

# RX261 Group

Evaluation Kit for RX261 Microcontroller Group  
EK-RX261  
Quick Start Guide

Renesas RX Family  
RX200 Series

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## Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,  
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# 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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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.

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## Renesas RX Family

# EK-RX261 - Quick Start Guide

## Contents

Corporate Headquarters .....	2
Contact information.....	2
Trademarks.....	2
1. Introduction.....	7
1.1 Assumptions and Advisory Notes.....	7
2. Kit Contents .....	7
3. Overview of the Quick Start Example Project.....	8
3.1 Quick Start Example Project Flow .....	8
4. Running the Quick Start Example Project.....	9
4.1 Connecting and Powering Up the EK-RX261 .....	9
4.2 Running the Quick Start Example Project.....	10
5. Customizing the Quick Start Example Project.....	13
5.1 Downloading and Installing Software .....	13
5.2 Importing the Quick Start Example Project.....	13
5.3 Modifying, Generating, and Building the Quick Start Example Project.....	18
5.4 Setting Up Debug Connection between the EK-RX261 and Host PC .....	20
5.5 Downloading and Running the Modified Quick Start Example Project .....	21
5.6 Running the Quick Start Example Project.....	23
6. Next Steps.....	23
7. Website and Support .....	23
Revision History.....	24

## Figures

Figure 1. EK-RX261 Kit Contents.....	7
Figure 2. Operation overview of Quick Start Example Project .....	8
Figure 3. Connecting the EK-RX261 to the Host PC via USB Connector (J16).....	9
Figure 4. USB Serial Port in Windows Device Manager .....	10
Figure 5. Selecting the Serial Port on Tera Term.....	10
Figure 6. Select 19200 on the Speed Pulldown .....	11

Figure 7. Welcome and Main Menu.....	11
Figure 8. Kit Information .....	12
Figure 9. Next Steps .....	12
Figure 10. Creating a New Workspace.....	13
Figure 11. Launching the Workspace.....	14
Figure 12. Importing the Project .....	14
Figure 13. Importing Existing Projects into Workspace.....	15
Figure 14. Clicking Next to Import Existing Projects into the Workspace .....	15
Figure 15. Selecting the Root Directory.....	16
Figure 16. Finishing Importing the Quick Start Example Project.....	17
Figure 17. Opening the Smart Configurator .....	18
Figure 18. Switch to Smart Configurator Perspective .....	18
Figure 19. Modifying the Configuration Settings .....	19
Figure 20. Generate Code.....	19
Figure 21. Building the Project .....	19
Figure 22. Console screen when the build is successful.....	19
Figure 23. Connecting the EK-RX261 to the Host PC via USB Debug Port .....	20
Figure 24. Selecting the Debug Option .....	21
Figure 25. Selecting the Debug Image.....	21
Figure 26. Opening the Debug Perspective .....	22
Figure 27. Executing the Project .....	23

## Tables

Table 1. Pin header configuration for Quick Start Example Project .....	9
Table 2. Pin header configuration for Debug On-Board .....	20

## 1. Introduction

This Quick Start Guide (QSG) provides:

- An overview of the Quick Start Example Project that the EK-RX261 comes pre-programmed with.
- Instructions for running the Quick Start Example Project.
- Instructions for importing, modifying, and building the Quick Start Example Project using Firmware Integration Technology (FIT) and e<sup>2</sup> 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<sup>2</sup> studio and terminal emulation programs such as TeraTerm.
2. Subject knowledge: It is assumed that the user has basic knowledge about microcontrollers, embedded systems, and FIT to modify the example project described in this document.
3. Prior to running the Quick Start Example Project or programming the EK-RX261, default jumper settings must be used. Refer to the EK-RX261 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. Kit Contents

The following components are included in the kit:

1. EK-RX261
2. Micro USB function cable (type-A male to micro-B male)
3. Micro USB host cable (type-A female to micro-B male)
4. Ferrite core

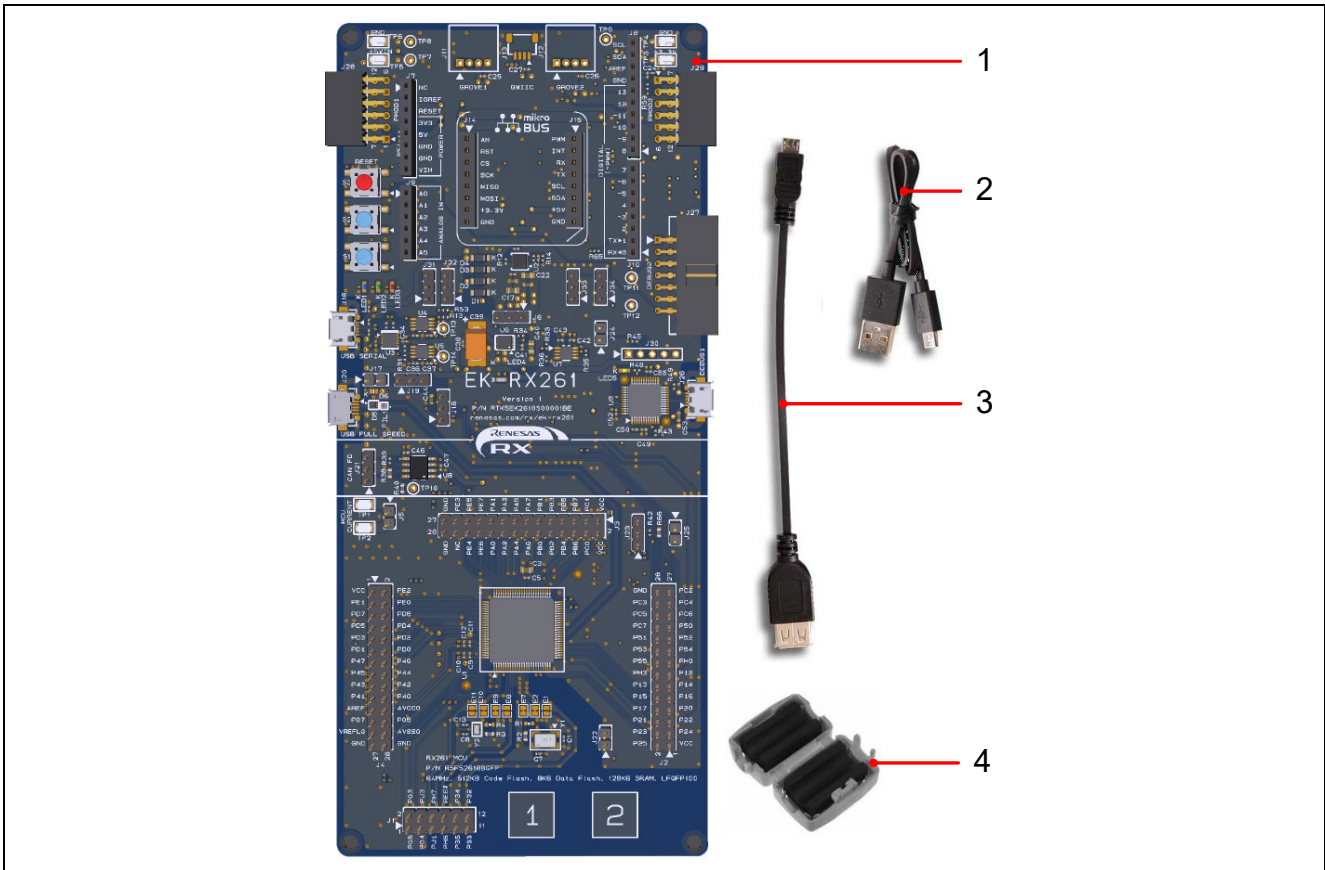


Figure 1. EK-RX261 Kit Contents

### 3. Overview of the Quick Start Example Project

The Quick Start Example Project allows the user to change the frequency and intensity of the on-board user LED1 (blue) using the user buttons (S1 and S2). The supported frequencies are 1 Hz, 5 Hz, and 10 Hz and the supported intensities are 10%, 50%, and 90%.

When the EK-RX261 running the Quick Start Example Project is connected to a host PC via USB connector (J16), the kit information, MCU die temperature, and user LED blinking frequency are displayed on a terminal console.

