Quick Start Guide

RA4M1 Group

Evaluation Kit for RA4M1 Microcontroller Group
EK-RA4M1
Quick Start Guide

Renesas RA Family
RA4 Series

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
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The product generates, uses, and can radiate radio frequency energy and may cause harmful interference to radio communications. There is no guarantee that interference will not occur in a particular installation. If this equipment causes harmful interference to radio or television reception, which can be determined by turning the equipment off or on, you are encouraged to try to correct the interference by one or more of the following measures:

• Ensure attached cables do not lie across the equipment.

• Reorient the receiving antenna.

• Increase the distance between the equipment and the receiver.

• Connect the equipment into an outlet on a circuit different from that which the receiver is connected.

• Power down the equipment when not in use.

• Consult the dealer or an experienced radio/TV technician for help.

Note: It is recommended that wherever possible shielded interface cables are used.

The product is potentially susceptible to certain EMC phenomena. To mitigate against them it is recommended that the following measures be undertaken:

• The user is advised that mobile phones should not be used within 10 m of the product when in use.

• The user is advised to take ESD precautions when handling the equipment.

The Evaluation Kit does not represent an ideal reference design for an end product and does not fulfill the regulatory standards for an end product.

Renesas RA Family

EK-RA4M1

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1. Introduction

This Quick Start Guide (QSG) provides:

- An overview of the Quick Start example project that the EK-RA4M1 board comes pre-programmed with.
- Instructions for running the Quick Start example project.
- Instructions for importing, modifying, and building the Quick Start example project using Flexible Software Package (FSP) and e^2 studio Integrated Development Environment (IDE).

1.1 Assumptions and Advisory Notes

1. Tool experience: It is assumed that the user has prior experience working with IDEs such as e^2 studio 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 project described in this document.
3. 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. Kit Contents

The following components are included in the kit:

1. EK-RA4M1 board
2. Micro USB device cable

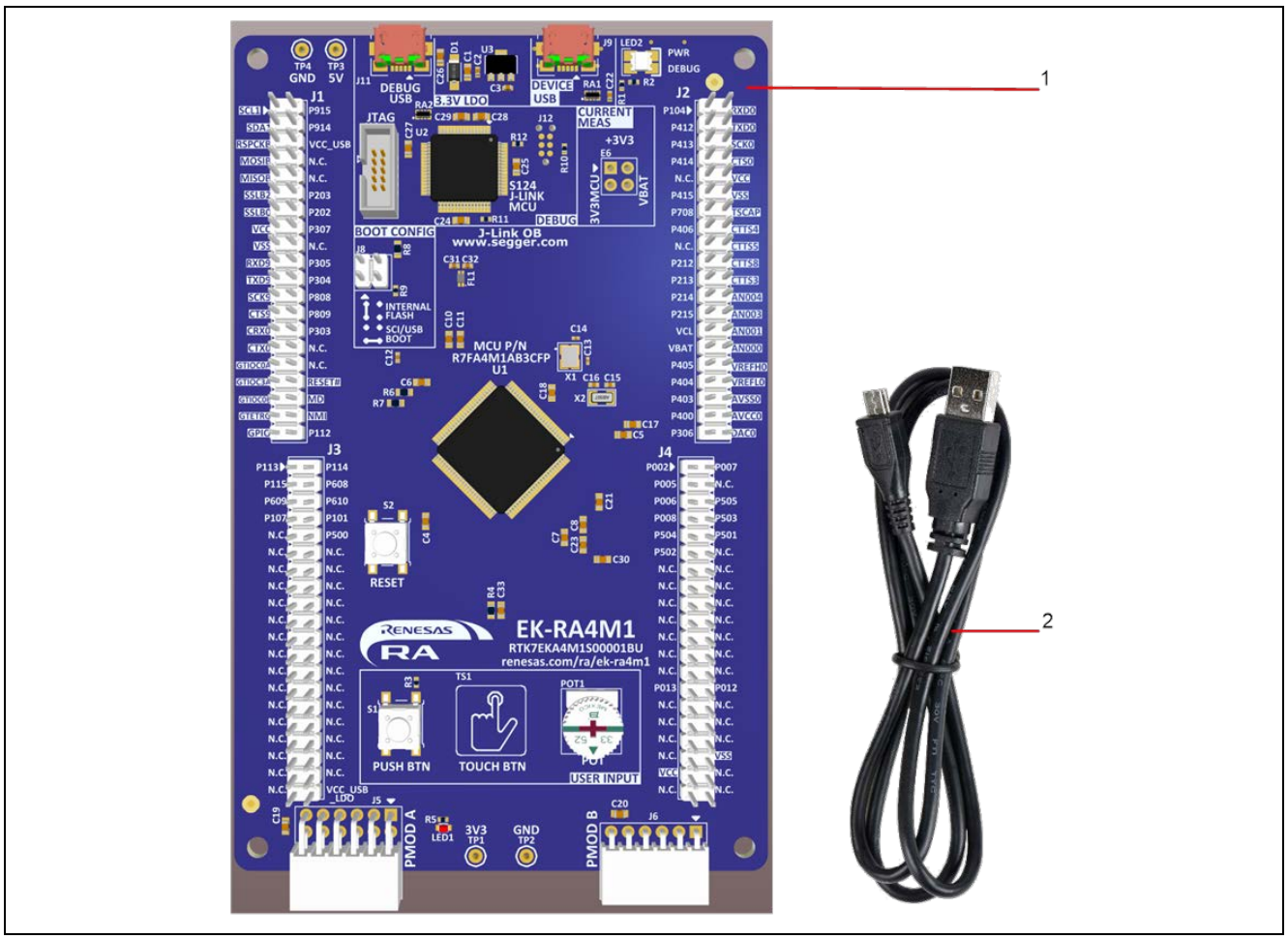

Figure 1. EK-RA4M1 Kit Contents

3. Overview of the Quick Start Example Project

The Quick Start example project allows the user to change the frequency of the on-board LED, LED1, using the User Button (PUSH BTN). The supported LED frequencies are 1 Hz, 5 Hz, and 10 Hz.

When the board running the Quick Start example project is connected to the PC via Device USB port, the kit information, MCU die temperature, user LED blinking frequency, and so forth, can be displayed on a terminal console.

3.1 Quick Start Example Project Flow

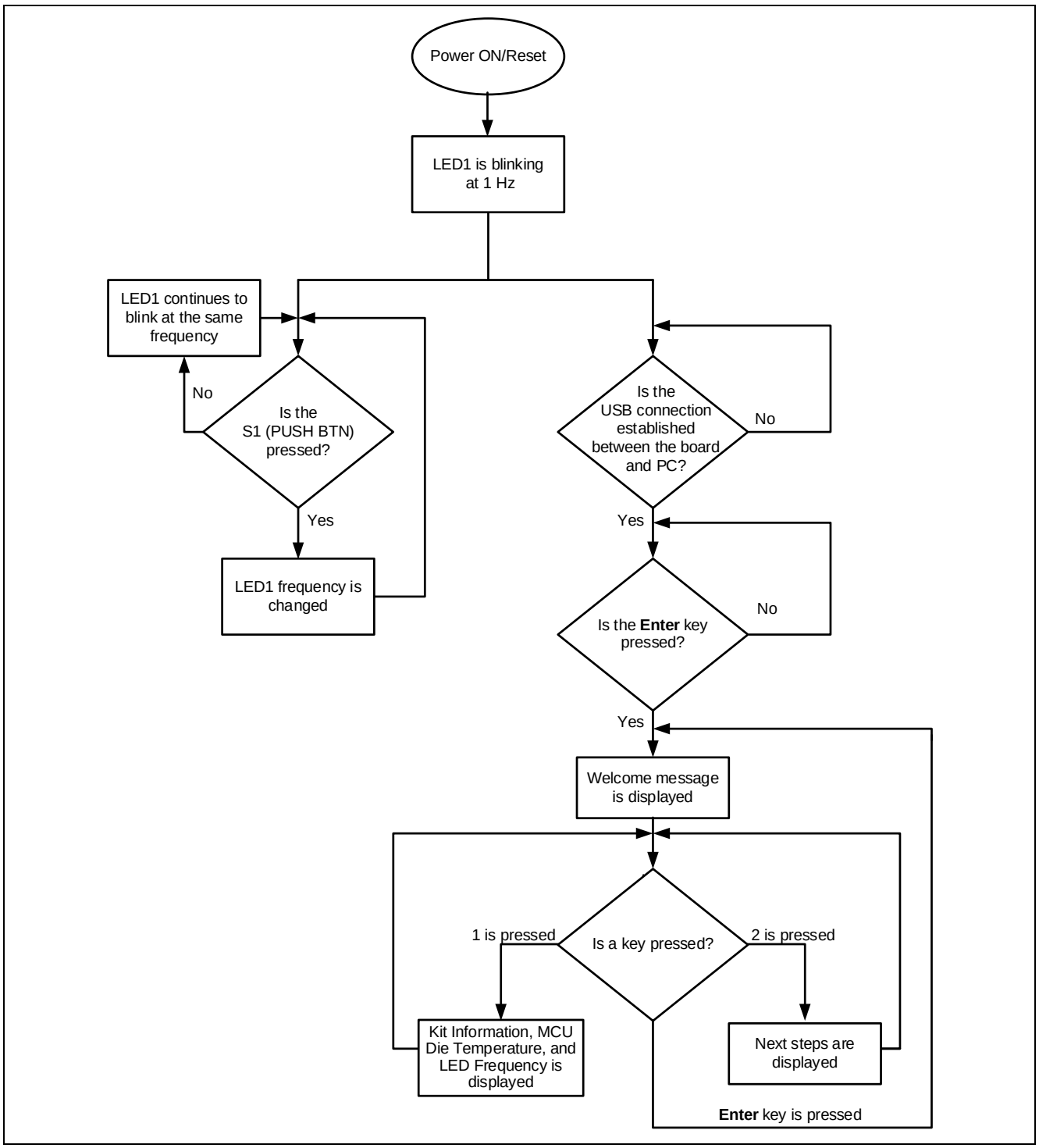

Figure 2. Quick Start Example Project Flow

4. Running the Quick Start Example Project

This section lists the requirements and instructions to power up the EK-RA4M1 board and run the Quick Start example project.

