Integrated Development Environment e² studio

How to create a project for RH850 multi-core device as multiple projects

Introduction

Integrated Development Environment e^2 studio supports creating, building, and debugging projects for the RH850 family. The RH850 family includes devices that support multi-cores, and e^2 studio allows you to create projects for these multi-core devices. However, currently only the method of treating all cores as a single project is supported.

This document describes how to create projects for the RH850 family of multi-core devices as multiple projects.

Contents

1. Overview

1.1 Purpose

e² studio is an integrated development environment for Renesas microcontrollers based on the open source "Eclipse".

e² studio supports creating, building, and debugging projects for the RH850 family. The RH850 family includes devices that support multi-cores, and e² studio allows you to create projects for these multi-core devices. However, currently only the method of treating all cores as a single project is supported. This method may not be suitable for development by multiple developers.

One way to solve this subject is to divide the source files for each core into individual projects for each core and manage them. To do this, you need to create multiple projects in e² studio and edit and configure each one for each core. You also need to configure the link between the projects.

This document describes detailed information on how to create projects for the RH850 family of multi-core devices as multiple projects.

1.2 Environment

Renesas have confirmed the operating procedure explained in this document in the following environment.

[OS]

- OS Windows 11

[Tool]

- e² studio 2025-07
- Toolchain CC-RH V2.07.00

2. How to create a project for RH850 multi-core device as multiple projects

This chapter describes how to create multiple projects for the RH850 multi-core devices.

As an example, create a project for a multi-core device (RH850/U2C8: R7F702600AFABB) with two cores.

2.1 Create projects

Please create three projects as the following steps.

The three projects are used for the following purposes:

- RH850_boot: Boot program
- RH850_core0: Application program for core0
- RH850_core1: Application program for core1

1) Start e² studio.
2) Select the menu [File] > [New] > [Renesas C/C++ Project] > [Renesas RH850].
3) The [New C/C++ Project] dialog box will appear.
   Select the [Renesas CC-RH C Executable Project] and click the [Next >] button.

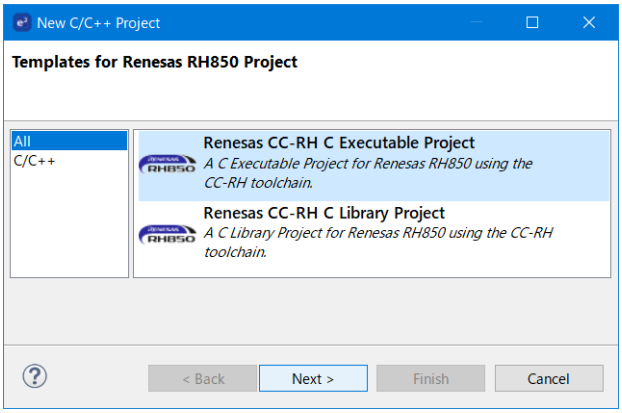

Figure 1

4) The [New Renesas CC-RH Executable Project] page in the [New Renesas CC-RH Executable Project] dialog box will display.
   Input any name (Eg: "RH850_boot") to the [Project name:] textbox and click the [Next >] button.

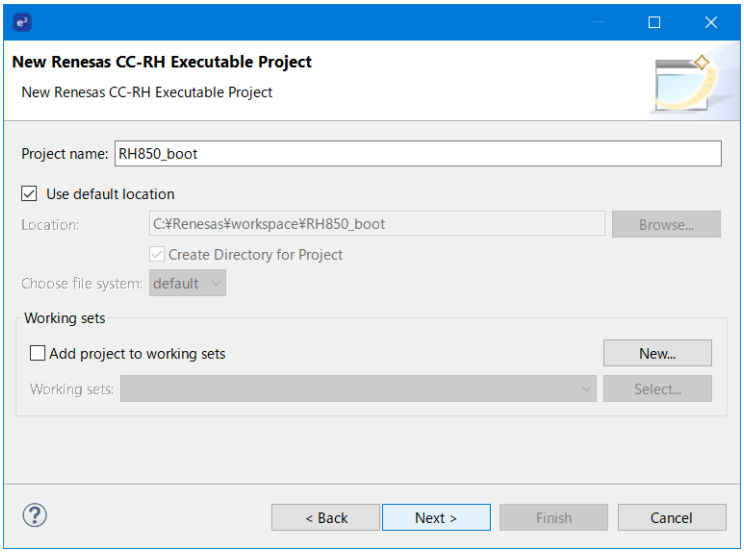

Figure 2

5) The [Select toolchain, device & debug settings] page will display.