#### 3.1 Quick Start Example Project Flow

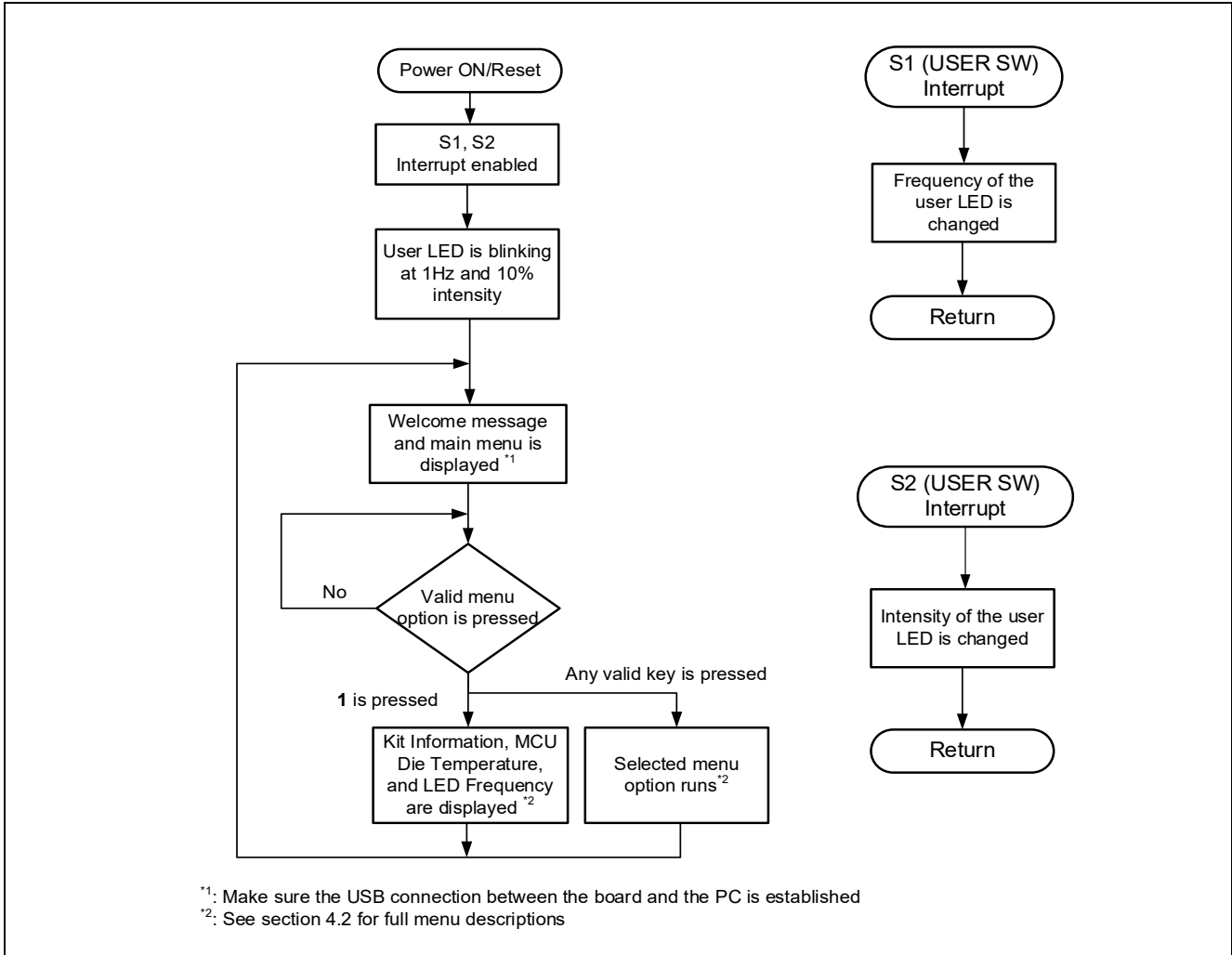


Figure 2. Operation overview of Quick Start Example Project



## 4. Running the Quick Start Example Project

This section lists the requirements and instructions to power up the EK-RX261 and run the Quick Start Example Project.

### Hardware Requirements

- EK-RX261
- Micro USB function cable
- A Host PC with at least 1 USB port

### Software Requirements

- Microsoft® Windows® 10 operating system
- USB Serial Drivers  
The user must install the following drivers from the FTDI's web site.  
- VIRTUAL COM PORT (VCP) Drivers  
<https://ftdichip.com/>
- TeraTerm (or similar) terminal console application

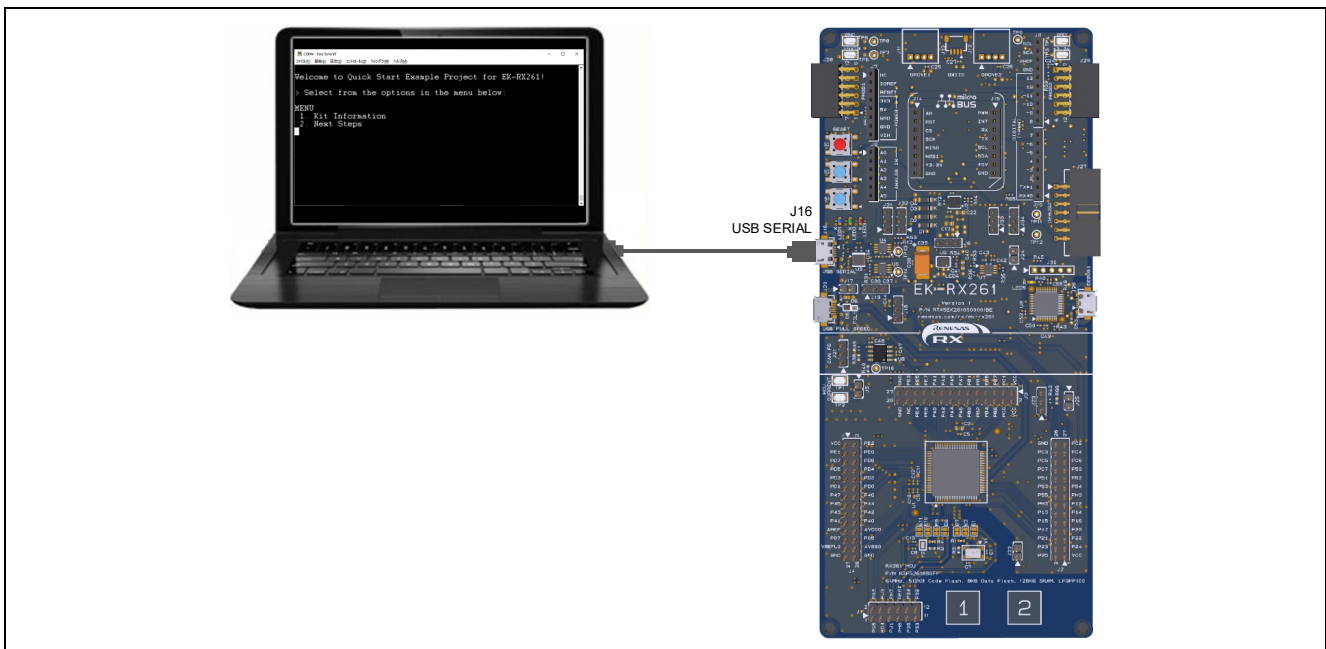
### 4.1 Connecting and Powering Up the EK-RX261

1. Configure the pin header jumpers on the EK-RX261 as following table.

**Table 1. Pin header configuration for Quick Start Example Project**

J22	J23	J24	J25
Open	Jumper on pins 1-2 or Jumper on pins 2-3	Closed	Open

2. Connect the Micro USB end of the Micro USB function cable to USB connector (J16) of the EK-RX261.
3. Connect the other end of this cable to the USB port of the host PC. Power LED (LED4) on the EK-RX261 lights up white, indicating that the EK-RX261 is powered on.



**Figure 3. Connecting the EK-RX261 to the Host PC via USB Connector (J16)**

## 4.2 Running the Quick Start Example Project

To run the Quick Start Example Project, use the following instructions:

1. On power up or RESET, the three user LEDs will take on the following states:
  - LED1 Blue - Blinking at 1 Hz frequency and at 10% intensity
  - LED2 Green – Steady, full intensity
  - LED3 Red – Off
2. Press the user button (S1) on the EK-RX261 to change the blinking frequency of the user LED1. With every press of the user button (S1), the frequency will switch from 1 Hz to 5 Hz to 10 Hz and cycle back.
3. Press the user button (S2) on the EK-RX261 to change the intensity of the user LED1 (blue). With every press of the first user button (S2), the intensity will switch from 10% to 50% to 90% and cycle back.
4. On the host PC, open Windows Device Manager. Expand **Ports (COM & LPT)**, locate **USB Serial Port (COMxx)** and note down the COM port number for reference in the next step.

Note: USB Serial Device drivers (FTDI) are required to communicate between the EK-RX261 and the terminal application on the host PC.