Hardware Requirements

- EK-RA4M1 board
- Two Micro USB device cables

  Note: EK-RA4M1 includes only one micro USB device cable. The user will need an additional micro USB device cable for this project.

- A PC with at least 1 USB port

Software Requirements

- Windows® 10 operating system
- USB Serial Drivers (included in Windows 10)
- Tera Term (or similar) terminal console application

4.1 Connecting and Powering Up the Board

1. Connect the micro USB end of the first micro USB device cable to connector J11 (DEBUG USB located in the DEBUG area) on the board.
2. Connect the other end of this cable to the USB port of the host PC or a 5 V power source. LED2 (PWR) on the board lights up solid green, indicating that the board is powered on.

   Note: EK-RA4M1 uses SEGGER J-Link® as the on-board debugging interface. Make sure that the J-Link drivers are installed on the PC by checking for them in the Windows Device Manager. If J-Link drivers are installed on the PC and detected by the board, the LED2 (DEBUG) blinks orange with a very small duty cycle that is barely noticeable. Otherwise, LED2 (DEBUG) blinks orange prominently.

3. Connect the micro USB end of the second micro USB device cable to connector J9 (DEVICE USB) on the board. Connect the other end of the cable to the USB port of the host PC.

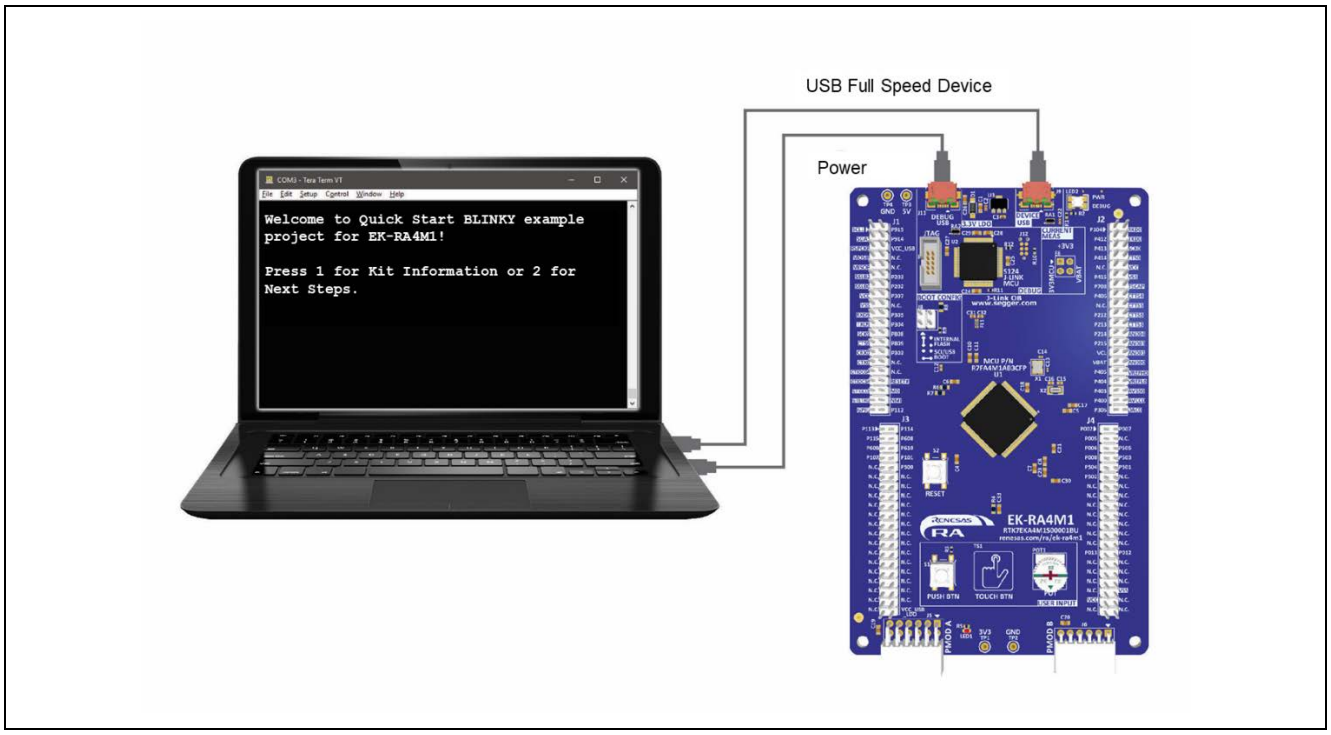

Figure 3. Connecting the Board to the Host PC via USB Full Speed Port

4.2 Running the Quick Start Example Project

To run the Quick Start example project, follow the instructions below:

1. On power up or RESET, the user LED (LED1) starts blinking red at 1 Hz.
2. Press the user button (S1**,** PUSH BTN) on the EK-RA4M1 board to change the blinking frequency of LED1. With every button press, the frequency will switch from 1 Hz to 5 Hz to 10 Hz and cycle back.
3. On the host PC, open Windows Device Manager. Expand **Ports (COM & LPT)**, locate **USB Serial Device (COMxx)** and note down the COM port number for reference in the next step.

   Note: USB Serial Device drivers are required to communicate between the EK-RA4M1 board and the terminal application on the host PC.

