

FSP Example Project Usage Guide

User's Manual

Renesas RA Family

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Renesas Electronics Corp. without notice. Please review the latest information published by Renesas Electronics Corp. through various means, including the Renesas Electronics Corp. website (<http://www.renesas.com>).

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.

6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/

Renesas RA Family

FSP Example Project Usage Guide

Contents

1. Introduction.....	1
1.1 Prerequisites.....	1
2. Hardware and Software Requirements	2
3. Tool Installation	2
3.1 FSP and tools installation	2
3.2 JFlashLite and JLink RTTViewer Installation	2
4. Importing and Running the Project.....	3
4.1 Downloading the Project	3
4.1.1 Downloading the Project from GitHub	3
4.1.2 Downloading the Project from Renesas.com	3
4.2 Running the project	3
4.2.1 Flashing pre-built binary	3
4.2.2 Importing the project into e2studio, Keil MDK and IAR	5
4.2.3 Running the Project.....	6
5. References	8
6. Appendix	9
6.1 Limitations in connecting with J-Link RTT Viewer v7.62 or later.....	9
Revision History.....	11

1. Introduction

This Example Project Usage Guide provides steps and guidelines for operating example projects which use the Renesas Flexible Software Package (**FSP**).

1.1 Prerequisites

1. Tool experience: It is assumed that the user has prior experience working with integrated development environments, such as e² studio, Segger RTT Viewer and terminal emulation programs, such as Tera Term.
2. Subject knowledge: It is assumed that the user has basic knowledge about microcontrollers, embedded systems, and FSP to modify the example projects. First time users are recommended to refer to FSP User Manual for Tutorial on *Starting Development*, paying special attention to sections *First RA MCU Project – Blinky*, *Importing an Existing Project into e2 studio*, and Tutorial on *Using HAL Drivers* –

Programming the WDT. When working with Microcontrollers which have support for Arm® TrustZone® refer to section *Primer: TrustZone Project Development*.

3. Prior to running the example projects or programming the kits, default jumper settings must be used. Refer to the kits' user's manual for the default jumper settings.
4. The screen shots provided throughout this document are for reference. The actual screen content may differ depending on the version of software and development tools used.

2. Hardware and Software Requirements

RA FSP Example projects are designed to operate using RA MCU kits officially supported by Renesas. Supported kits are identified for each group of microcontrollers on the Renesas website.

Refer to the readme.txt file in the specific module folder of */example_projects* folder for additional hardware and software requirements for running the projects.

Note:

1. Some projects may require external hardware as mentioned in the respective readme.txt files
2. Some pin numbers may be printed on the back of the Evaluation Kit board.

Software Requirements

- Windows® 10 operating system
- FSP v3.8.0 or later
- e² studio v2022-04 or later
- Keil MDK v5.36 or later
- IAR Embedded Workbench v.9.20.2 or later
- IAR Patch EWARMv9202_Renesas_RA6T2_patch2_301121
- ARM Compiler 6.18
- RASC 2022-04 (v3.8.0)
- SEGGER J-Link RTTViewer v7.62b or later
- SEGGER J-Flash Lite v7.64e or later

3. Tool Installation

3.1 FSP and tools installation

Download and install the latest version of FSP and tools from FSP GitHub repository.

1. Open FSP GitHub repository: <https://github.com/renesas/fsp>
2. Go to the **Releases** section of Git and navigate to latest FSP section.
3. Follow the instructions on installing and using FSP and e² studio, Keil MDK and IAR.

3.2 JFlashLite and JLink RTTViewer Installation

Download and install SEGGER J-Link Software for Windows from <https://www.segger.com/downloads/jlink#J-LinkSoftwareAndDocumentationPack>.

Default download path is C:\Program Files\SEGGER\JLink.

Note: Select version 7.56b or later from the drop-down menu in Version tab.

4. Importing and Running the Project

4.1 Downloading the Project

4.1.1 Downloading the Project from GitHub

1. Open FSP Examples Repository: <https://github.com/renesas/ra-fsp-examples/releases>.
2. Navigate to **Assets** section.
3. Download the project files for specific kit.