Input a multi-core device name (Eg: "R7F702600AFABB") to the [Target Device:] text box and specify any value to the other items. Next, click the [Next >] button.

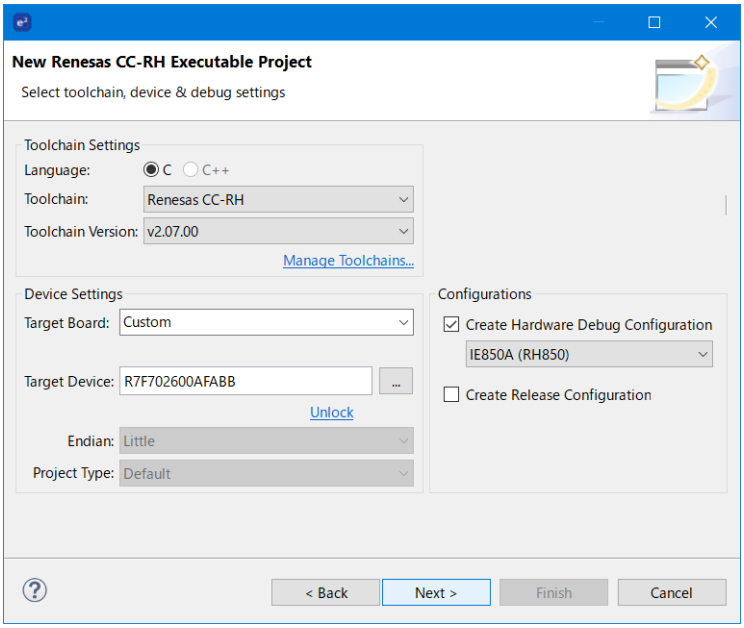

Figure 3

6) The [Select Coding Assistant settings] page will display.

Uncheck the [Use Smart Configurator] checkbox and click the [Finish] button.

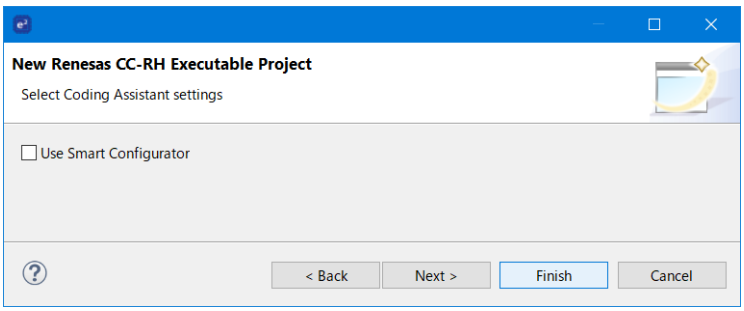

Figure 4

7) The "RH850_boot" project will be created.

8) Continuously, create two more projects in the same way.
   - Project1 name: RH850_core0
   - Project2 name: RH850_core1

9) After 3 projects creation, select the "RH850_boot" in the [Project Explorer] view and click the right clicked menu [Properties].

10) The [Properties for RH850_boot] dialog box will appear.

    Select the [Project References] in the left side tree.

11) The [Project References] panel will display.

    Check the "RH850_core0" and "RH850_core1" in the [Project references for 'RH850_boot'] list box and click the [Apply and Close] button.

    With this setting, when you execute Build for the "RH850_boot" project, the "RH850_core0" project and the "RH850_core1" project will be executed Build first, followed by executing Build for the "RH850_boot" project.