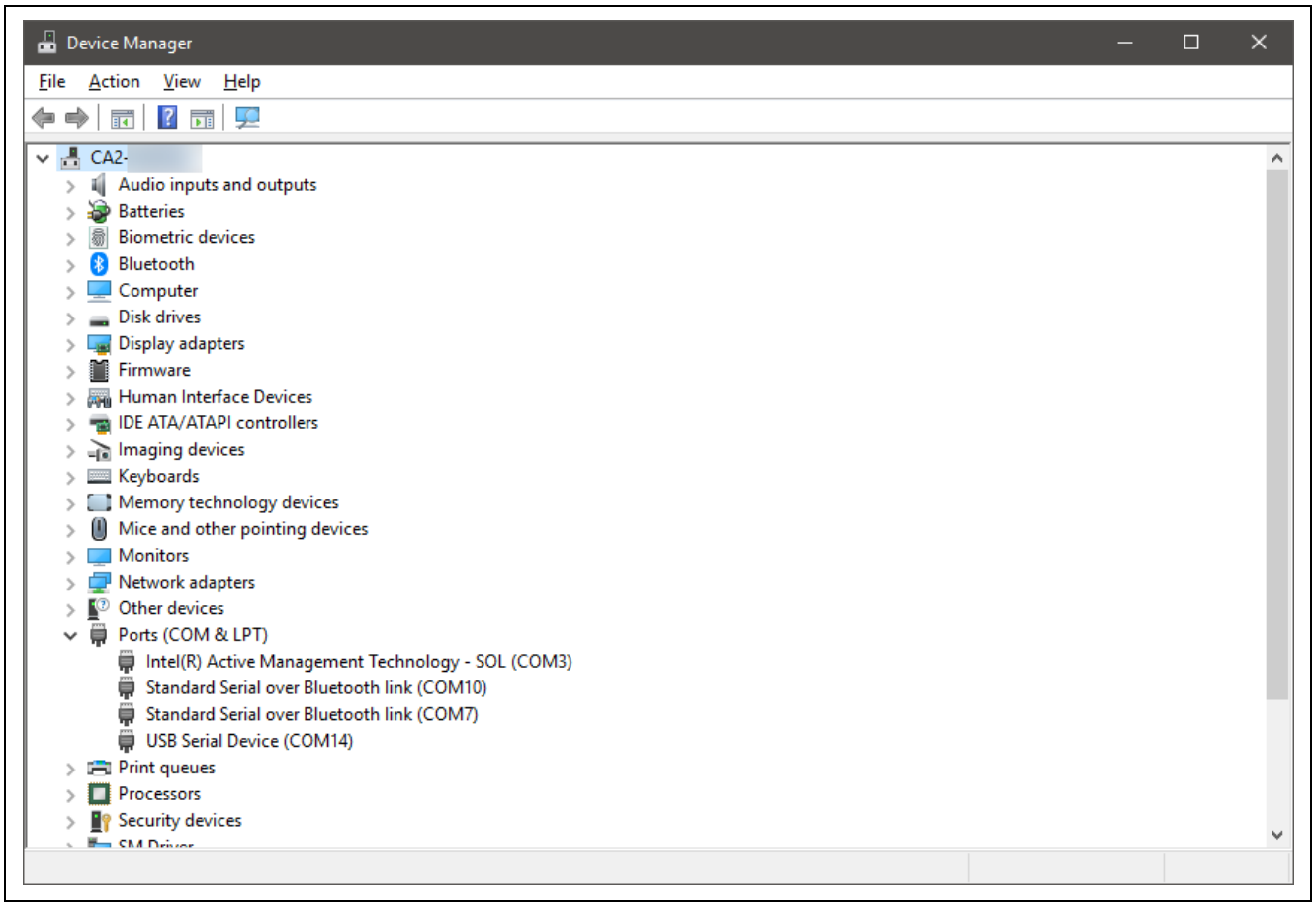

Figure 4. USB Serial Device in Windows Device Manager

4. Open Tera Term, select **Serial** and **COMxx: USB Serial Device (COMxx)** and click **OK**.

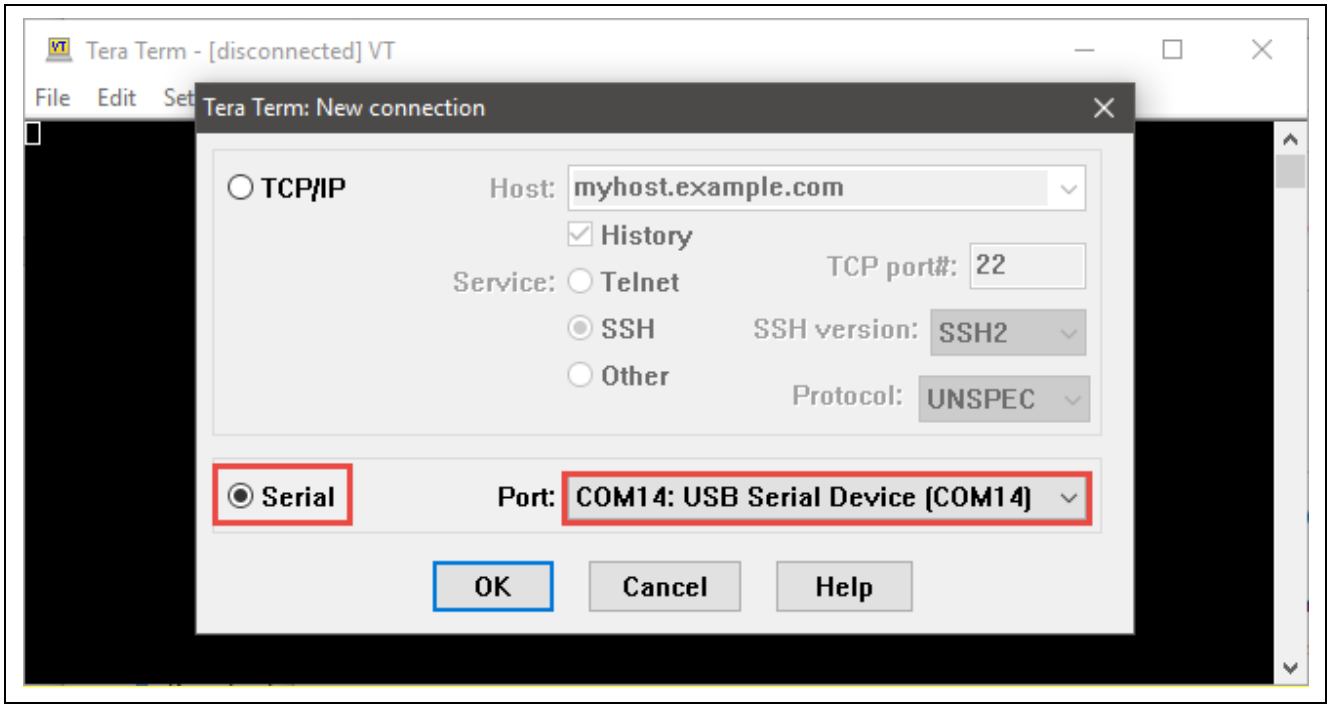

Figure 5. Selecting the Serial Port on Tera Term

5. Press the **Enter** key. The welcome message will be displayed.

Figure 6. Welcome Message

6. Press **1** to display the kit name, part number, MCU die temperature, and LED1's current blinking frequency.

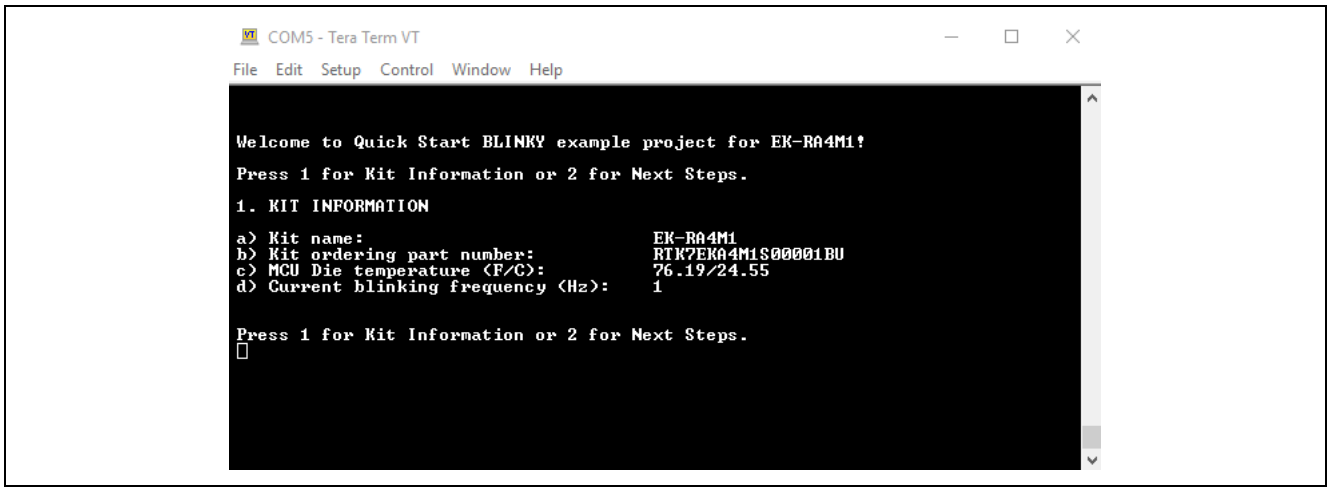

Figure 7. Kit Information

7. Press **2** to display Next Steps.

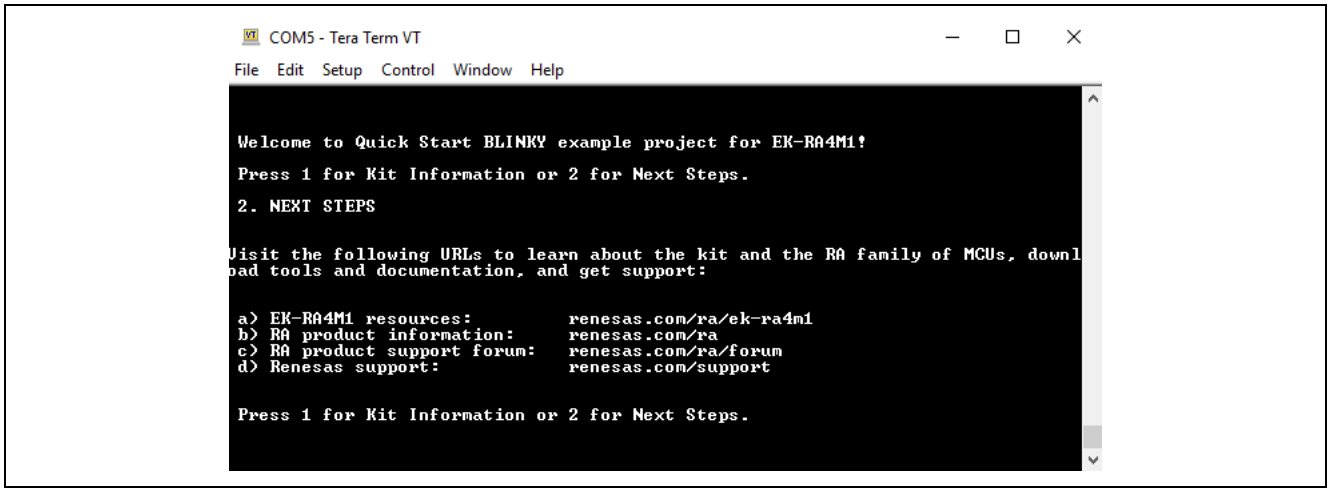

Figure 8. Next Steps

Note: At any point, the user can press the **Enter** key to return to the welcome message.

5. Customizing the Quick Start Example Project

This section provides instructions on customizing the Quick Start example project.

5.1 Downloading and Installing Software and Development Tools

Before the Quick Start example project can be modified, it is necessary to download and install software and development tools on the host PC.

The FSP, J-Link® USB drivers, and e² studio are in a single downloadable platform installer available on the FSP webpage at renesas.com/ra/fsp. New users are recommended to use the **Quick Install** option provided in the installation wizard, to minimize the amount of manual configuration needed.

There is no need to download and install software, development tools, and drivers separately.