4.1.2 Downloading the Project from Renesas.com

1. Download the example project bundle for the specific kit from <https://www.renesas.com/us/en/products/software-tools/software-os-middleware-driver/software-package/ra-fsp.html#downloads>

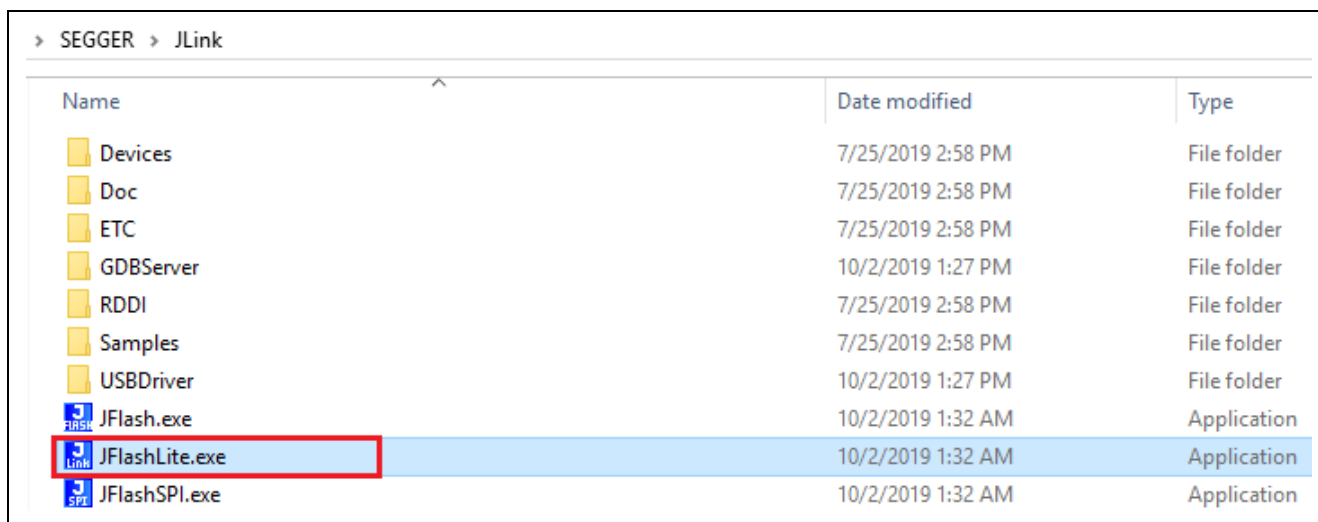
4.2 Running the project

There are two ways of running the project:

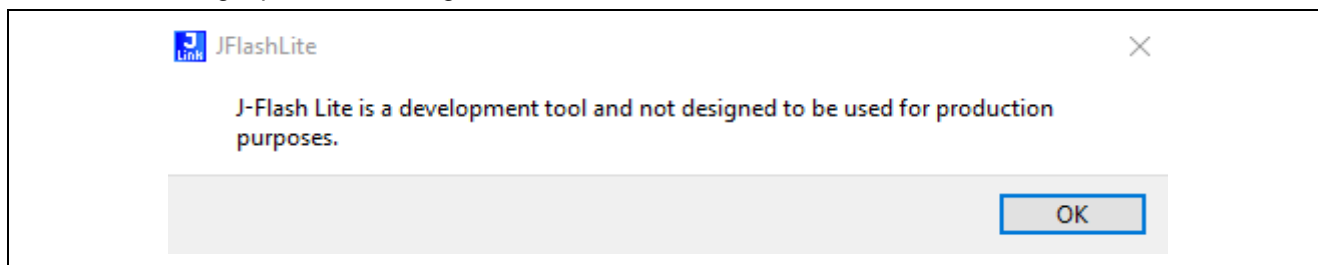
- Flashing the pre-built binary (.hex file) and running the project as explained in section 4.2.1.
- Importing the project into e² studio, building, loading and running the project as explained in section 4.2.2.

4.2.1 Flashing pre-built binary

1. In the **e2studio** folder of the module folders, a **.hex** file included.
2. Navigate to the downloaded /Segger/JLink folder and open JFlash Lite by double clicking on JFlashLite.exe.