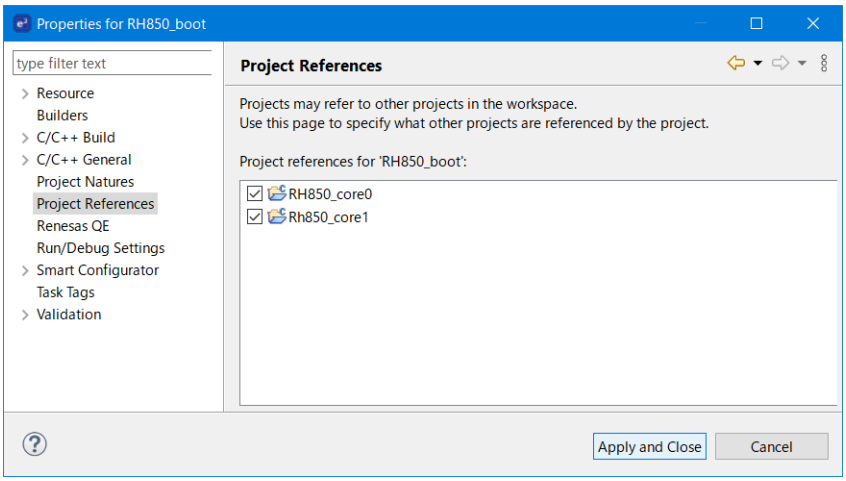

Figure 5

12) The projects will display as follows in the [Project Explorer] view.

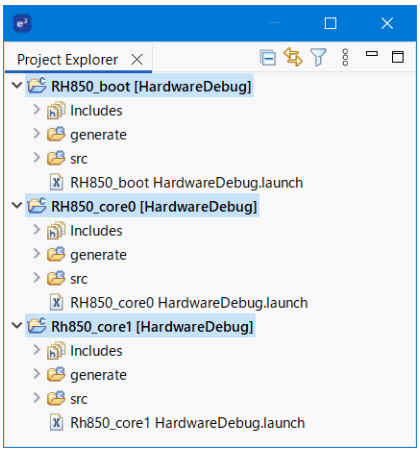

Figure 6

2.2 Change source files construction

You need to delete duplicate files for each project depending on the purpose of the projects. Please delete the files marked in red on the table below from your projects.

You can delete a source file by selecting it in [Project Explorer] view and performing one of the following operations.

- Press the Delete key.
- Select the right clicked menu [Delete].

Table 1

Folder		File	Notes
RH850_boot	generate	boot.asm	Keep
		cstart_pm0.asm	Delete
		cstart_pm1.asm	Delete
		iodefine.h	Keep
	src	main_pm0.c	Delete
		main_pm1.c	Delete
RH850_core0	generate	boot.asm	Delete
		cstart_pm0.asm	Keep
		cstart_pm1.asm	Delete
		iodefine.h	Keep
	src	main_pm0.c	Keep
		main_pm1.c	Delete
RH850_core1	generate	boot.asm	Delete
		cstart_pm0.asm	Delete
		cstart_pm1.asm	Keep
		iodefine.h	Keep
	src	main_pm0.c	Delete
		main_pm1.c	Keep

For the boot program to call the startup of the application programs for Core0 and Core1, the symbols must be output to the externally defined symbol file so that the boot program can recognize them. Therefore, to output only the startup symbols for Core0 and Core1 to the externally defined symbol file, change the startup section name for Core0 and Core1 to a different name.

Please modify the contents of the files "cstart_pm0.asm" and "cstart_pm1.asm" according to the following figures.

- cstart_pm0.asm ("RH850_core0" project)
  - Change the section name to ".text.cmn".

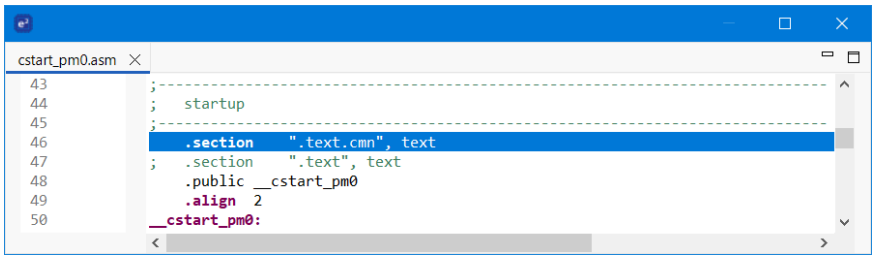

Figure 7

- cstart_pm1.asm ("RH850_core1" project)
  - Change the section name to ".text.cmn".