5.2 Downloading and Importing the Quick Start Example Project

1. Download and extract the Quick Start example project to a local directory on the host PC.
   - The Quick Start example project (source code and project files) is available in the EK-RA4M1-Example Projects Bundle that is available in the Downloads tab of EK-RA4M1 webpage at renesas.com/ra/ek-ra4m1.
   - Download and extract the example projects bundle (`xxxxxxxxxxxxxxx-ek-ra4m1-exampleprojects.zip`) to a local directory on the host PC.
   - Browse to the Quick Start example project at xxxxxxxxxxxxxxx-ek-ra4m1-exampleprojects\ek_ra4m1_quickstart\quickstart_ek_ra4m1_ep
2. Launch e² studio.
3. Browse to the Workspace where the project file is to be imported. Enter the name in the Workspace dialog box to create a new workspace.

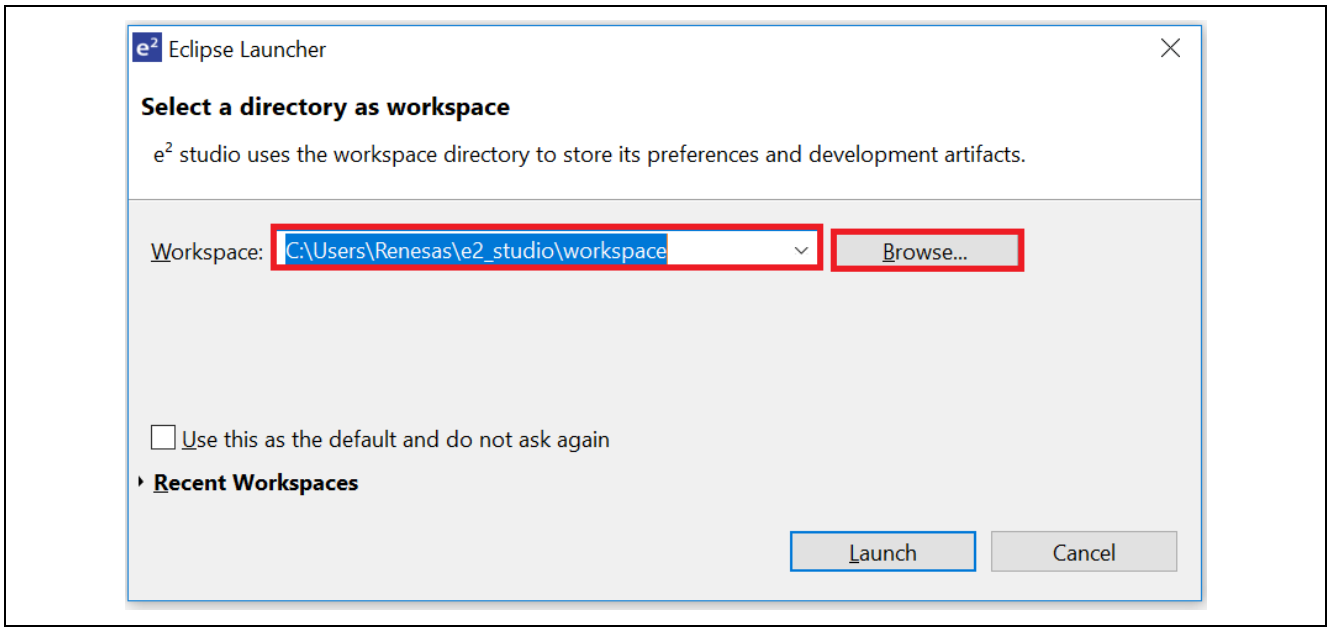

Figure 9. Creating a New Workspace

4. Click **Launch.**

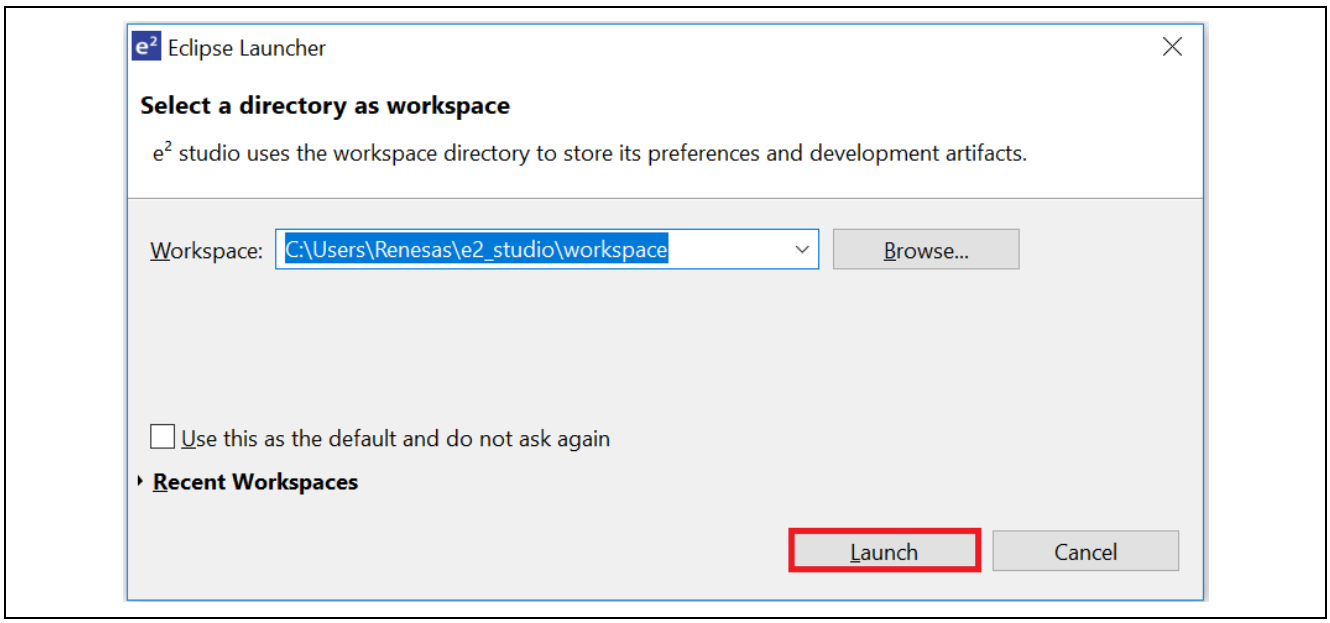

Figure 10. Launching the Workspace

5. Click **Import** from the **File** drop-down menu.

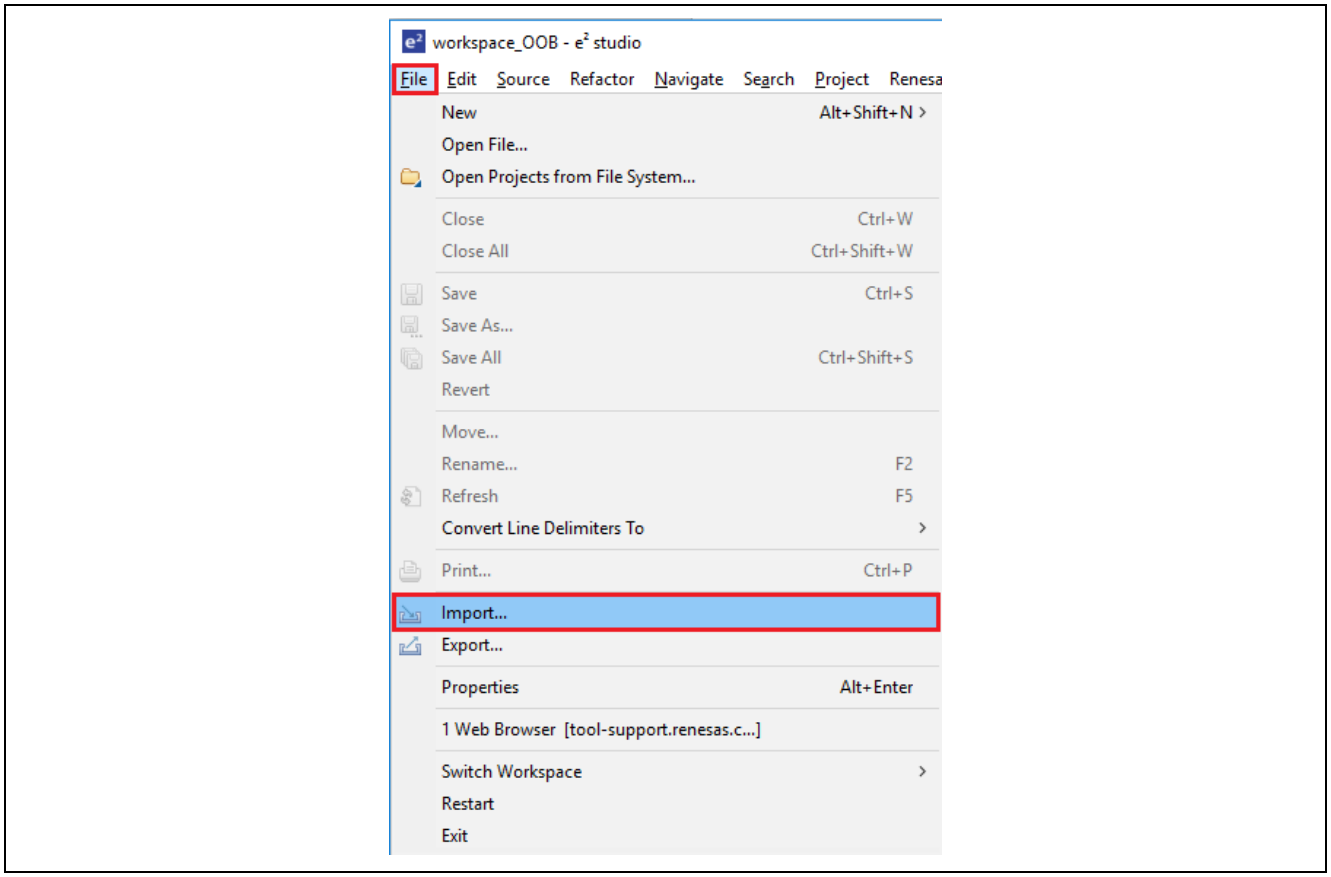

Figure 11. Importing the Project

6. In the Import dialog box, select General, and then select Existing Projects into Workspace.

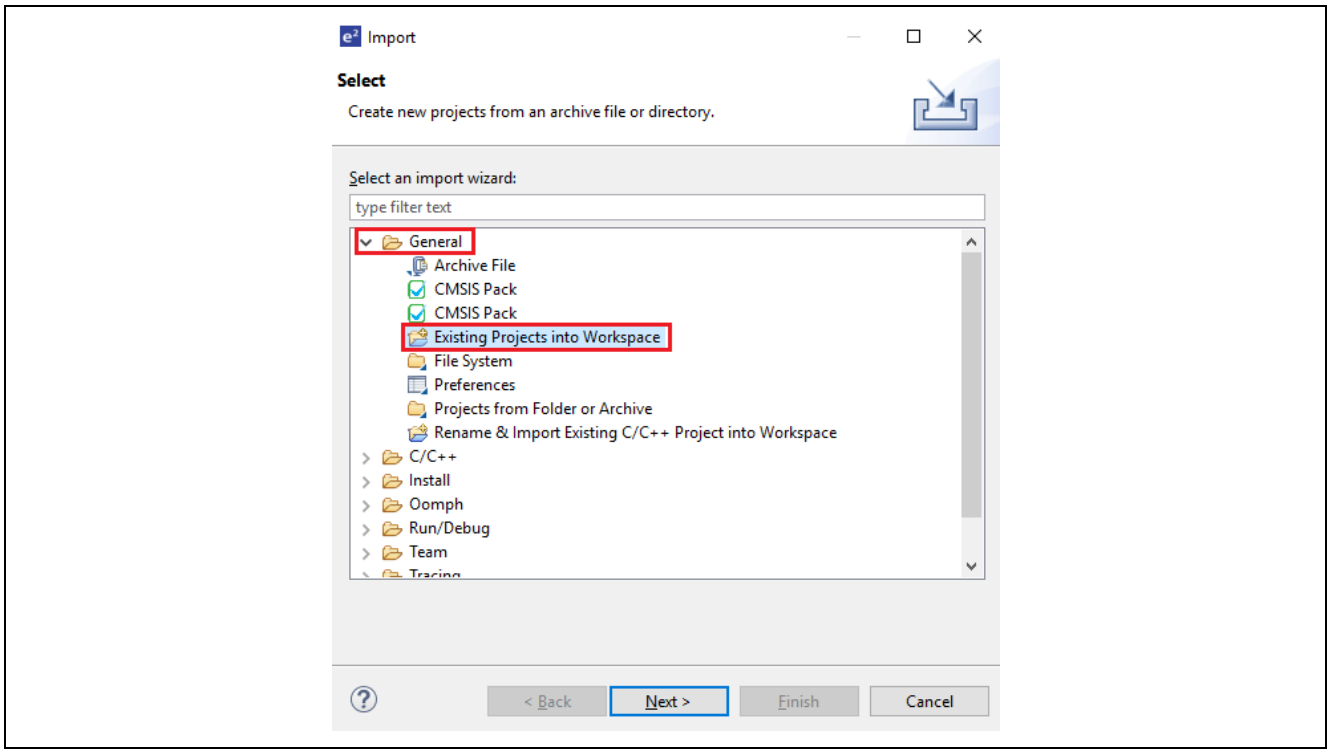

Figure 12. Importing Existing Projects into the Workspace

7. Click **Next**.

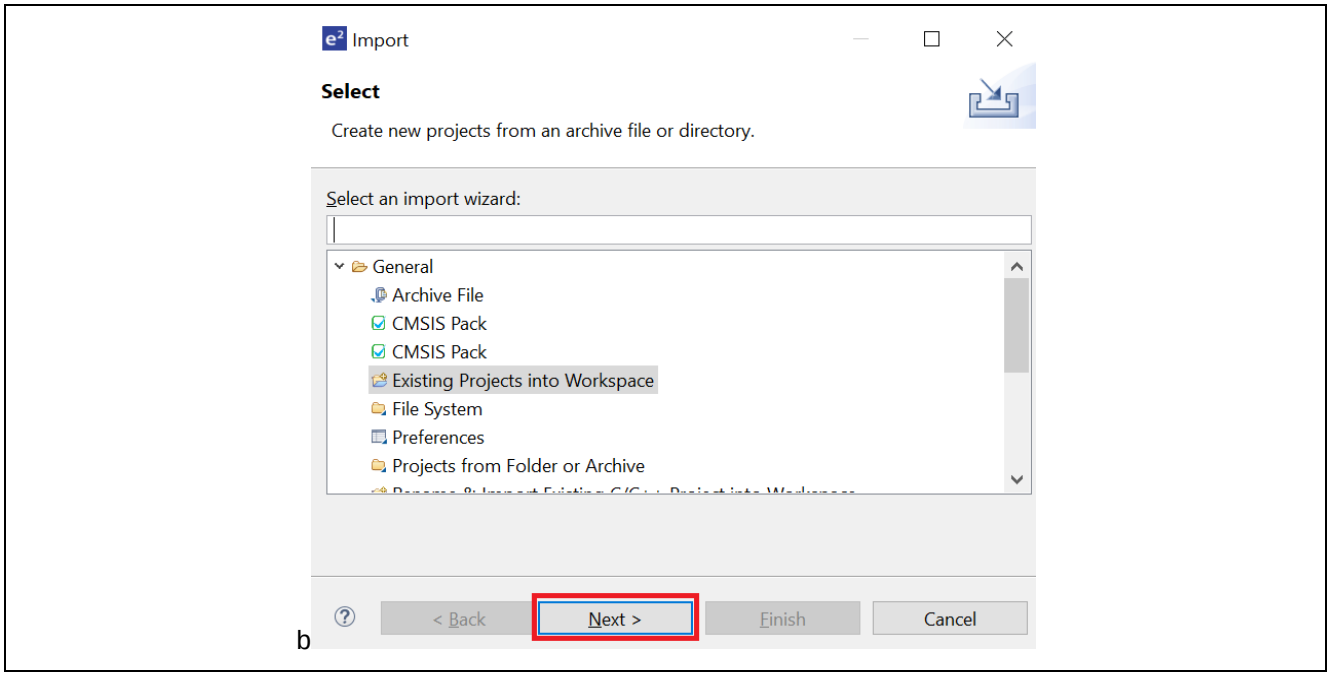

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Figure 13. Clicking Next to Import Existing Projects into the Workspace