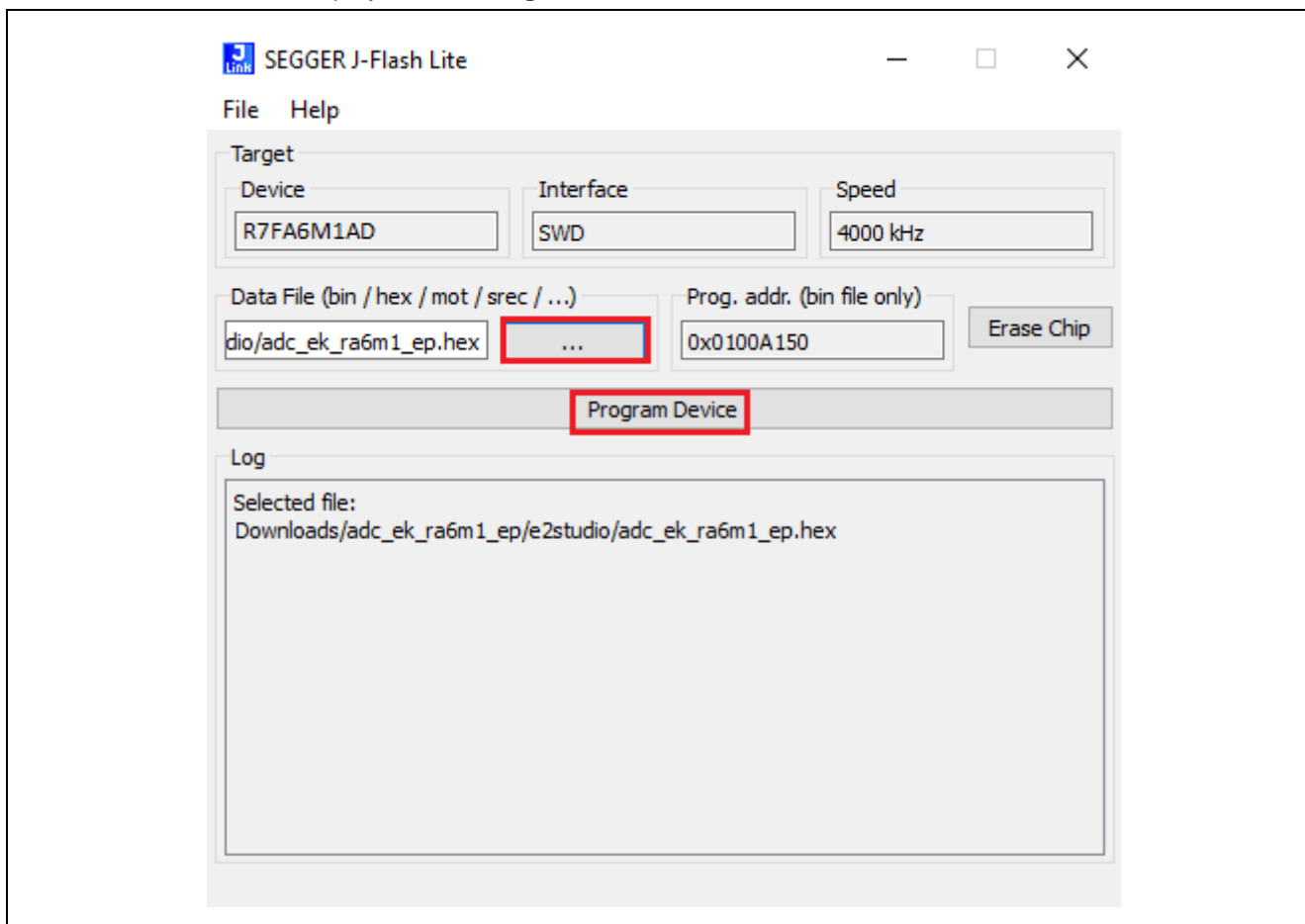
3. Click **OK** to get past the warnings.



