procedure below to configure the location of a specific DDR Tools Packages.

(3) Click [Browse…] of [DDR Tools Packages] and navigate to the folder on the PC that contains the specific DDR Tools Packages.
(4) Click [Apply and Close] to apply the selected package path.

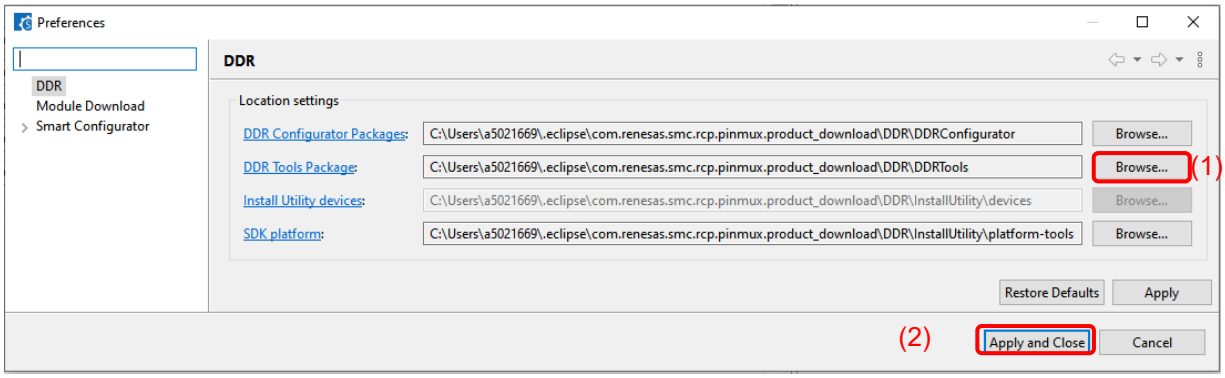


Figure 3-27 Configuring DDR Tools Packages

Select [Window] folder dropdown menu and → [Preferences] in the Smart Configurator to open the [DDR] settings.

3.8 MCU migration feature

The MCU migration feature helps to convert user project settings from device A to device B. Conversion of project settings can be done within the same family and can be done from Smart Configurator as follows.

Note: Project settings may change due to device change. It is recommended to back up the smart configurator project file (*.scfg) before executing the device change.

(1) Open the [Device Selection] page by clicking on the [Board] tab view.

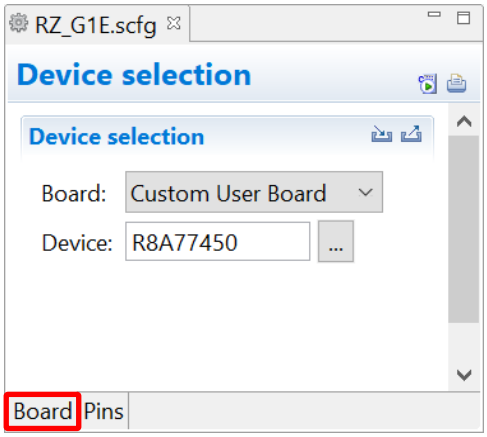


Figure 3-28 [Device Selection]

(2) Click on this icon ... and select the target device from the device dropdown menu list.

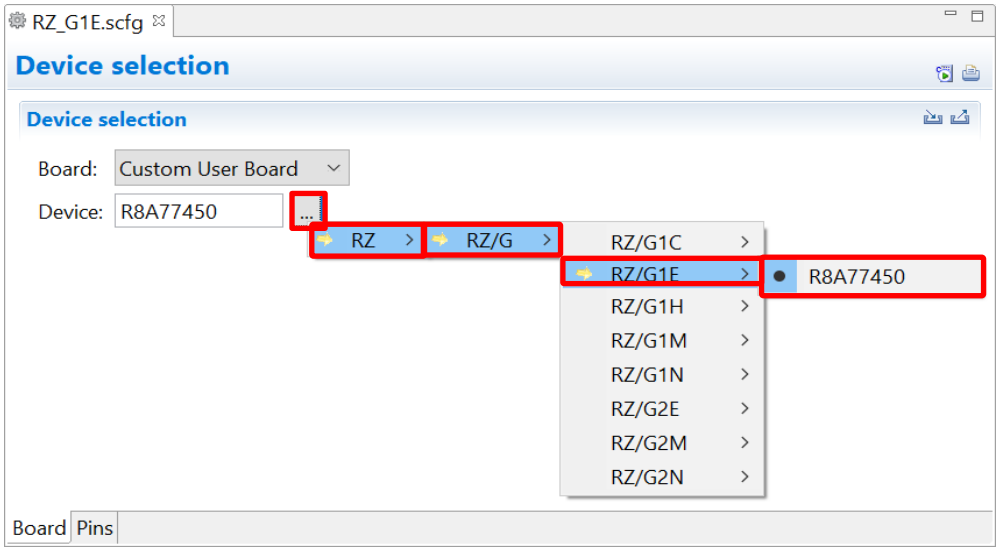


Figure 3-29 Select target device

(3) Select Save and continue Or Continue to change to another target device. (E.g. change to RZ/G1H).