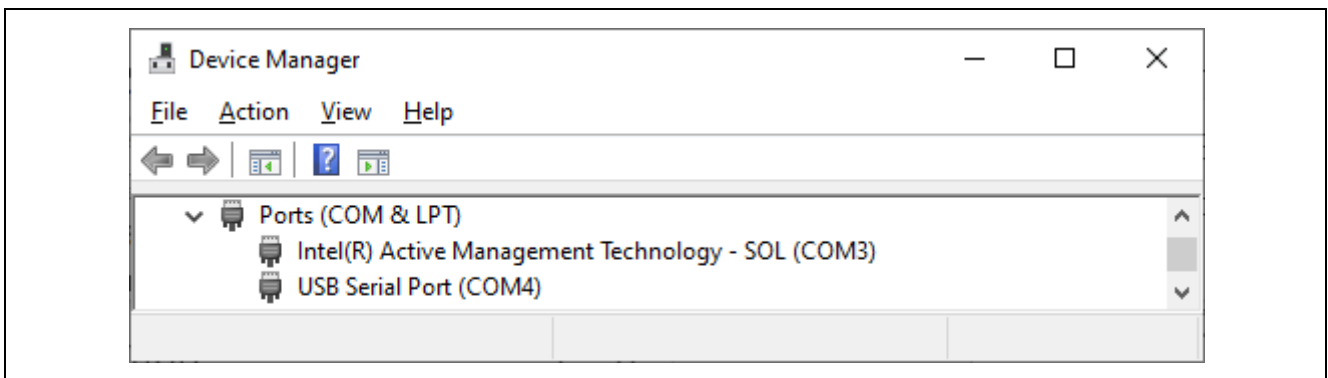


Figure 4. USB Serial Port in Windows Device Manager

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

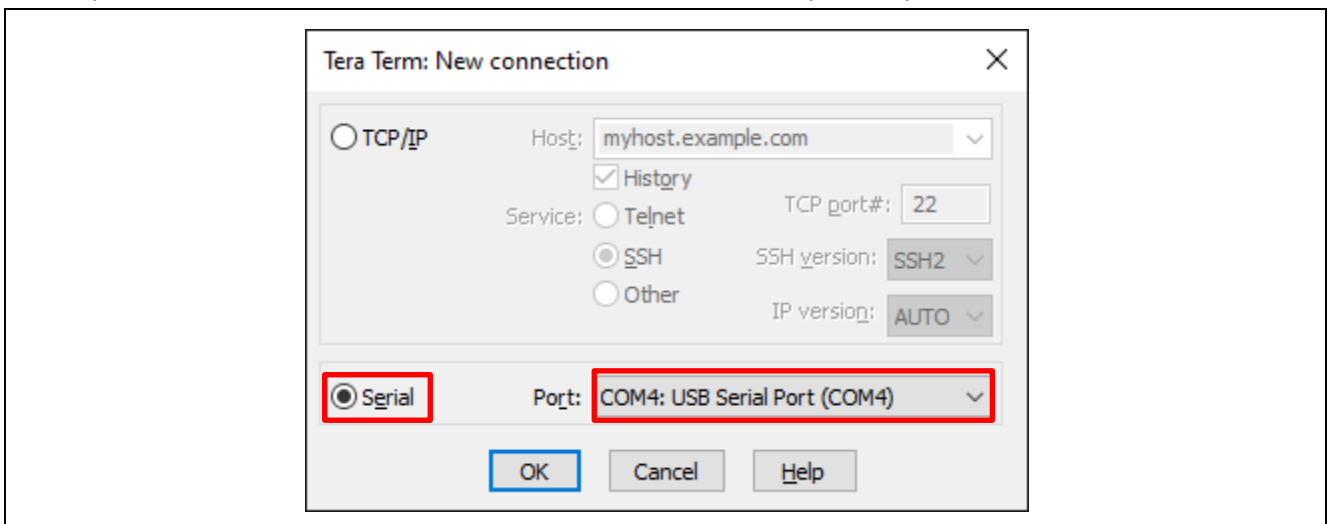
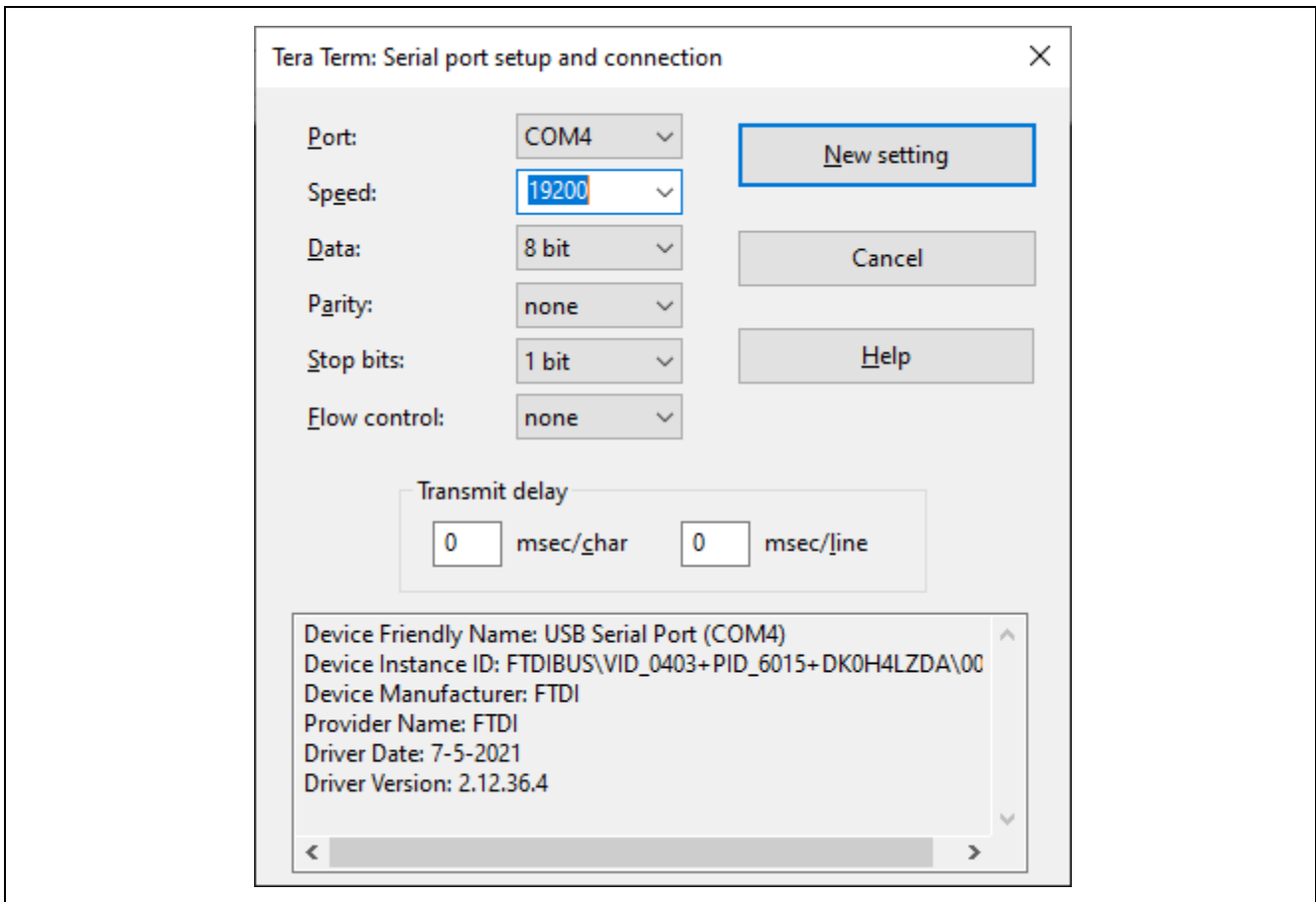


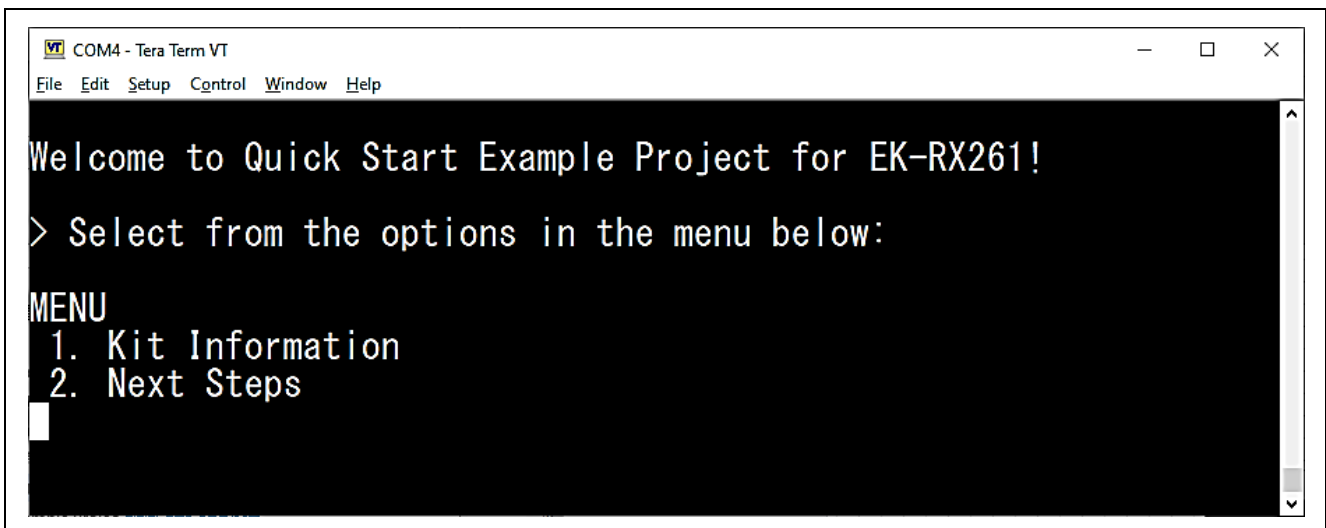
Figure 5. Selecting the Serial Port on Tera Term

- Using the **Setup** menu pull-down, select **Serial port...** and ensure that the speed is set to 19200, as shown below.