8. Click **Select root directory** and click **Browse** to go to the location of the Quick Start example project folder.

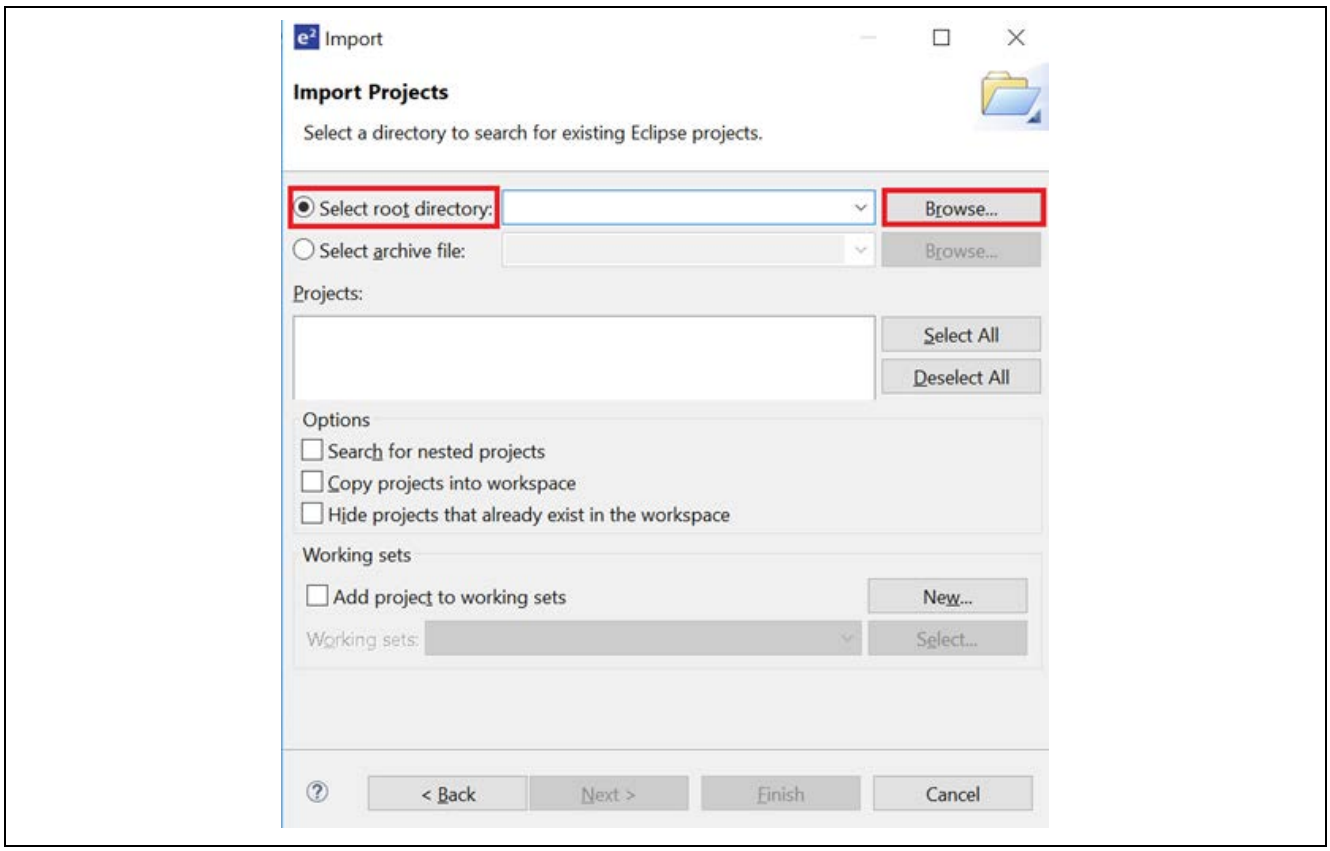

Figure 14. Selecting the Root Directory

9. Select the Quick Start example project and click **Finish**.

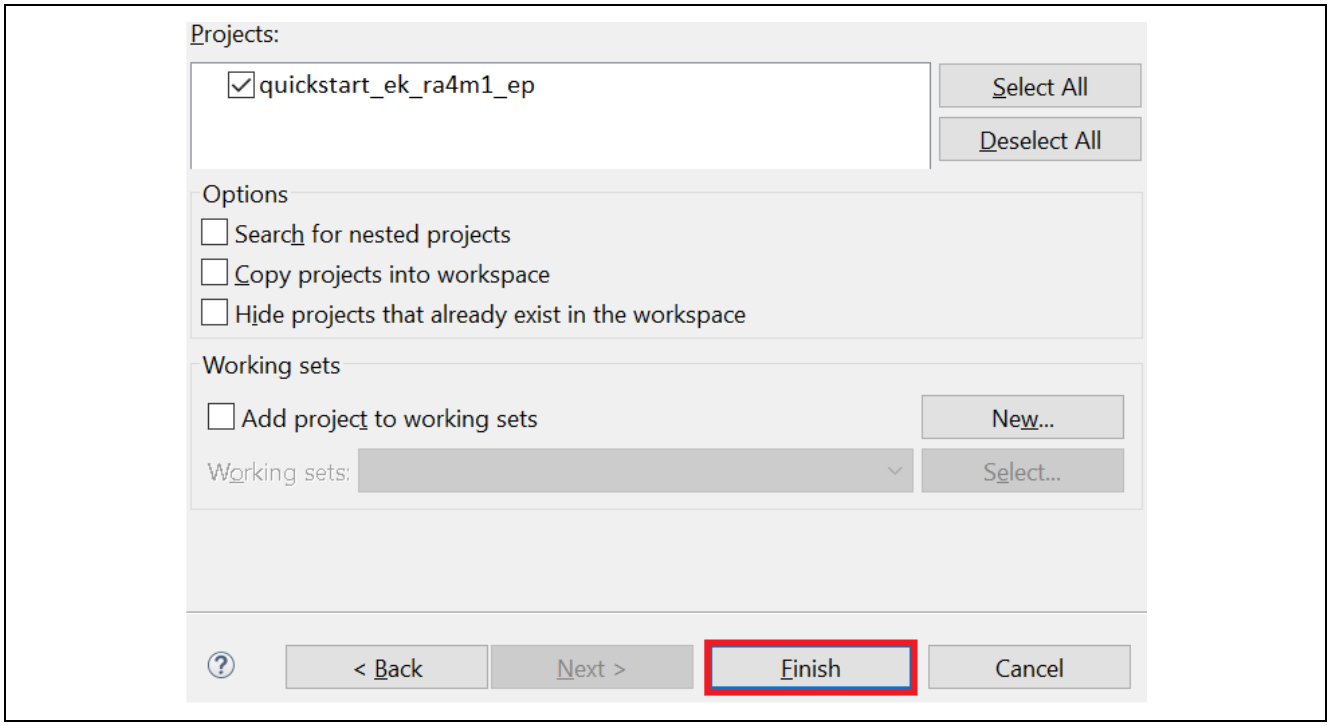

Figure 15. Finishing Importing the Quick Start Example Project

5.3 Modifying, Generating, and Building the Quick Start Example Project

This section provides instructions to modify the Quick Start example project. The Quick Start example project can be modified by editing the source code and reconfiguring the properties of the MCU peripherals, pins, clocks, interrupts, and so forth.

Note: The specific modifications that can be performed to the Quick Start example project are not prescribed in this QSG. User discretion is advised while modifying the Quick Start example project.

1. Once the Quick Start example project is imported, click the **configuration.xml** file to open the configurator. The configurator provides an easy to use interface to configure the properties of MCU peripherals, pins, clocks, and so forth.

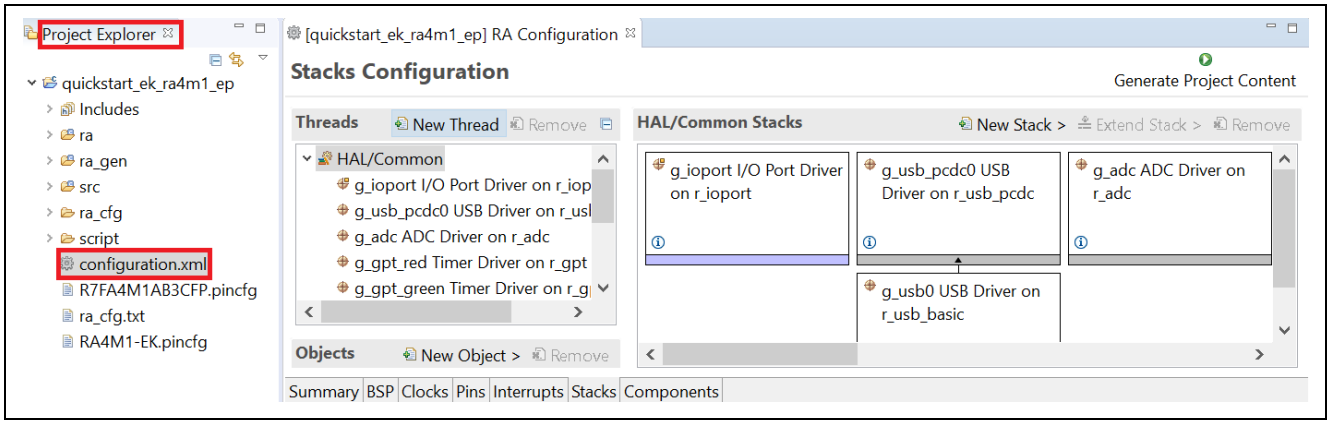

Figure 16. Opening the Configurator

2. For example, in the **Stacks** tab of the configurator, the user can click to select modules to modify the configuration settings, as required. The following screen shot illustrates modifying the ADC driver configuration.