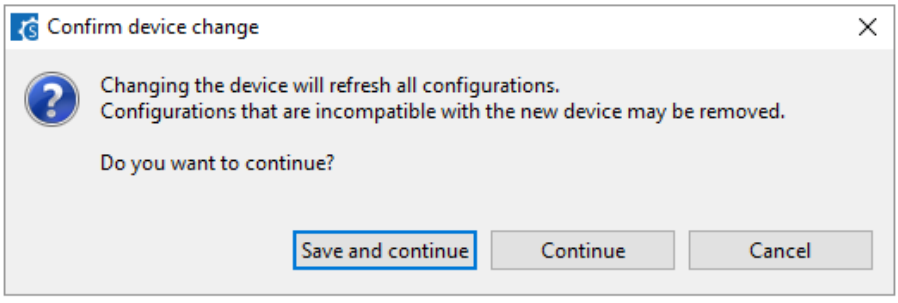


Figure 3-30 Confirm device change

(4) Migration report will be generated, the report information is displayed in console window.

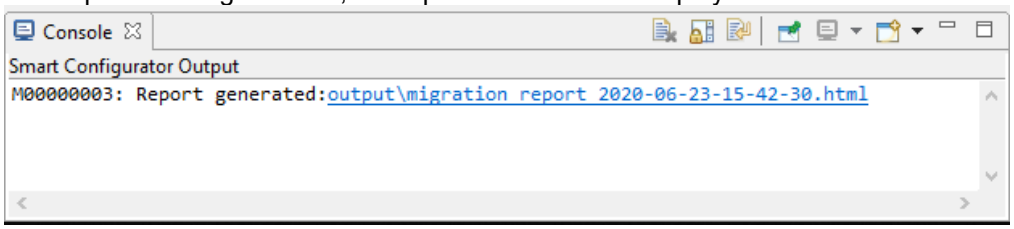
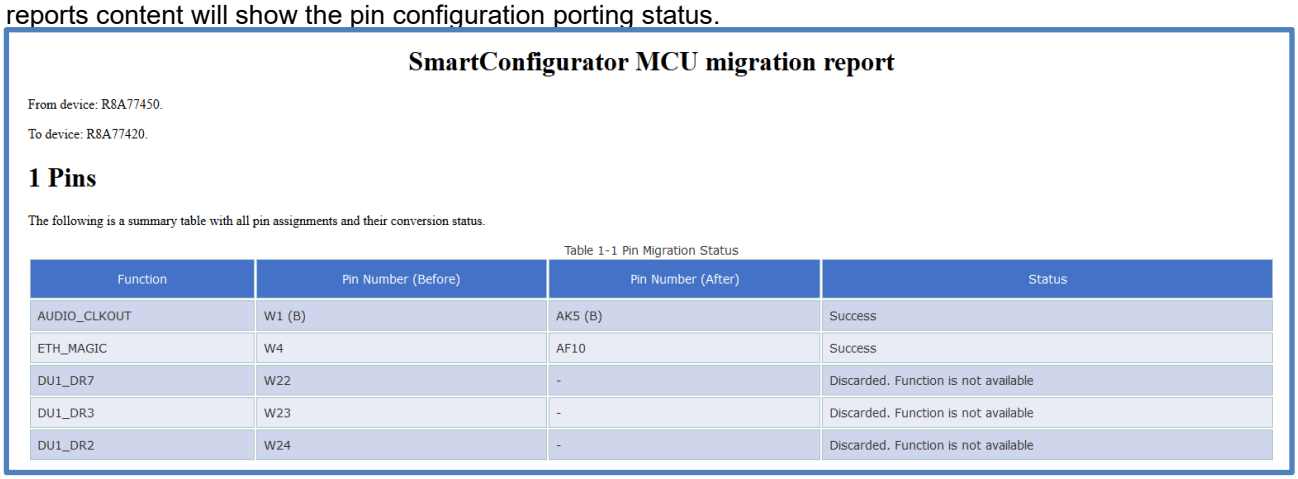


Figure 3-31 Output Migration report

(5) The migration report can be opened by clicking the hyperlink string in the console window. The reports content will show the pin configuration porting status.