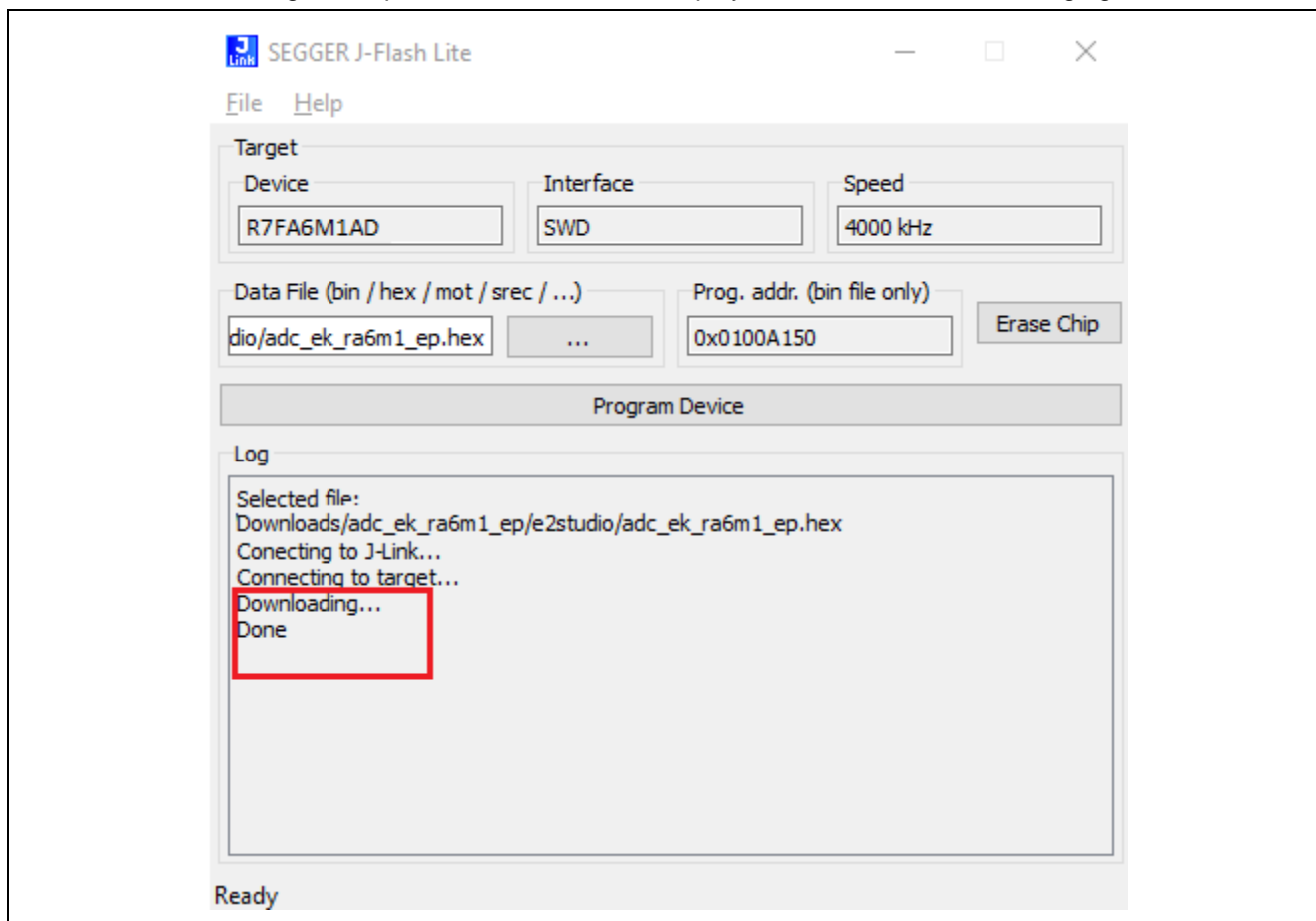
4. Click on the tab for the list of supported devices and choose Renesas RA device. Click **OK**.



5. Browse to the location of the .hex file using the tab and click on the **Program Device** tab. The selected file will be displayed in the **Log** section.



6. When downloading is complete, the status will be displayed as shown in the following figure.



7. Skip to section 4.2.3 for steps on running the project.

4.2.2 Importing the project into e2studio, Keil MDK and IAR

Refer to FSP User Manual for steps on importing a project:

- Importing an existing project
- Generating Project content¹
- Building the project
- Downloading the project image to the board

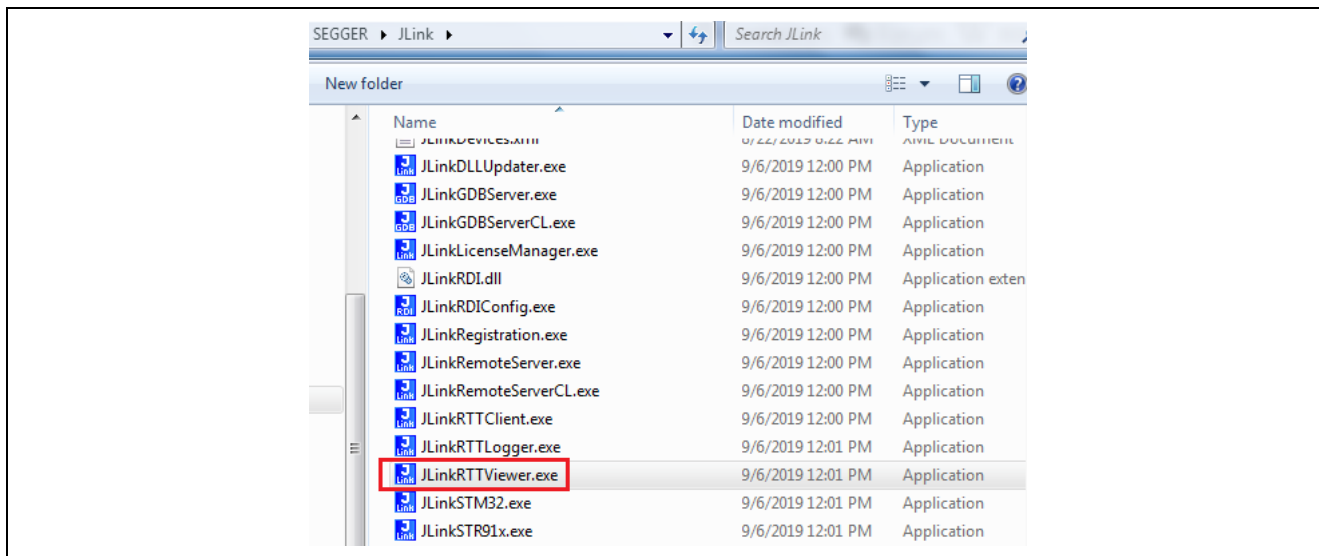
¹ Upon importing some example projects a user may be prompted to upgrade the e2studio project to the FSP version distributed with the e2studio platform installer available on GitHub.