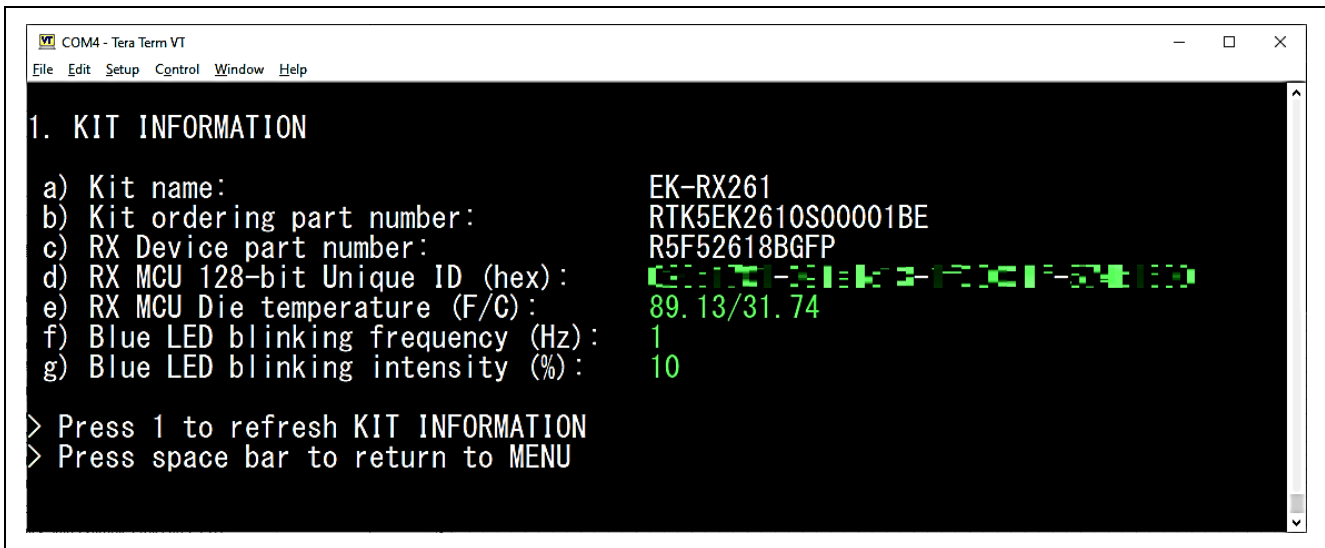
**Figure 6. Select 19200 on the Speed Pulldown**

- After completing the connection, press switch S3(RESET) and the terminal window will show 'welcome and main menu'.



**Figure 7. Welcome and Main Menu**

8. Press **1** to display the **Kit Information** including the kit name, part number, MCU unique ID, MCU die temperature, and the user LED's current blinking frequency & intensity.



```
COM4 - Tera Term VT
File Edit Setup Control Window Help

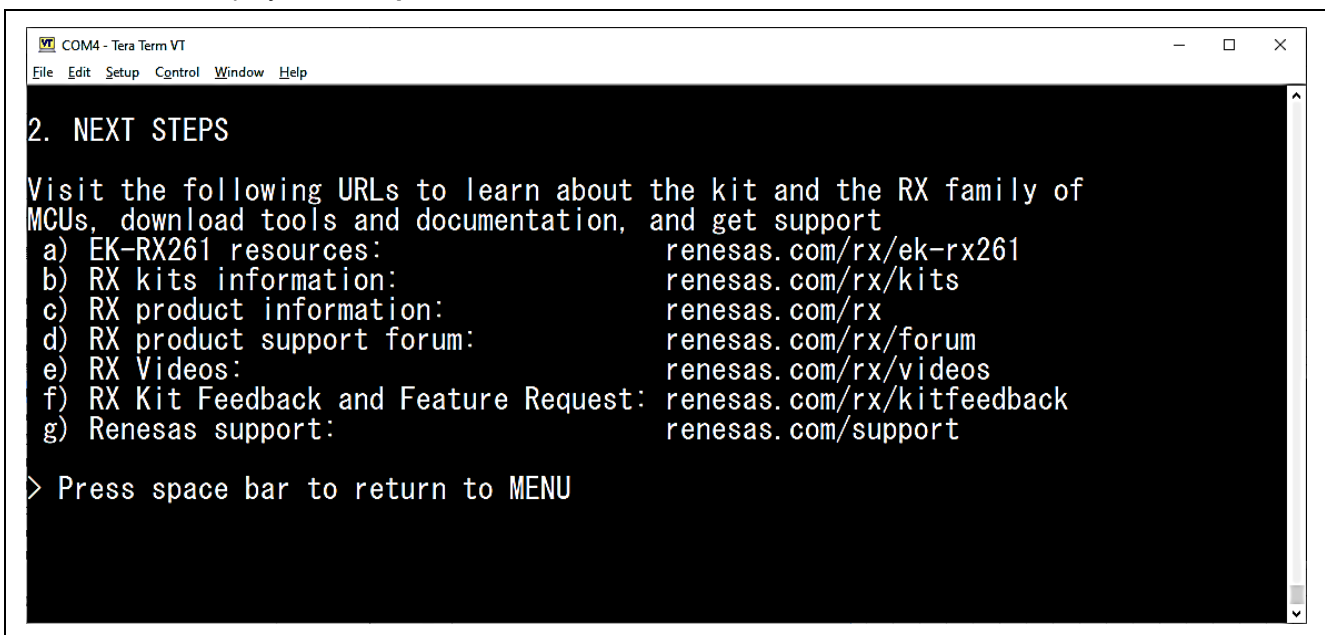
1. KIT INFORMATION

a) Kit name: EK-RX261
b) Kit ordering part number: RTK5EK2610S00001BE
c) RX Device part number: R5F52618BGFP
d) RX MCU 128-bit Unique ID (hex): 00000000-00000000-00000000-00000000
e) RX MCU Die temperature (F/C): 89.13/31.74
f) Blue LED blinking frequency (Hz): 1
g) Blue LED blinking intensity (%): 10

> Press 1 to refresh KIT INFORMATION
> Press space bar to return to MENU
```

Figure 8. Kit Information

9. Press **1** to refresh KIT INFORMATION.  
10. Press **Space** to return to the 'welcome and main menu' screen.  
11. Press **2** to display **Next Steps**.



```
COM4 - Tera Term VT
File Edit Setup Control Window Help

2. NEXT STEPS

Visit the following URLs to learn about the kit and the RX family of
MCUs, download tools and documentation, and get support
a) EK-RX261 resources: renesas.com/rx/ek-rx261
b) RX kits information: renesas.com/rx/kits
c) RX product information: renesas.com/rx
d) RX product support forum: renesas.com/rx/forum
e) RX Videos: renesas.com/rx/videos
f) RX Kit Feedback and Feature Request: renesas.com/rx/kitfeedback
g) Renesas support: renesas.com/support

> Press space bar to return to MENU
```

Figure 9. Next Steps

12. Press **Space** to return to the 'welcome and main menu' screen.

## 5. Customizing the Quick Start Example Project

This section lists the requirements and instructions for customizing the Quick Start Example Project.

### Hardware Requirements

- EK-RX261
- Micro USB function cable x2
- A Host PC with at least 2 USB ports

### Software Requirements

- Microsoft® Windows® 10 operating system
- USB Serial Drivers  
The user must install the following drivers from the FTDI's web site.  
- VIRTUAL COM PORT (VCP) Drivers  
<https://ftdichip.com/>
- TeraTerm (or similar) terminal console application
- e<sup>2</sup> studio IDE
- Quick Start Example Project
- C/C++ Compiler Package for RX Family [CC-RX]

### 5.1 Downloading and Installing Software

Before the Quick Start Example Project can be modified, it is necessary to download the Quick Start Example Project and install the e<sup>2</sup> studio and compiler package CC-RX on the host PC.

These can be downloaded from the website at [renesas.com/rx/ek-rx261](https://renesas.com/rx/ek-rx261).