SmartConfigurator MCU migration report

From device: R8A77450.

To device: R8A77420.

1 Pins

The following is a summary table with all pin assignments and their conversion status.

Table 1-1 Pin Migration Status

Function	Pin Number (Before)	Pin Number (After)	Status
AUDIO_CLKOUT	W1 (B)	AK5 (B)	Success
ETH_MAGIC	W4	AF10	Success
DU1_DR7	W22	-	Discarded. Function is not available
DU1_DR3	W23	-	Discarded. Function is not available
DU1_DR2	W24	-	Discarded. Function is not available

Figure 3-32 Migration report content

4. Generating Source Code

4.1 Outputting Generated Source Code

Output a source file for the configured details by clicking on the [(Generate Code)] button in the Smart Configurator view.

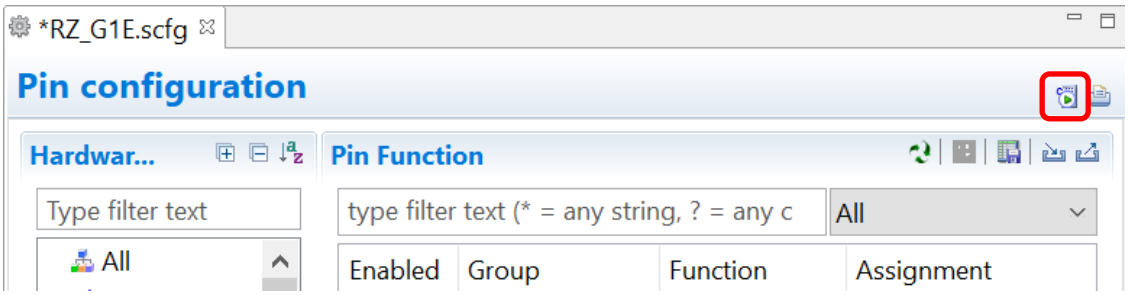


Figure 4-1 Generating a Source File

4.2 Configuration of Generated Files and File Names

Figure 4-2 shows the folders and file output by Smart Configurator. For the RZ/G2x and RZ/G3x device series, a single *.dtsi file is generated in the device tree syntax for Linux. For RZ/G3x device using DDR Configurator tool, an additional *.c file is generated in the include folder.
The generated source code feature is valid only for the RZ/G2x and RZ/G3x device series. For RZ/A1x and RZ/G1x device, no source file is generated.

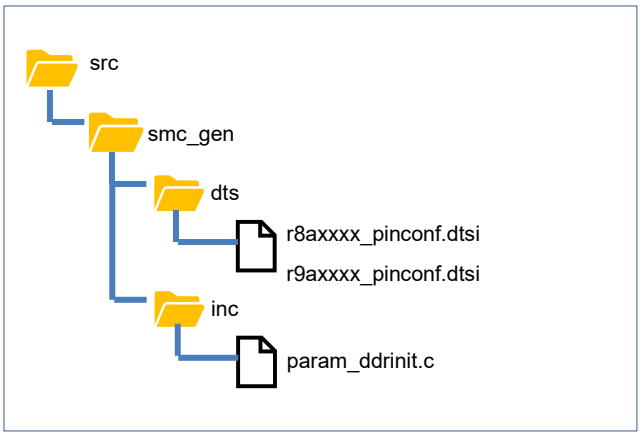


Figure 4-2 Configuration of Generated Files and File Names

Folder	File	Description
src/smc_gen/dts		This folder is always generated. It consists of only r8axxxx_pinconf.dtsi or r9axxxx_pinconf.dtsi file.
	r8axxxx_pinconf.dtsi r9axxxx_pinconf.dtsi	This file is always generated. It represents a set of text files in the Linux kernel source tree that describe the hardware of the RZ/G device tree.
src/smc_gen/inc		This folder is always generated for the RZ/G3x device. It consists of only param_ddrinit.c file.
	param_ddrinit.c	This file is always generated for the RZ/G3x device. It's a C source file (.c) that defines DDR initialization parameters, which will be converted into a binary file (.bin) for consistent use across DDR Tools and Install Utility.