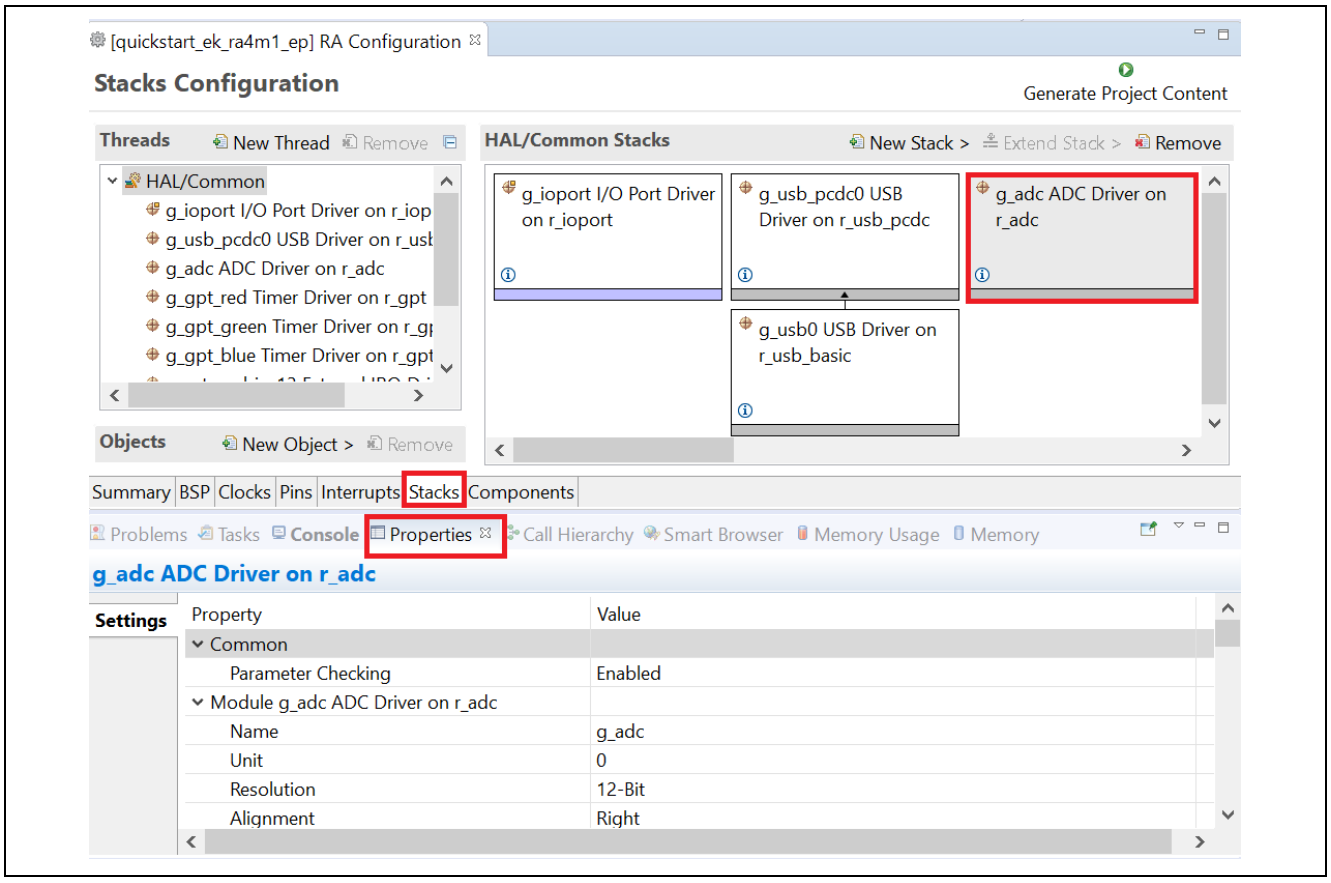

Figure 17. Modifying the Configuration Settings

3. After the desired modifications are made, click **Generate Project**. A dialog box may appear with an option of saving the configuration changes. Click **Proceed**.

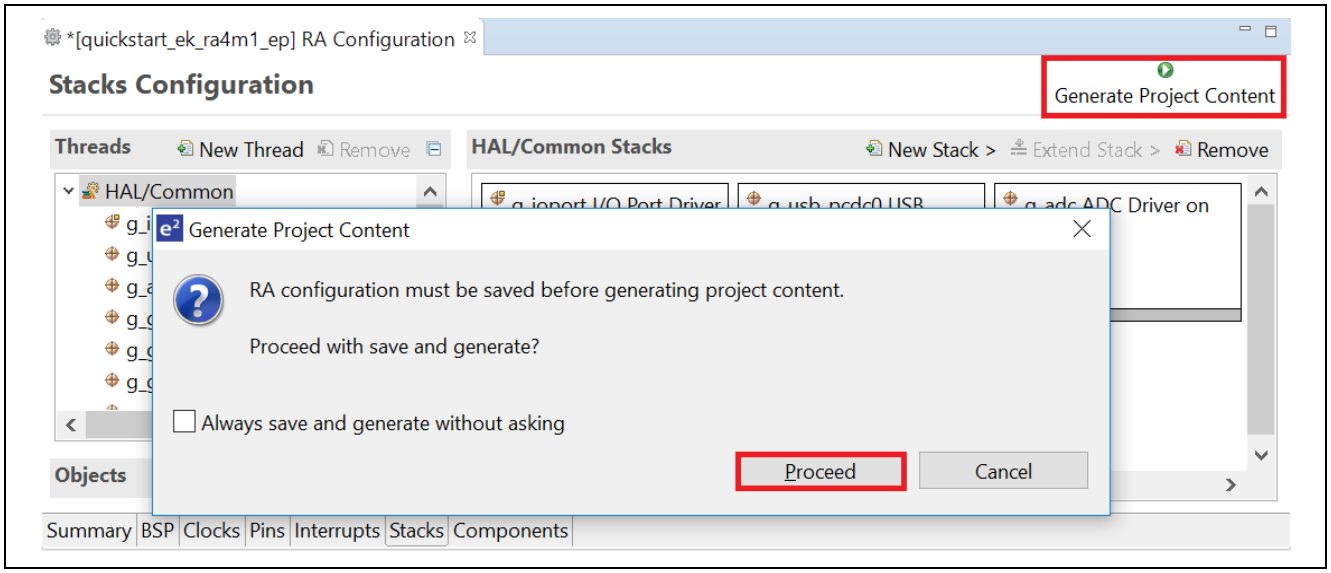

Figure 18. Saving the Configuration Changes

4. Modify the source files in the ***/src*** folder as needed and save the changes.
5. Build the project by clicking the build icon.

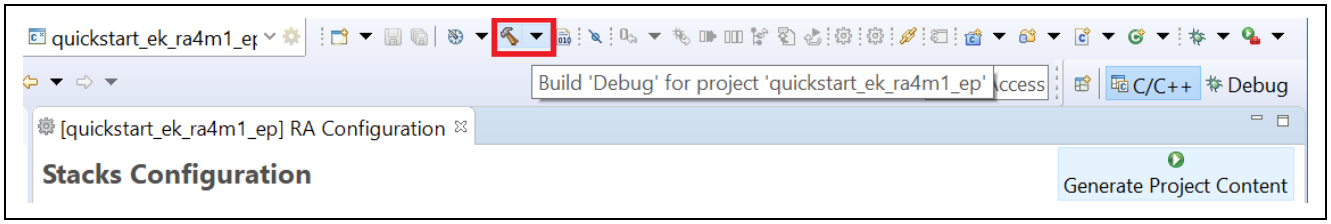

Figure 19. Building the Project

6. A successful build produces an output as follows.

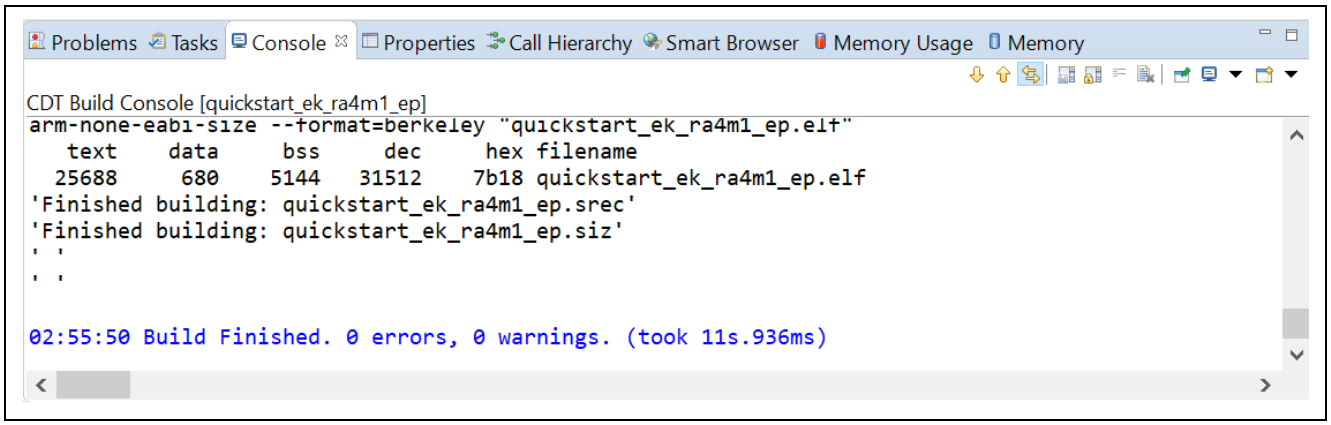

Figure 20. Successful Build Output

5.4 Downloading and Running the Modified Quick Start Example Project

Note: If, in section 4.1, the EK-RA4M1 board was powered using a power source other than the USB port of the host PC, make sure that the USB device cable connected to connector J11 (DEBUG USB located in the DEBUG area) on the board is connected to the USB port of the host PC. It is necessary to connect the host PC to J11 in order to download the project on the EK-RA4M1.