### 5.2 Importing the Quick Start Example Project

1. Place the Quick Start Example Project in a local directory on the host PC.
2. Launch e<sup>2</sup> studio.
3. Enter the name in the Workspace dialog box to create a new workspace.

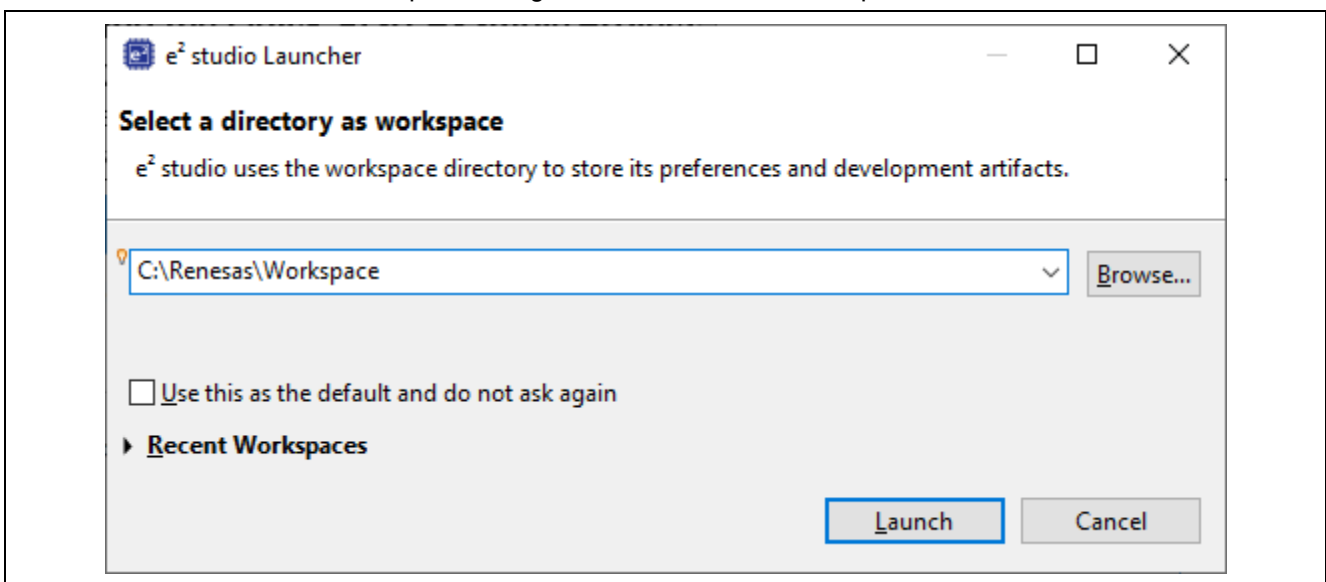


Figure 10. Creating a New Workspace

4. Click **Launch**.

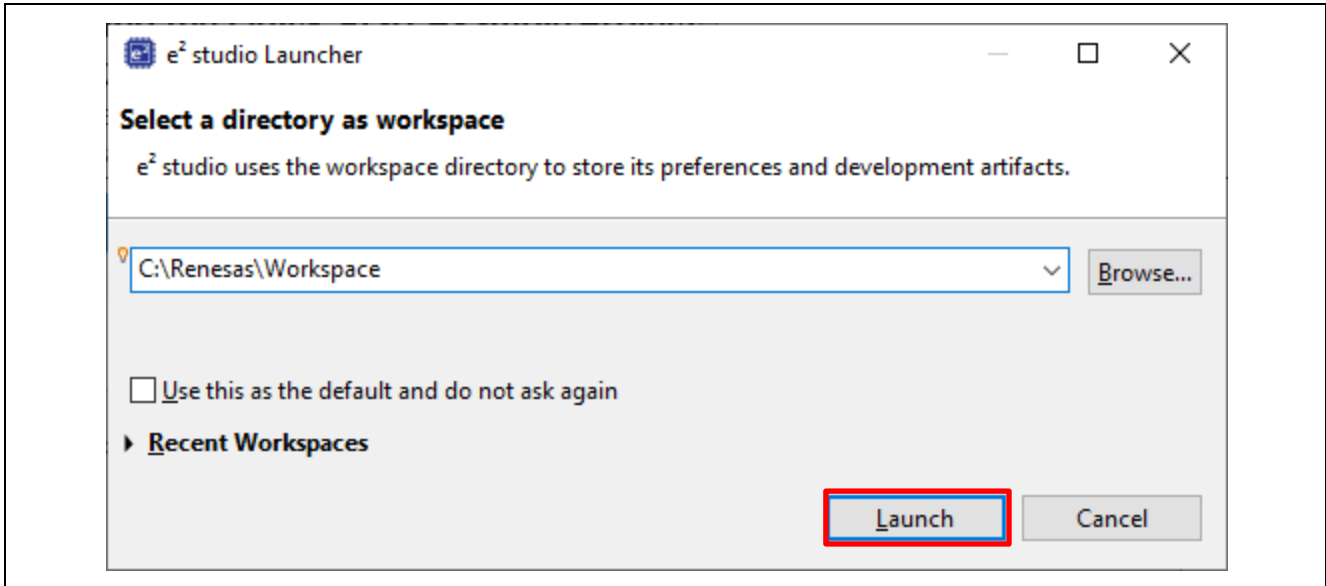


Figure 11. Launching the Workspace

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