5. Generating Report on Smart Configurator

The Smart Configurator generates a report on the configurations that the user works on. Follow the procedure below to generate a report.

5.1 Report on Device Configurations

A report is output by clicking on the [(Generate Report)] button in the Smart Configurator view.

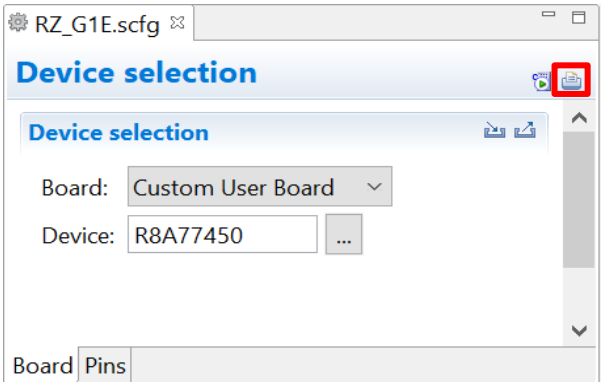


Figure 5-1 Output of a Report on the Configuration (as a Text File)

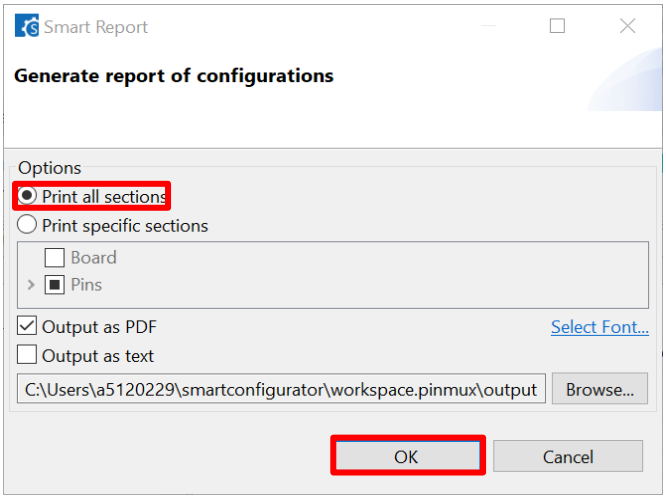


Figure 5-2 Dialog Box for Output of a Report

5.2 Configuration of Pin Function List and Pin Number List (in csv Format)

A list of the configuration of pin functions and pin numbers is output by clicking on the [(Save the list to .csv file)] button on the [Pins] page of the Smart Configurator view.