It is recommended that the user avoids this and instead opts to download and install the required (and missing) version of FSP from the available sources into the used e2studio platform installer.

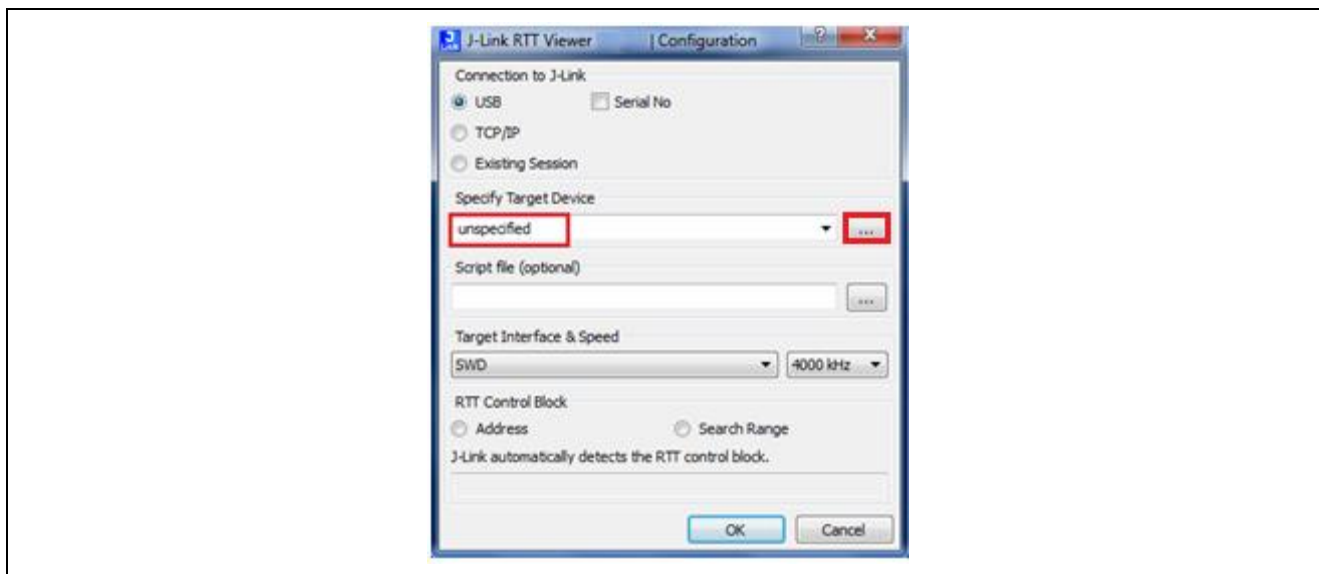
Example projects distributed through <https://github.com/renesas/ra-fsp-examples> may not be upgraded to the most release of FSP due to technical issues found during regression testing.

4.2.3 Running the Project

1. Open RTT Viewer by double clicking `JLinkRTTViewer.exe` in the downloaded /Segger/JLink folder.



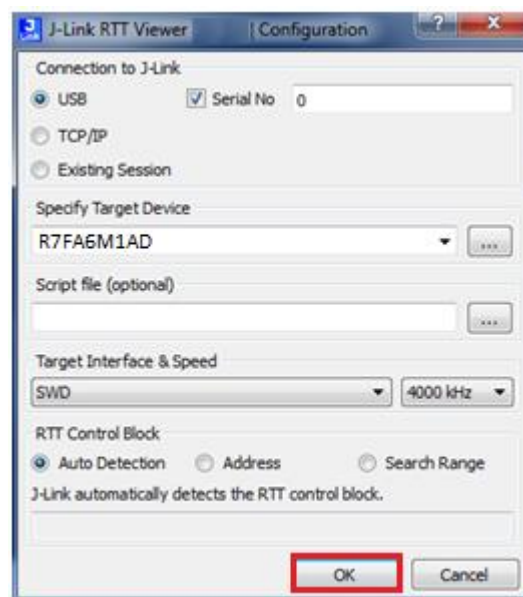
2. On opening, the field **Specify Target Device** shows up as **unspecified**. Click on the  tab to select the Renesas RA device.