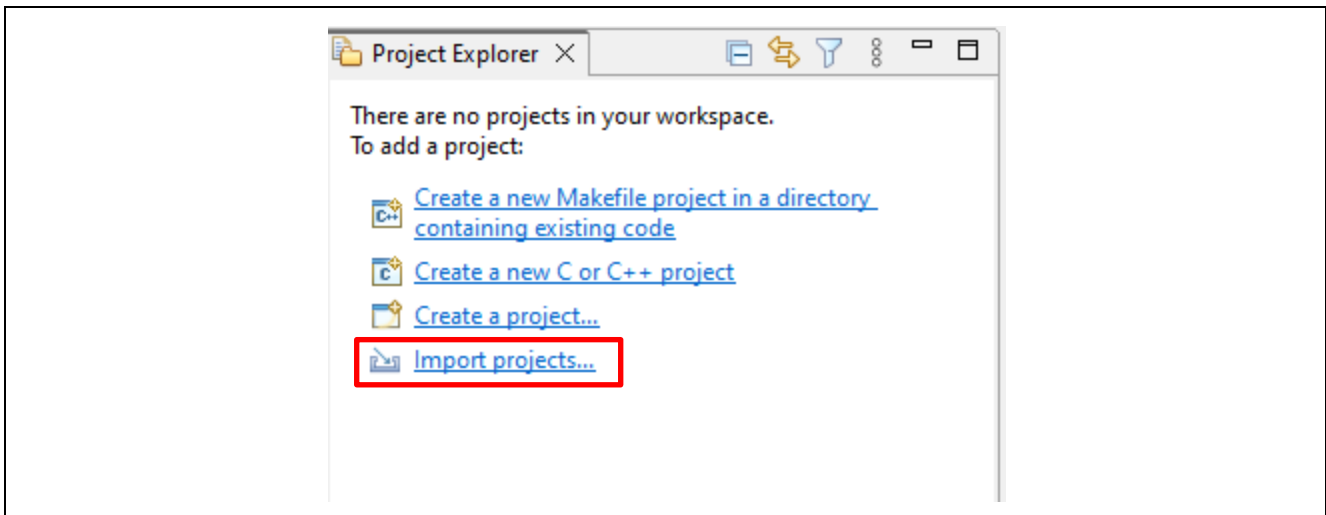


Figure 12. Importing the Project

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

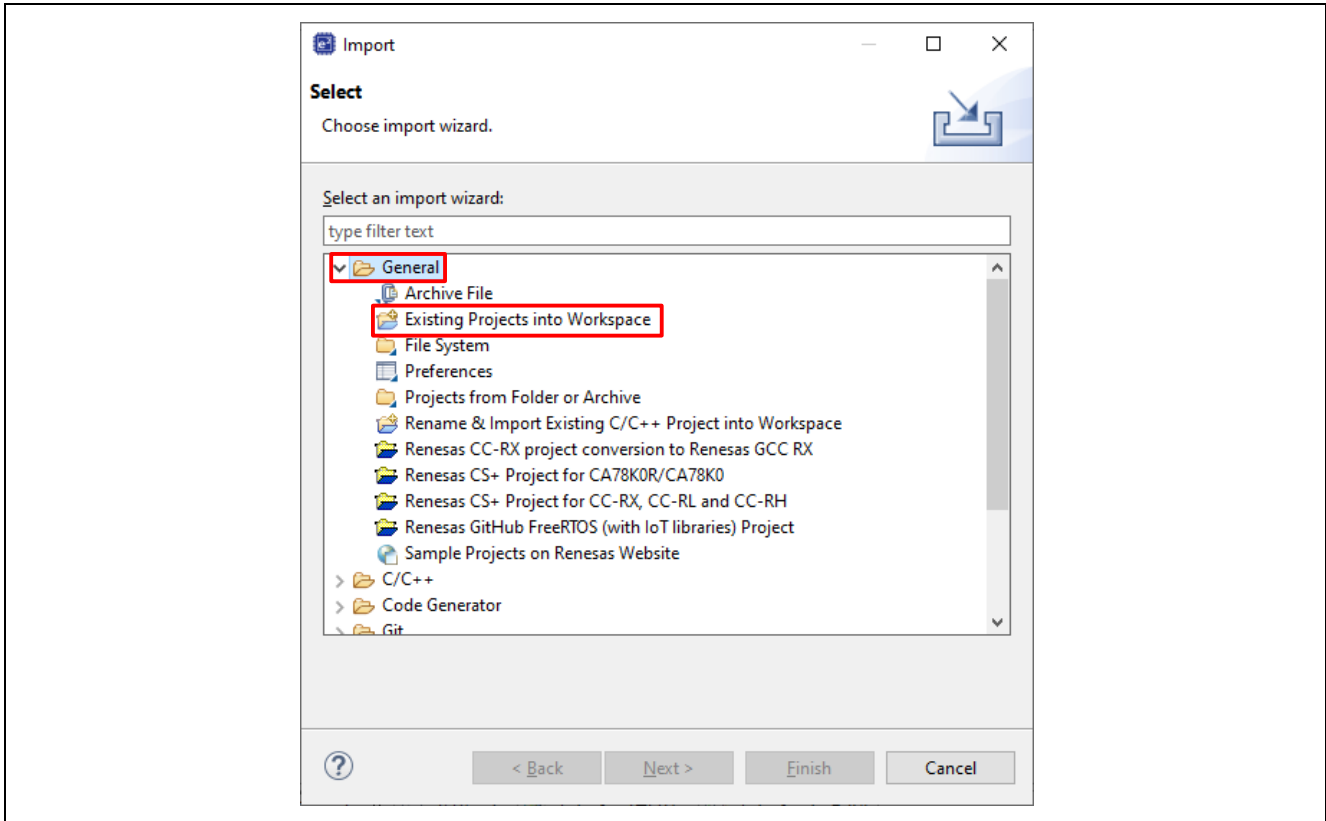


Figure 13. Importing Existing Projects into Workspace

7. Click **Next**.

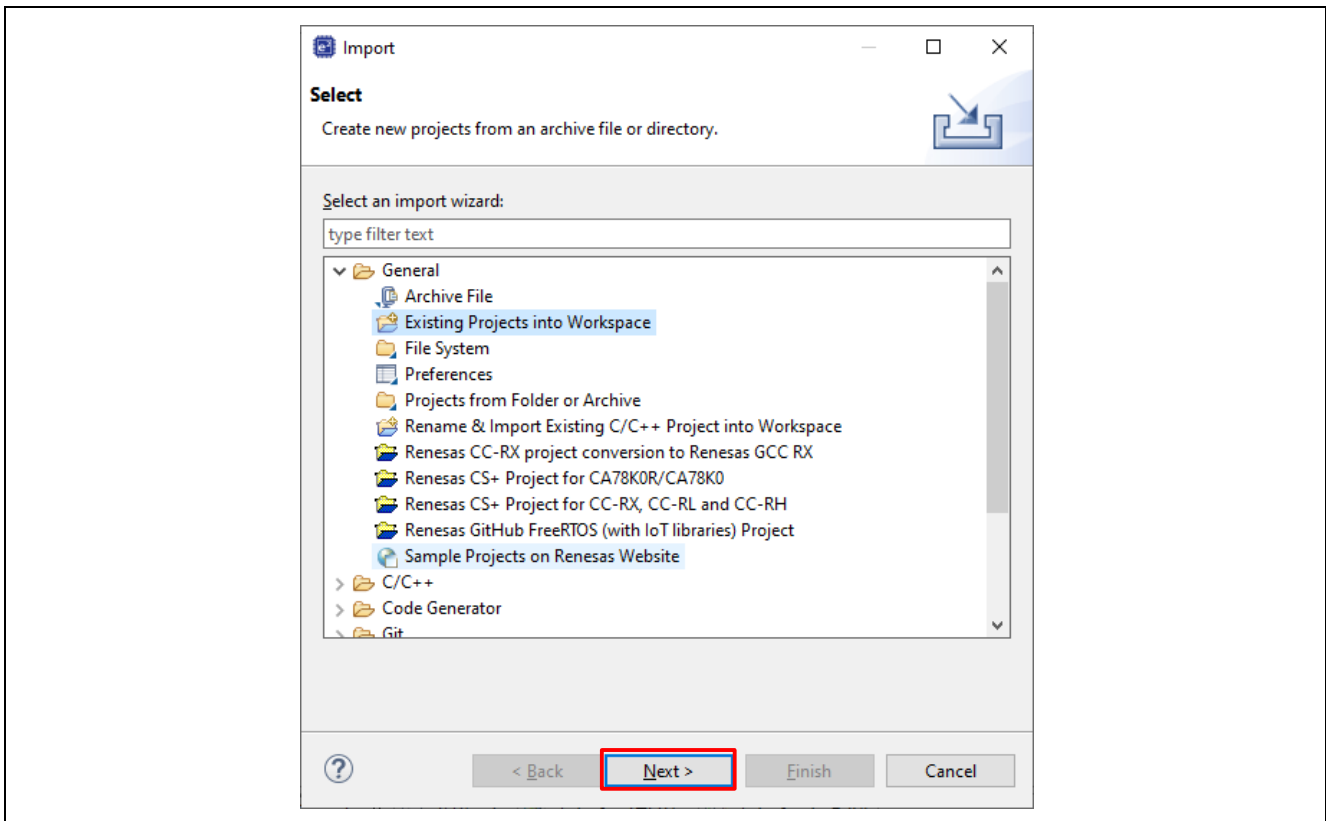


Figure 14. Clicking Next to Import Existing Projects into the Workspace

- 8. Click **Select root directory** and click **Browse** to go to the location of the Quick Start Example Project folder.