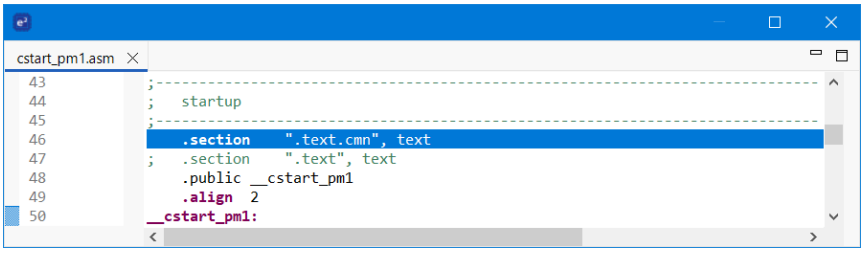

Figure 8

  - Delete the semicolon (;) so that they become valid lines.

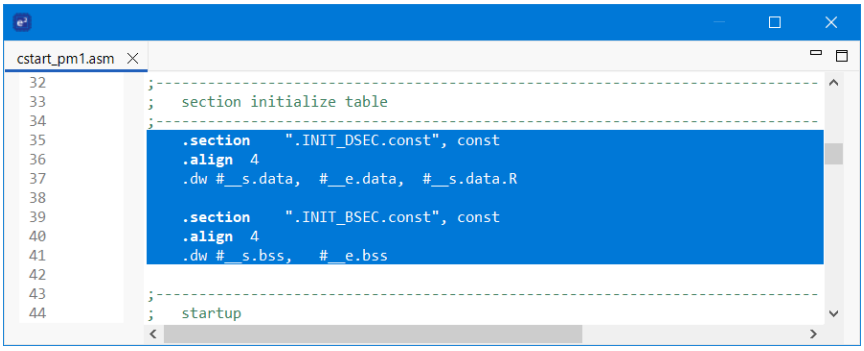

Figure 9

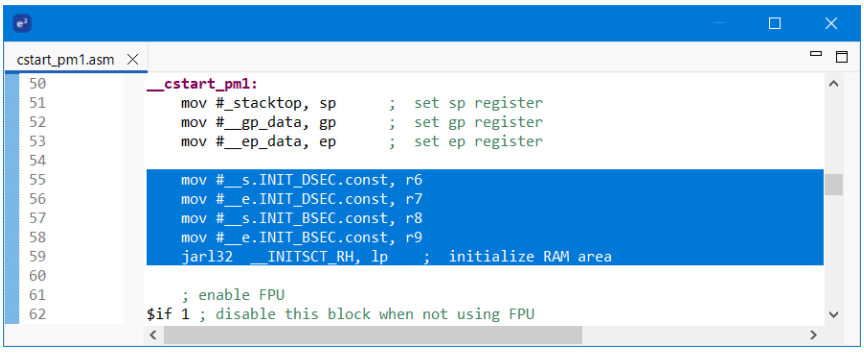

Figure 10

2.3 Configure Build options

Please configure the Build options as the following steps.

- Replace sections settings of section option for each project according to project purpose.
- For the boot program to call the startup of the application programs for Core0 and Core1, specify the option to output externally defined symbol files to make the symbols recognized by the boot program.

1) Select the "RH850_boot" project in the [Project Explorer] view and select the right clicked menu [C/C++ Project Settings].

2) The [Properties for RH850_boot] dialog box will appear.

   Change the value of [Section location (-start)] text box ([Linker] > [Section]) to "RESET_A,EIINTTBL_A/0,.text/00020000".