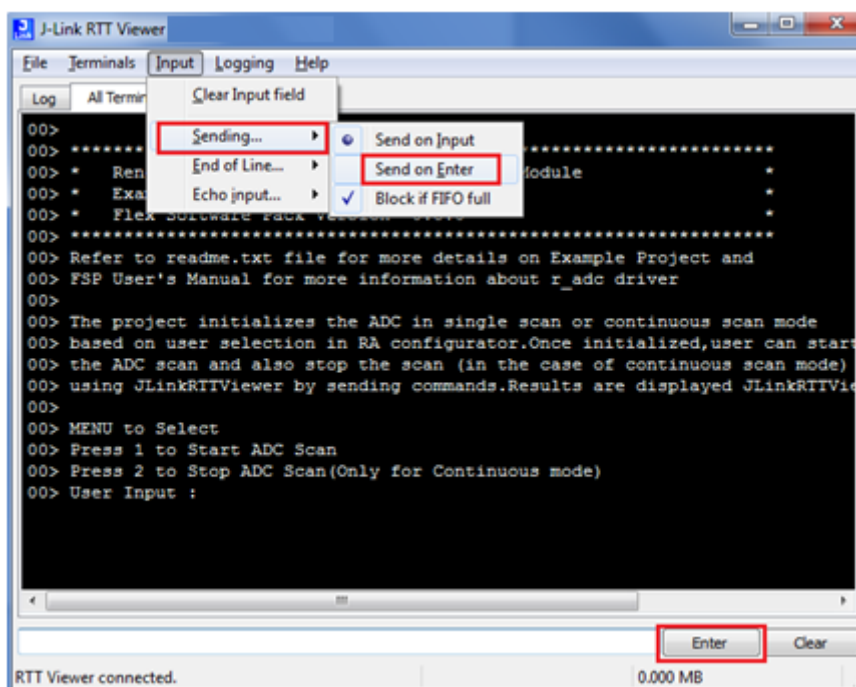
3. If multiple kits are connected to the PC, make sure to choose the corresponding serial number. The default is 0.



4. Click **OK**. (Refer Appendix).



5. Click on the **Input** tab and change **Sending** option to **Send on Enter**. Every time input is entered, you must either press the **Enter** or **Enter** tab on the RTT viewer.



6. Follow the instructions displayed on the RTT Viewer as shown above. Also refer to `readme.txt` file in the project folder (downloaded.zip file or in <https://github.com/renesas/ra-fsp>) to run the project.

Note:

1. Example Projects do not support floating point or special characters or any non-numeric characters.
2. Example projects do not handle cases where the user input is greater than the expected input array size.

5. References

FSP GitHub: <https://github.com/renesas/fsp>
 FSP User Manual: www.renesas.com/fsp#documents
 FSP Example Projects: <https://github.com/renesas/ra-fsp-examples>
 Evaluation Kit Manuals:

www.renesas.com/ra/ek-ra6m3g
www.renesas.com/ra/ek-ra6m3
www.renesas.com/ra/ek-ra6m2
www.renesas.com/ra/ek-ra6m1
www.renesas.com/ra/ek-ra4m1
www.renesas.com/ra/ek-ra2a1

Knowledge Base:

[Creating an RA Project with ARM Compiler 6 \(AC6\) in e2 studio](#)
[Creating a Custom Board Support Package \(BSP\) for FSP](#)
www.keil.com/appnotes/docs/apnt_330.asp