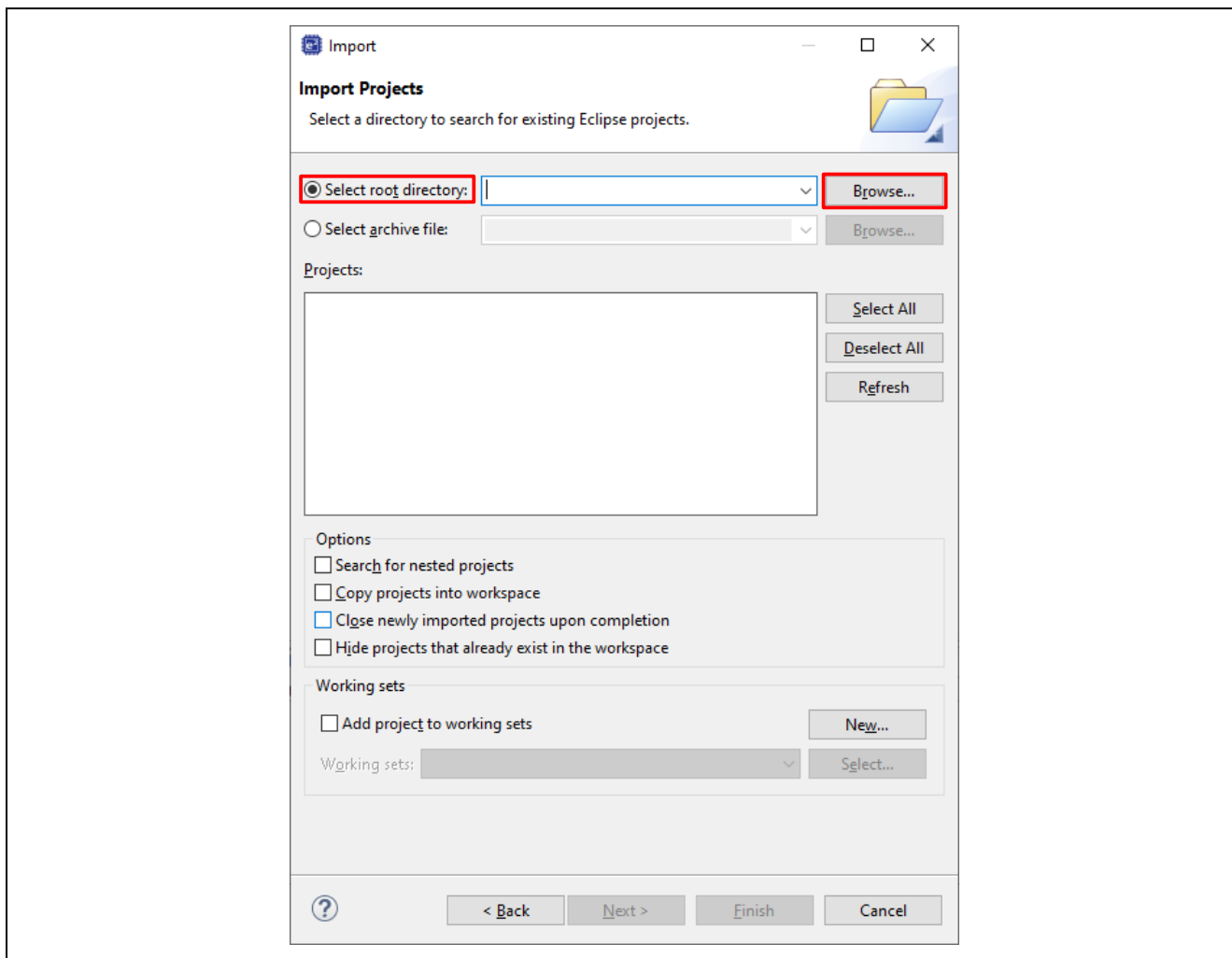


Figure 15. Selecting the Root Directory



9. Select the Quick Start Example Project and click **Finish**.

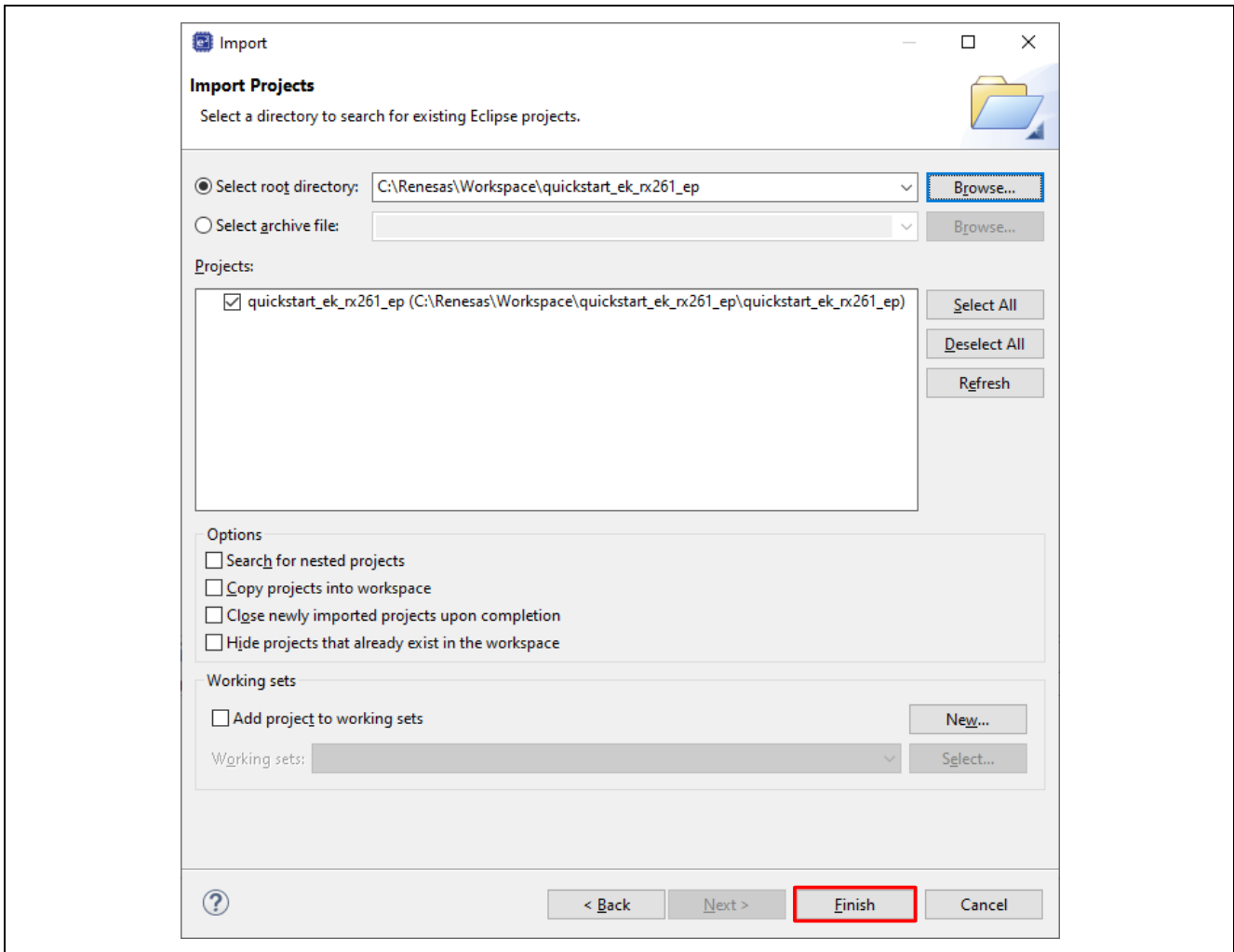


Figure 16. Finishing Importing the Quick Start Example Project

### 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.

1. Once the Quick Start Example Project is imported, double click the **quickstart\_ek\_rx261\_ep.scfg** file to open the smart configurator. The smart configurator provides an easy to use interface to configure the properties of the MCU peripherals.

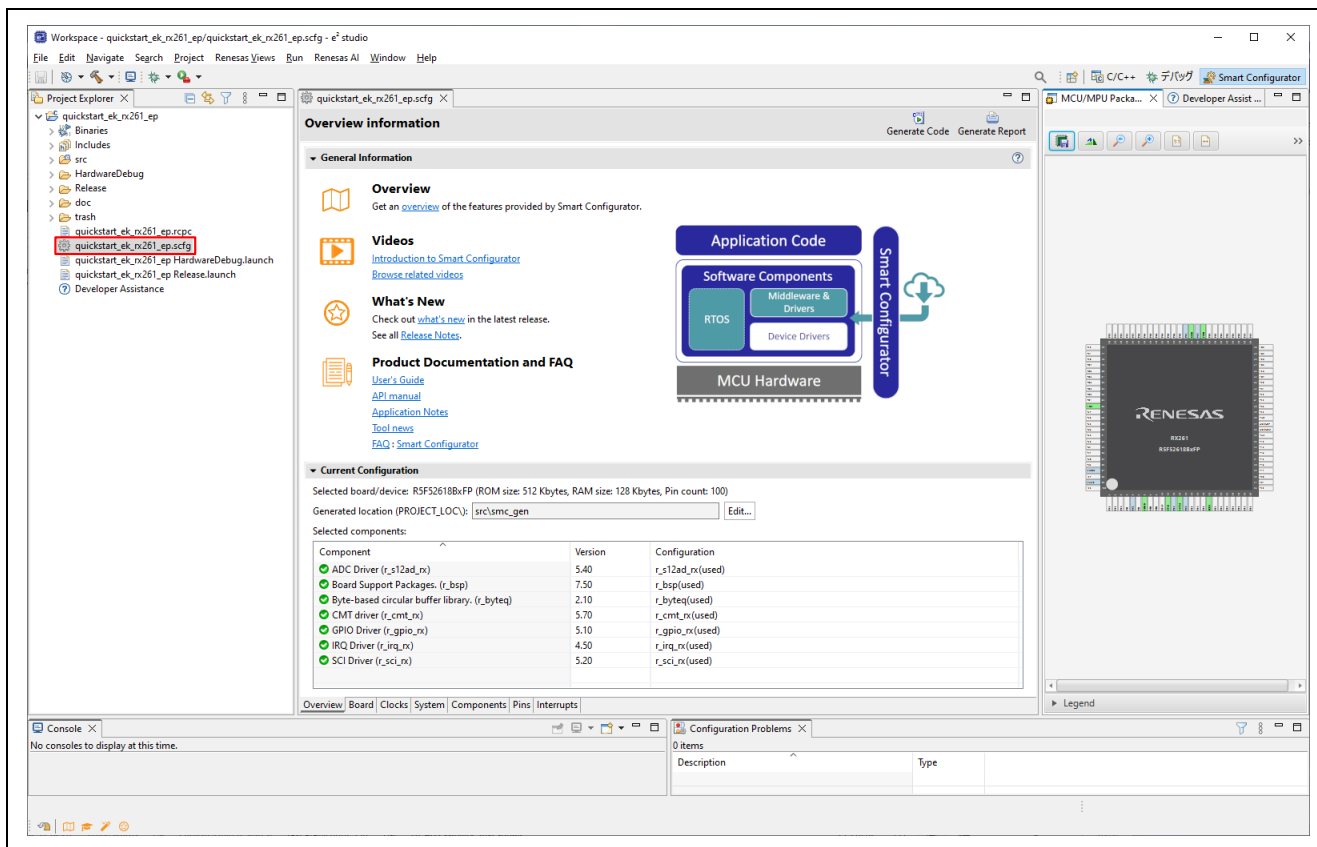


Figure 17. Opening the Smart Configurator

When the smart configurator is opened, the following dialog is displayed. Press **Open Perspective (O)** button.