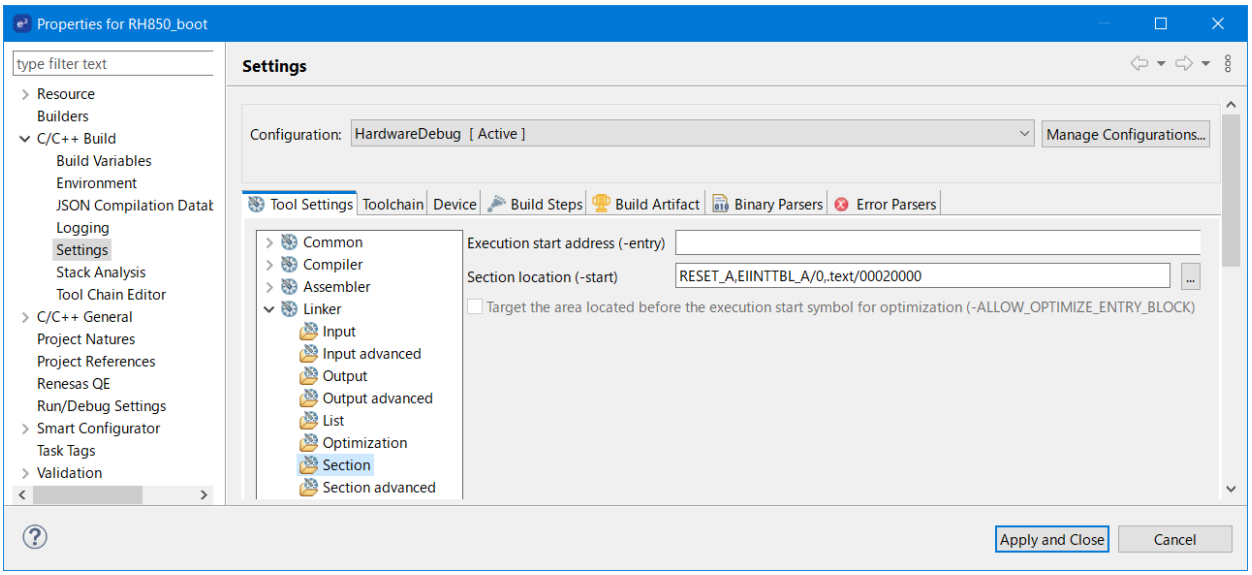

Figure 11

3) Delete the value of [Section to map from ROM to RAM (-rom)] list box ([Linker] > [Section advanced]).

   Next, click the [Apply and Close] button.

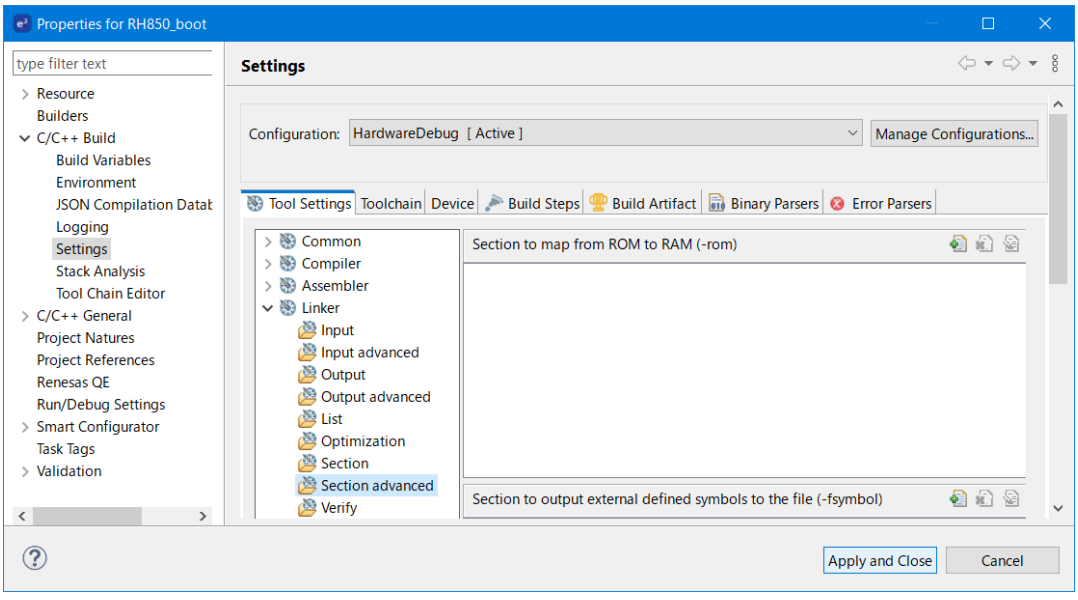

Figure 12

4) Select the "RH850_core0" project in the [Project Explorer] view and select the right clicked menu [C/C++ Project Settings].

5) The [Properties for RH850_core0] dialog box will appear.