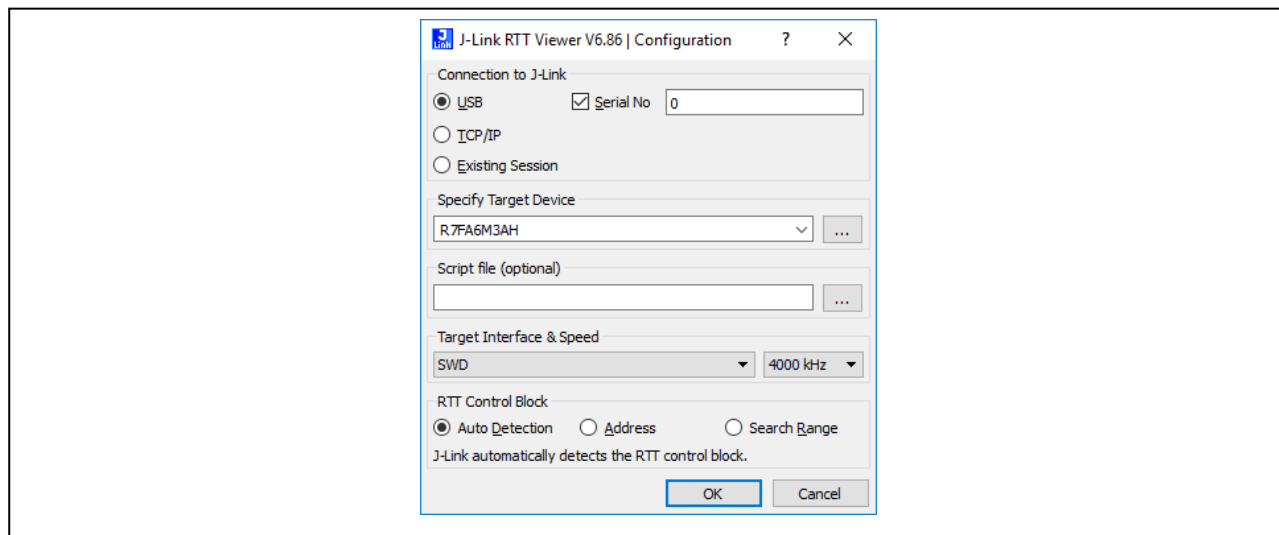
Support System:

www.renesas.com/ra/support

6. Appendix

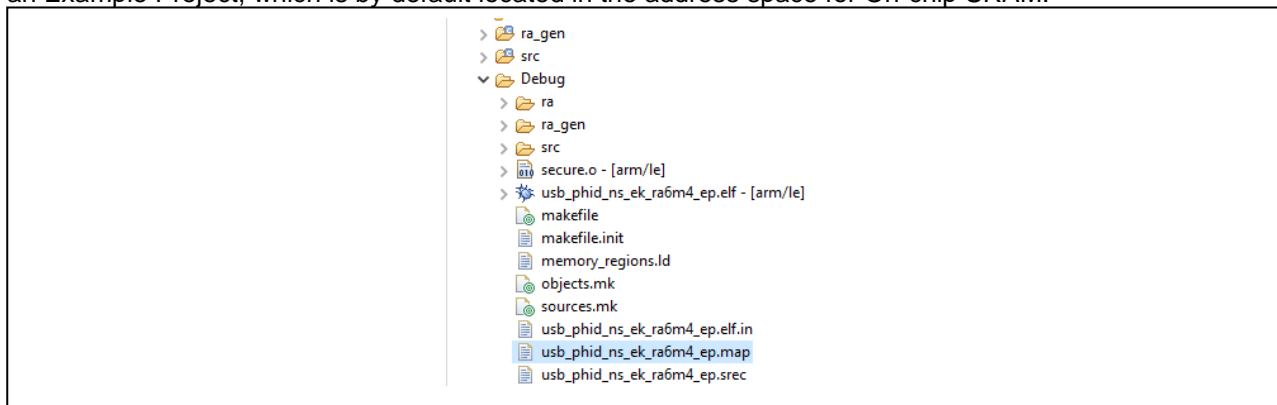
6.1 Limitations in connecting with J-Link RTT Viewer v7.64 or later

When using Auto Detection option for the RTT Control Block, J-Link RTT Viewer may not be able to find the `SEGGER_RTT` variable in RAM memory. If the RTT Control Block cannot be found by RTT Viewer, then output from an Example Project may not be visible in the RTT Viewer Console.