1. In e^2 studio, click the drop-down menu for the debug icon, select **Debug As** option, and choose **Renesas GDB Hardware Debugging.**

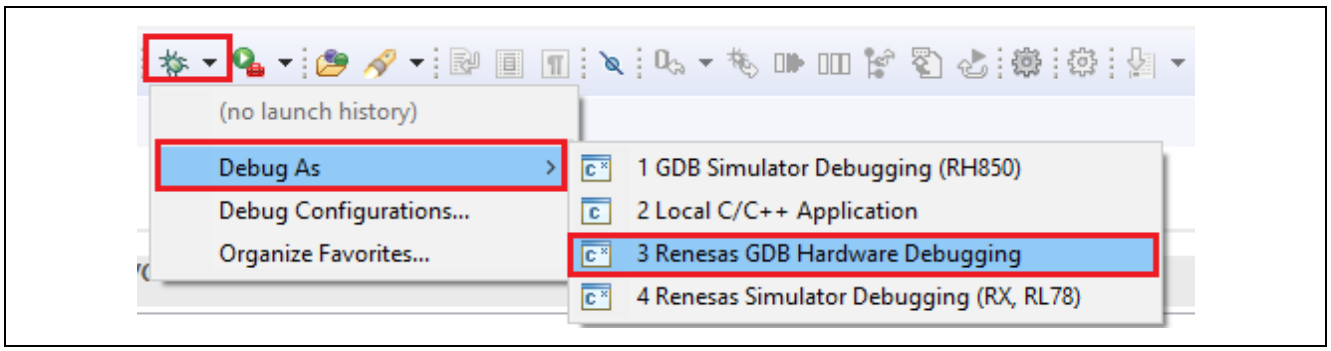

Figure 21. Selecting the Debug Option

2. A dialog box may appear. Click **Yes**.

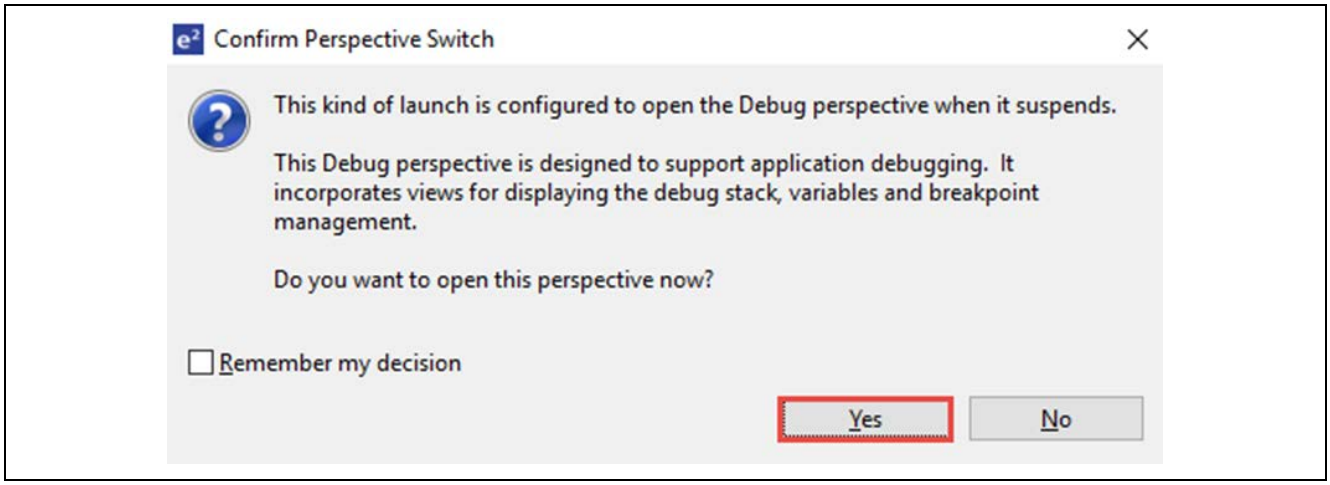

Figure 22. Opening the Debug Perspective

3. Press **F8** or **Resume** icon to begin executing the project.

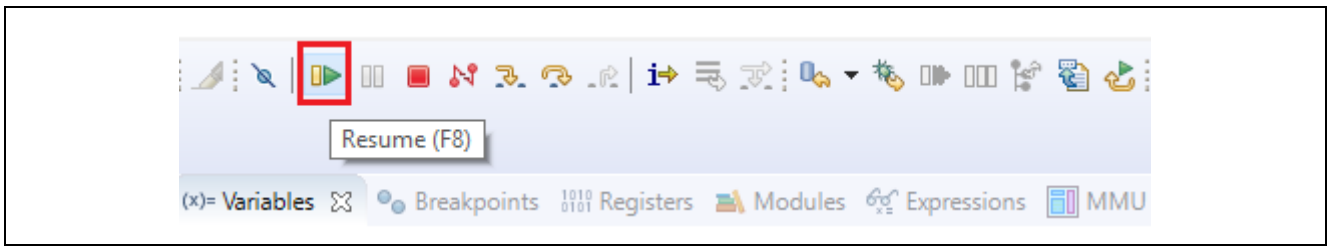

Figure 23. Executing the Project

4. The modified Quick Start example project is programmed into the kit and is running. The project can be paused, stopped, or resumed using the debug controls.

6. Next Steps

1. To learn more about the EK-RA4M1 kit, refer to the EK-RA4M1 user's manual and design package available in the Documents and Download tabs respectively of the EK-RA4M1 webpage at renesas.com/ra/ek-ra4m1.
2. Renesas provides several example projects that demonstrate different capabilities of the RA MCUs. These example projects can serve as a good starting point for users to develop custom applications. Example projects (source code and project files) for EK-RA4M1 kit are available in the EK-RA4M1-Example Projects Bundle. The example projects bundle is available in the Downloads tab of EK-RA4M1 webpage.
   - Download and extract the example projects bundle (`xxxxxxxxxxxxxxx-ek-ra4m1-exampleprojects.zip`) to a local directory on the host PC.
   - Refer to the list of all example projects (`xxxxxxxxxxxxxxx-ek-ra4m1-exampleprojects.pdf`) available inside the example projects bundle.
   - Browse to the desired example project (for example: adc_ek_ra4m1_ep) in the example projects bundle (xxxxxxxxxxxxxxx-ek-ra4m1-exampleprojects\ek_ra4m1\adc\adc_ek_ra4m1_ep)
   - For help on using example projects, refer to `Example Project Usage Guide.pdf` in the RA Example Repository on GitHub at github.com/renesas/ra-fsp-examples/tree/master/example_projects. The archived versions of the source code of the example projects are available the example project repository.

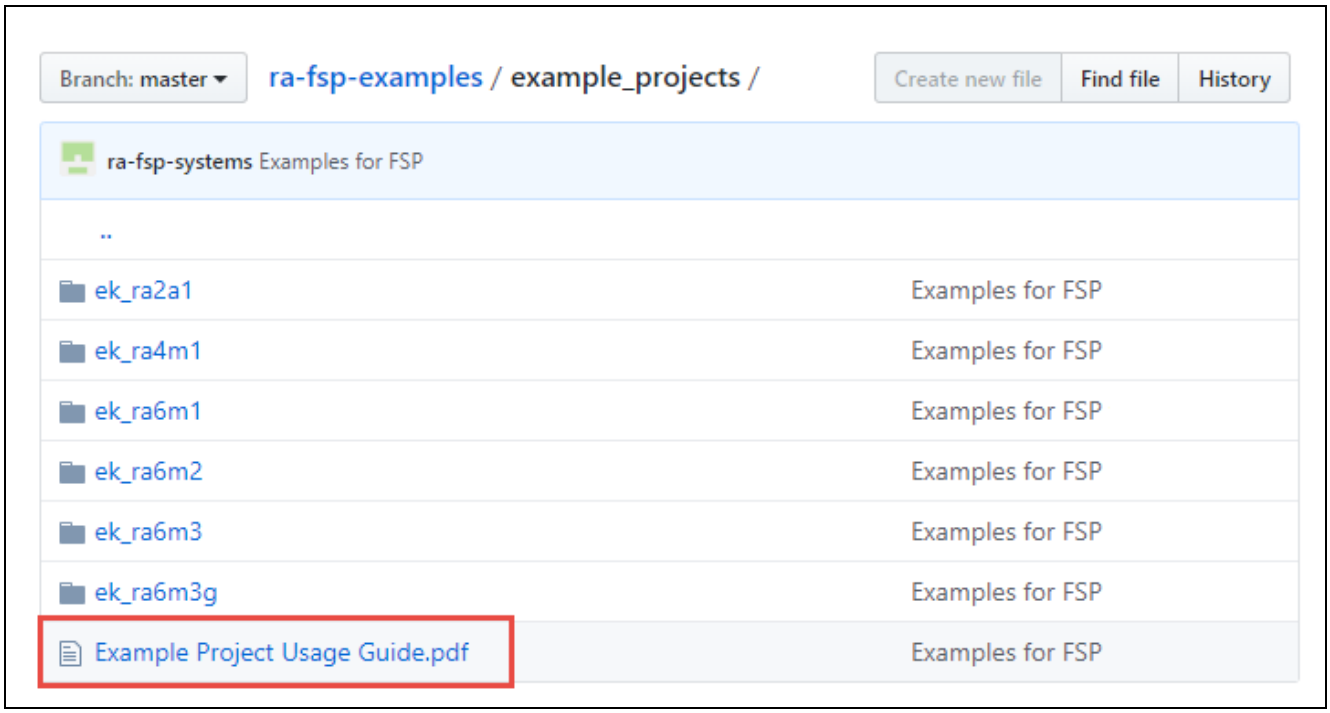

Figure 24. Example Project Directory Contents

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7. Website and Support

Visit the following URLs to learn about the kit and the RA family of microcontrollers, download tools and documentation, and get support.

EK-RA4M1 Resources	renesas.com/ra/ek-ra4m1
RA Product Information	renesas.com/ra
RA Product Support Forum	renesas.com/ra/forum
Renesas Support	renesas.com/support

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Sep.17.19	—	Initial release
1.01	Nov.18.20	—	Updated sections 5.2, Downloading and Importing the Quick Start Example Project and 6, Next Steps.
1.02	Jun.12.20	12, 18	Updated Example Project information

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