   Change the value of [Section location (-start)] text box ([Linker] > [Section]) to ".const,.INIT_DSEC.const,.INIT_BSEC.const,.text.cmn,.text,.data/00010000,.data.R,.bss,.stack.bss/FE000000".

6) Add ".text.cmn" to the [Section to output external defined symbols to the file (-fsymbol)] list box ([Linker] > [Section advanced]).

   Next, click the [Apply and Close] button.

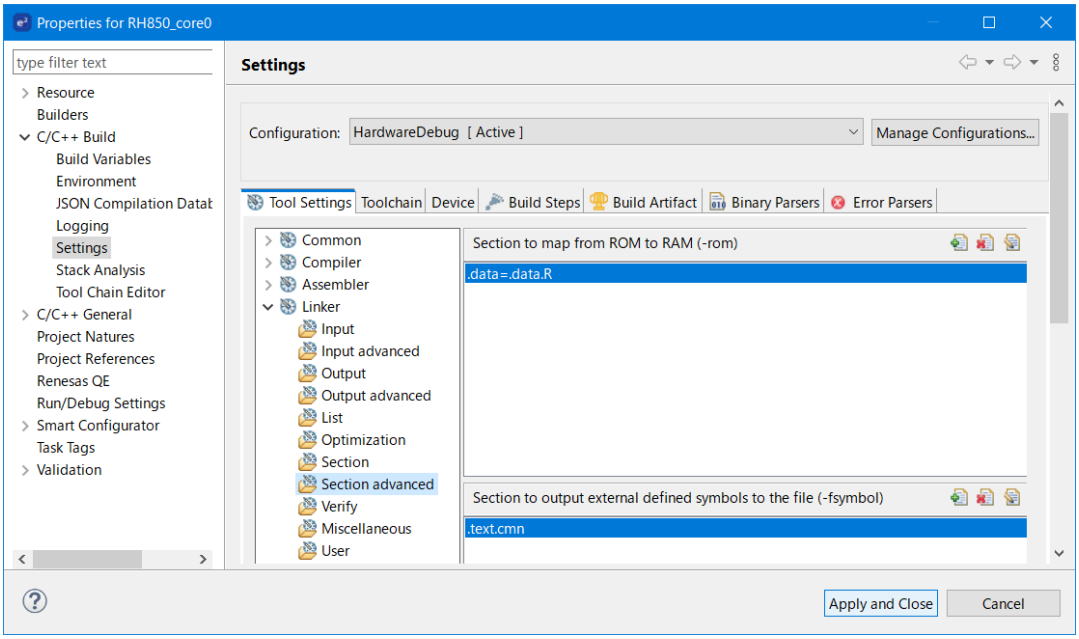

Figure 13

7) Select the "RH850_core1" project in the [Project Explorer] view and select the right clicked menu [C/C++ Project Settings].

8) The [Properties for RH850_core1] dialog box will appear.

   Change the value of [Section location (-start)] text box ([Linker] > [Section]) to ".const,.INIT_DSEC.const,.INIT_BSEC.const,.text.cmn,.text,.data/00011000,.data.R,.bss,.stack.bss/FE000000".

9) Add ".text.cmn" to the [Section to output external defined symbols to the file (-fsymbol)] list box ([Linker] > [Section advanced]).

   Next, click the [Apply and Close] button.

2.4 Add linked files

You need to register the externally defined symbol files (.fsy files) required for the boot program to call the startup for Core0 and Core1 in the boot program project and make them a build target of the boot program project.

Please register a .fsy file of project for each core to the boot project as the following steps.

1) Execute Build for the "RH850_core0" project and the "RH850_core1" project.

2) Drag and drop the "RH850_core0.fsy" file ([RH850_core0] > [HardwareDebug]) with pressing the [Ctrl] key to the [RH850_boot] > [src] folder in the [Project Explorer] view.

3) The [File Operation] dialog box will appear.

   Specify the following and next click the [OK] button.

   - Check the [Link to files] radio button.
   - Check the [Create link locations relative to:] check box and select "PROJECT_LOC".