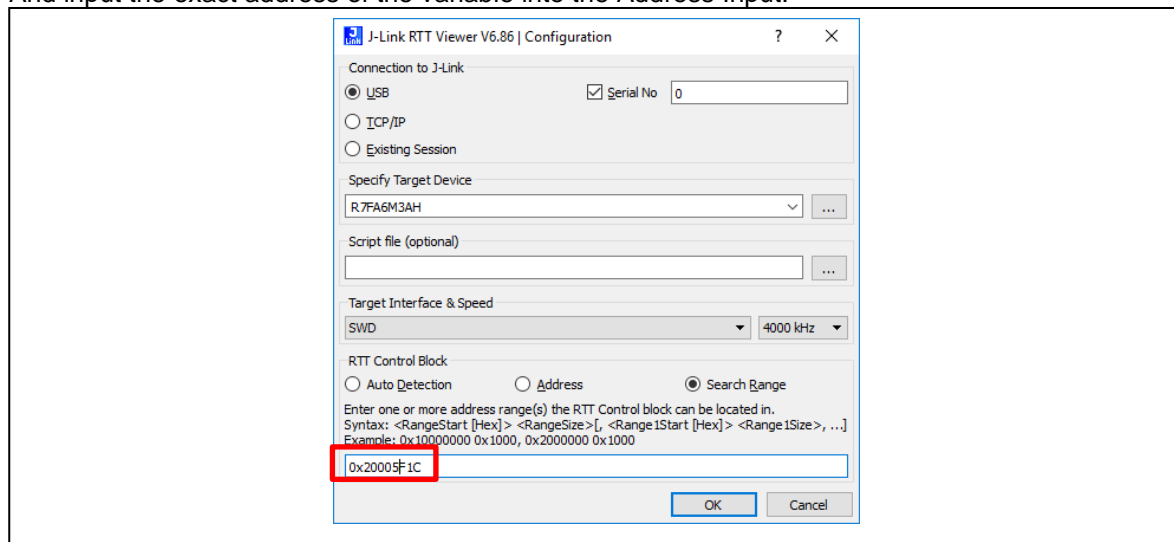
To circumvent this situation, you may use any one of the following approaches:

1. Search `_SEGGER_RTT` variable in the map file, generated upon successfully building a configuration of an Example Project, which is by default located in the address space for On-chip SRAM.

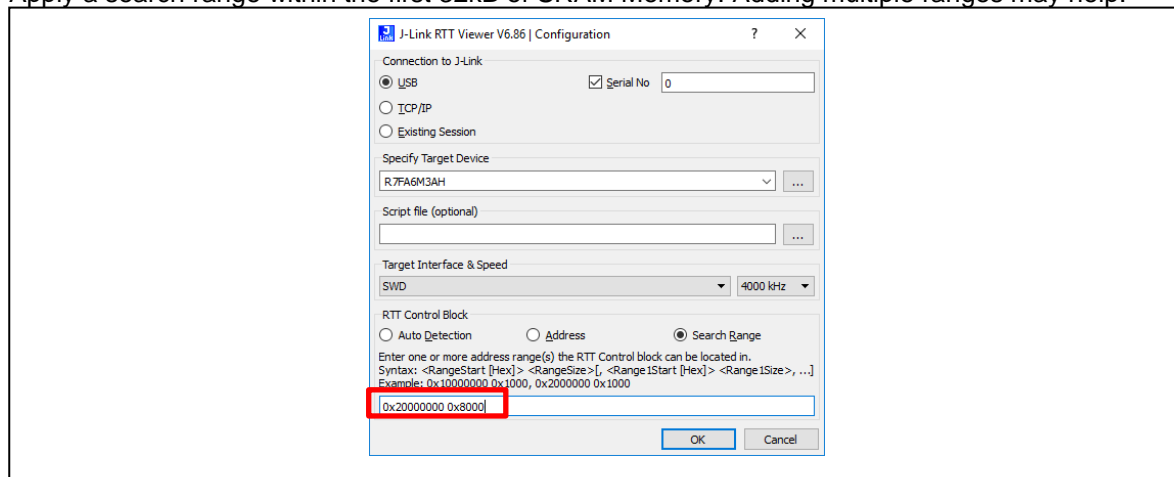


COMMON	0x20005f1c	0xa8	./src/SEGGER_RTT/SEGGER_RTT.o
	0x20005f1c		SEGGER_RTT
COMMON	0x20005fc4	0x51	./ra_gen/main.o
	0x20005fc4		g_fsp_common_initialized_semaphore_memory
	0x2000600c		g_fsp_common_thread_count

And input the exact address of the variable into the Address Input.



2. Apply a search range within the first 32kB of SRAM Memory. Adding multiple ranges may help.



Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Oct.03.19	—	Initial release
1.01	May.26.20	—	Support for IAR, EK-RA4W1
1.02	Jul.08.20	—	Updates for FSP v1.2.0
1.03	Aug.27.20	—	Support for FSP v1.3.0
1.04	Oct.07.20	—	Support for FSP v2.0.0. Appendix for known limitations.
1.05	Nov.30.20	—	Support for FSP v2.2.0
1.06	Jan.25.21	—	Support for FSP v2.3.0
1.07	Jun 19.21	—	Added footnote for usage with Platform Installers
1.08	Feb.09.22	—	Support for FSP v3.5.0
1.09	May.11.22	—	Support for FSP v3.7.0
1.10	July.14.22	—	Support for FSP v3.8.0

FSP Example Project Usage Guide – User's Manual

Publication Date: July.14.22

Published by: Renesas Electronics Corporation

FSP Example Project Usage Guide