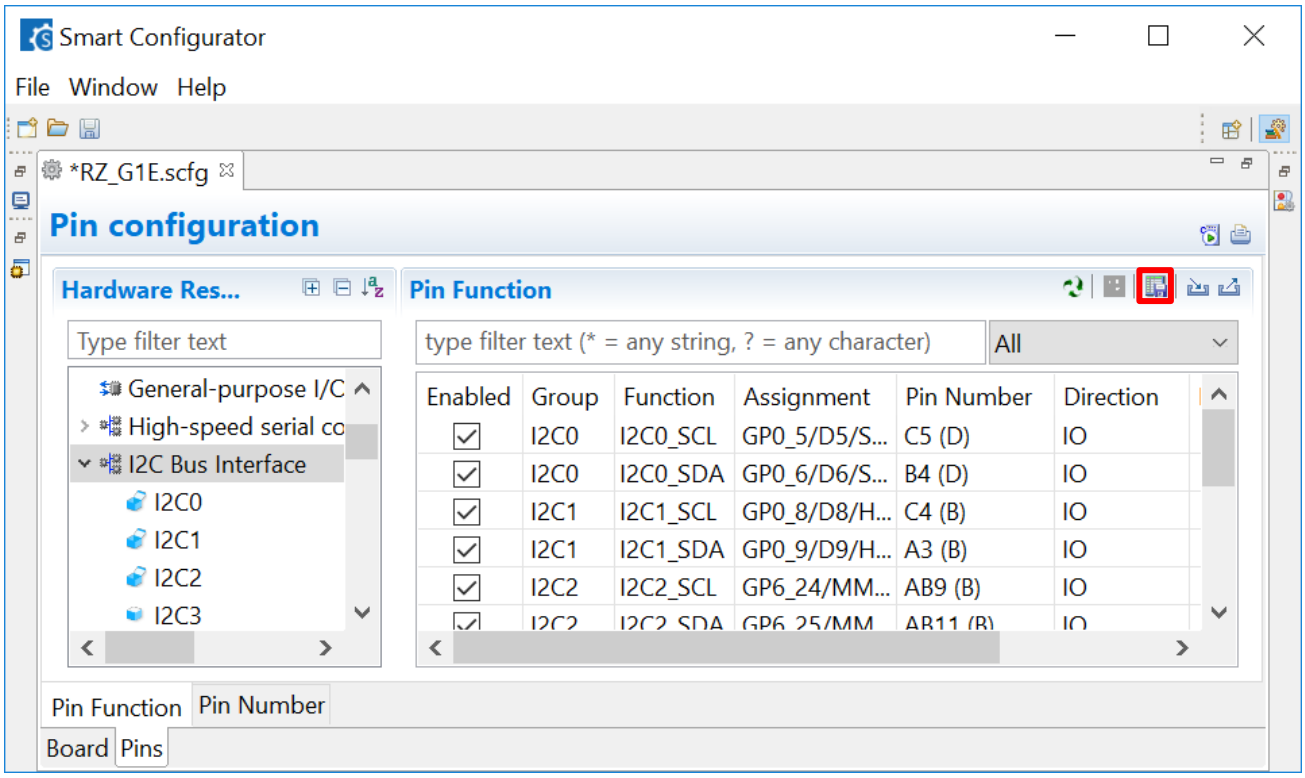


Figure 5-3 Output of a List of Pin Functions or Numbers (in csv Format)

5.3 Image of MCU Package (in png format)

An image of the MCU package is output by clicking on the [(Save Package View to external image file)] button of the [MCU Package] view.

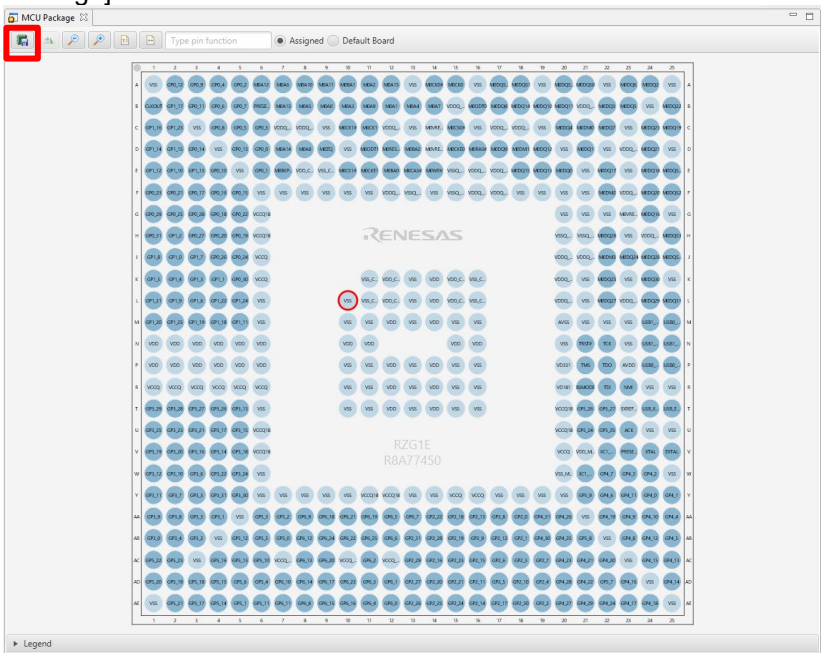


Figure 5-4 Output an image of the MCU Package (in png Format)

6. Help

Refer to the help dropdown menu for detailed information on the Smart Configurator.

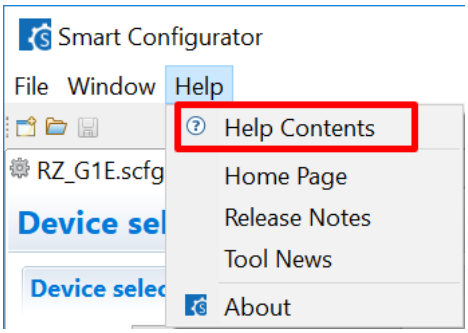


Figure 6-1 Help Menu

7. Documents for Reference

User's Manual: Hardware
Obtain the latest version of the manual from the Renesas Electronics website.

Technical Update/Technical News
Obtain the latest information from the Renesas Electronics website.

Website and Support

Renesas Electronics Website
http://www.renesas.com/
Inquiries
http://www.renesas.com/contact/

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	December 22, 2025	-	First edition issued

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)
   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on
   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state
   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins
   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals
   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin
   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses
   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products
   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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