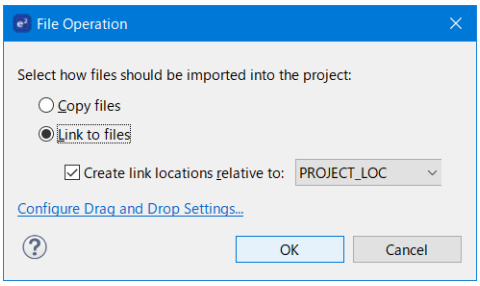

Figure 14

4) Drag and drop the "RH850_core1.fsy" file ([RH850_core1] > [HardwareDebug]) in the same way.

2.5 Execute Build

Please execute Build for the "RH850_boot" project.

The "RH850_core0" project and the "RH850_core1" project will be executed Built first, followed by the "RH850_boot" project.

2.6 Execute Debugger

Please debug using the "RH850_boot" project.

By setting the download module as follows, you can debug multiple cores simultaneously.

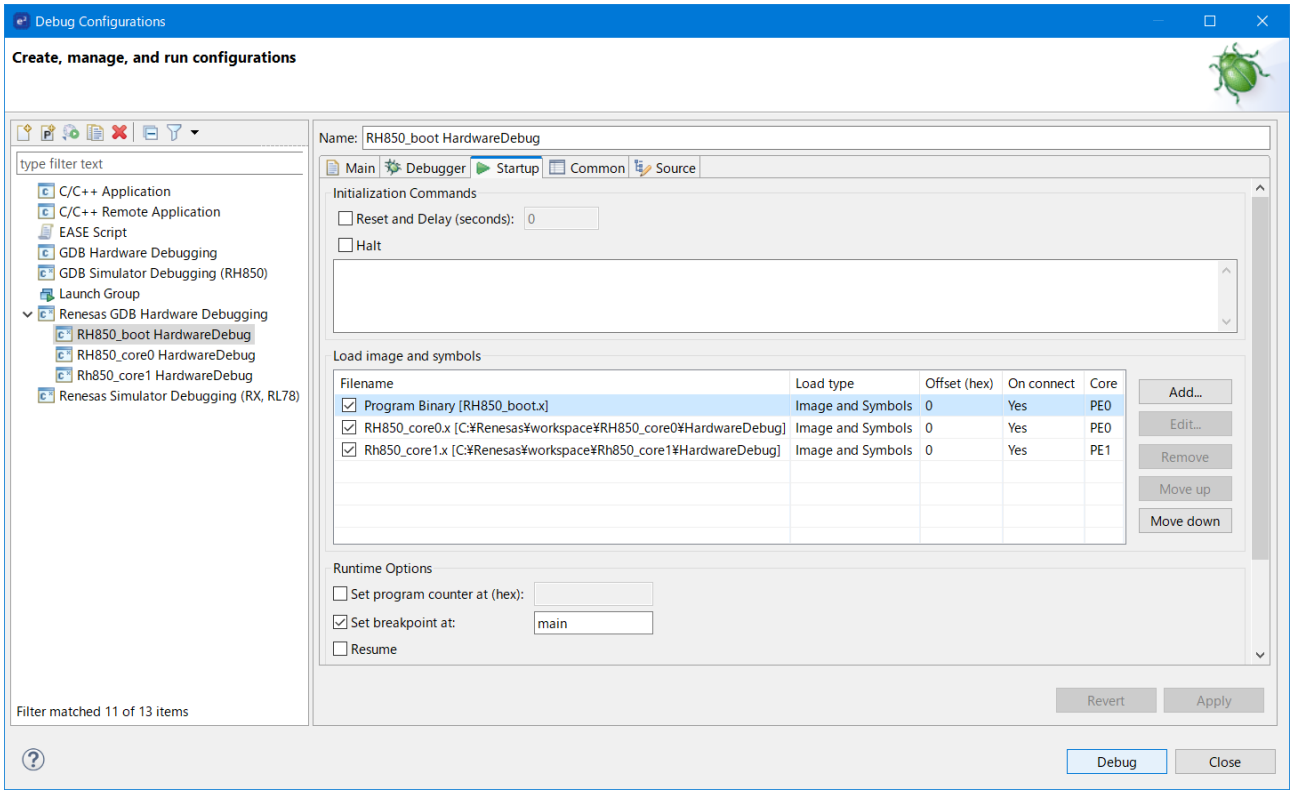

Figure 15

3. Reference information

- Website
  e² studio

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Oct.21.25	All	New create

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

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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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