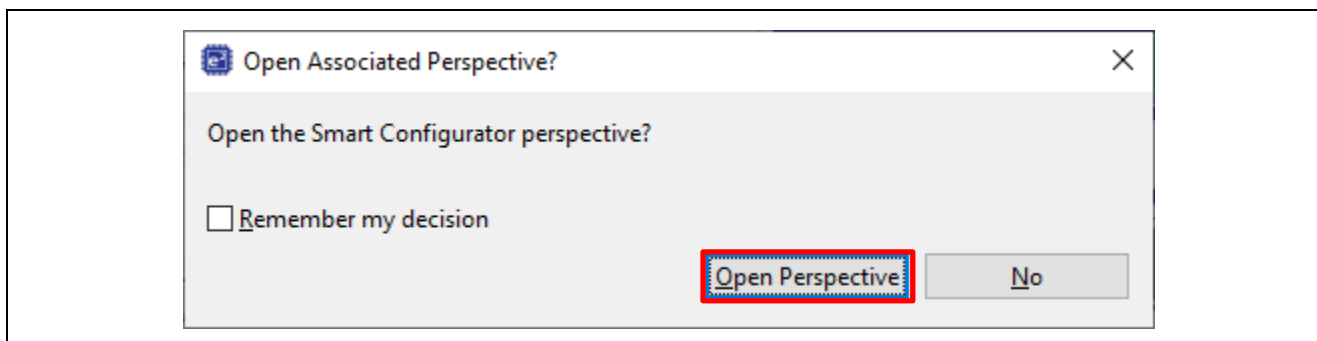
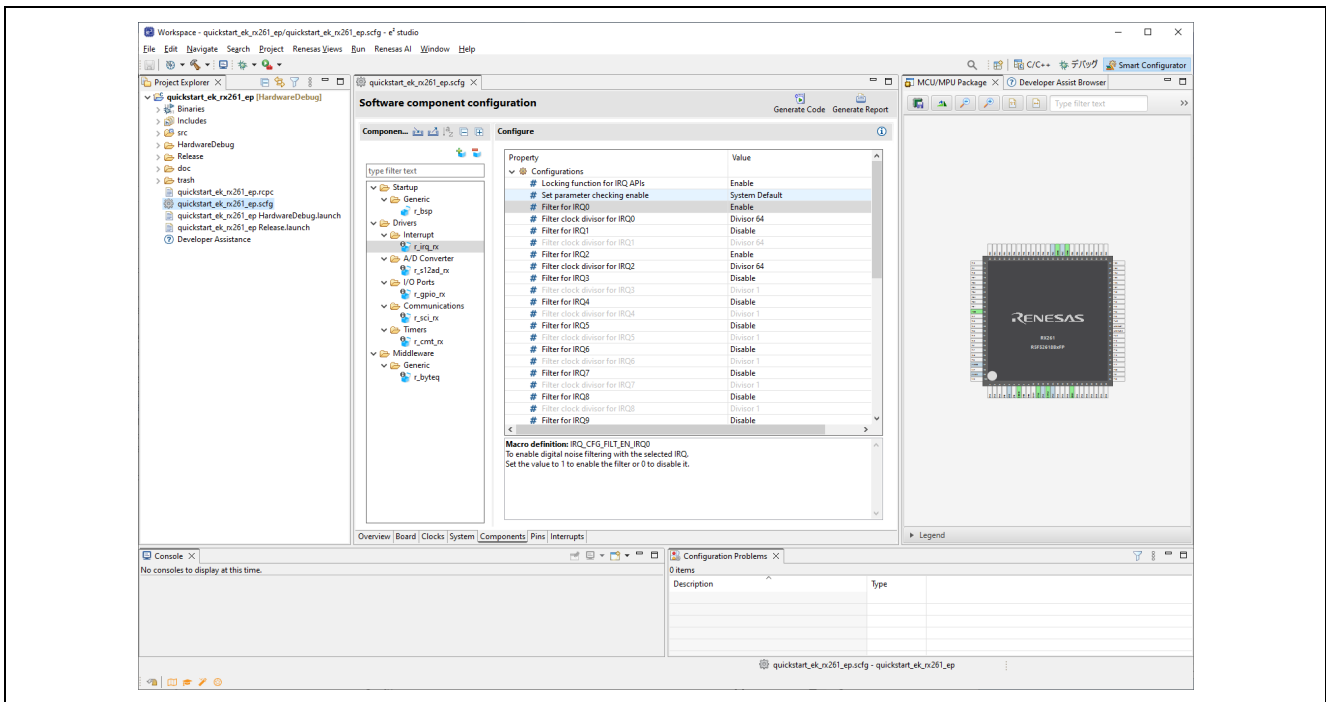


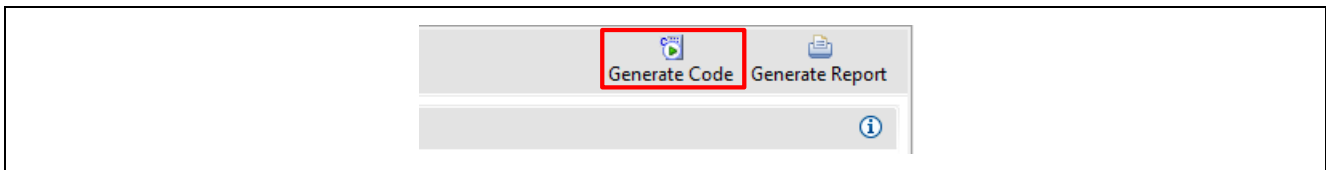
Figure 18. Switch to Smart Configurator Perspective

- For example, in the **Components** tab of the smart configurator, the user can click to select a module to modify its configuration settings, as required. **Figure 19** illustrates modifying the **IRQ** configuration.



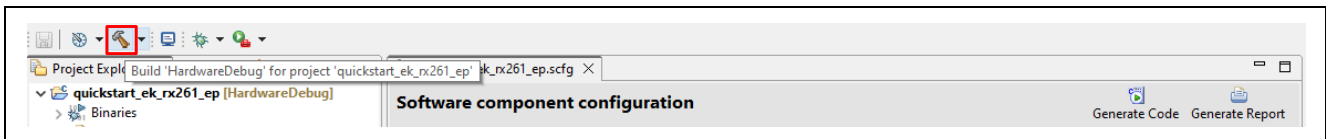
**Figure 19. Modifying the Configuration Settings**

- After the desired modifications are made, click **Generate Code**.



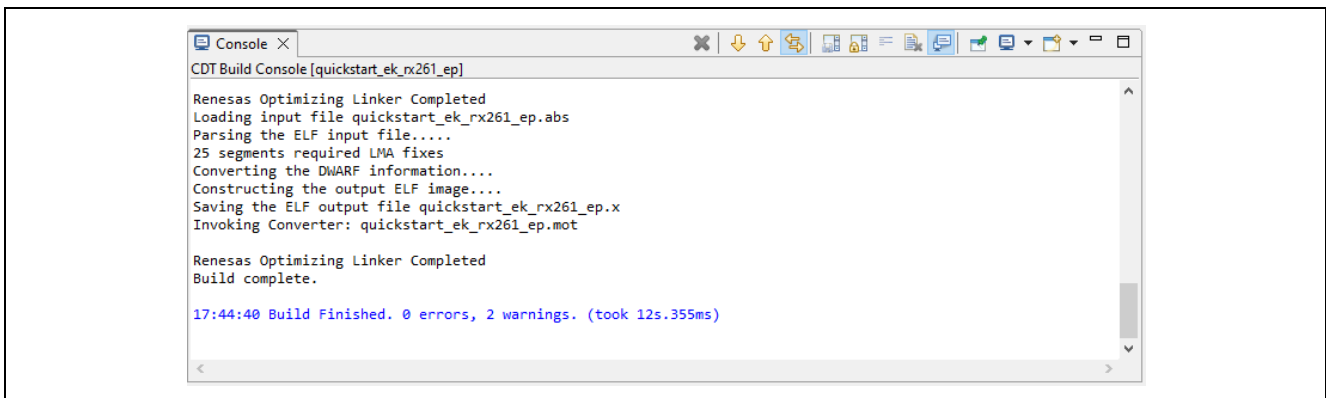
**Figure 20. Generate Code**

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



**Figure 21. Building the Project**

- If the build finishes successfully, the following message will be output to the console.



**Figure 22. Console screen when the build is successful**

### 5.4 Setting Up Debug Connection between the EK-RX261 and Host PC

To program the modified Quick Start Example Project on to the EK-RX261, a debug connection is necessary between the EK-RX261 and host PC.

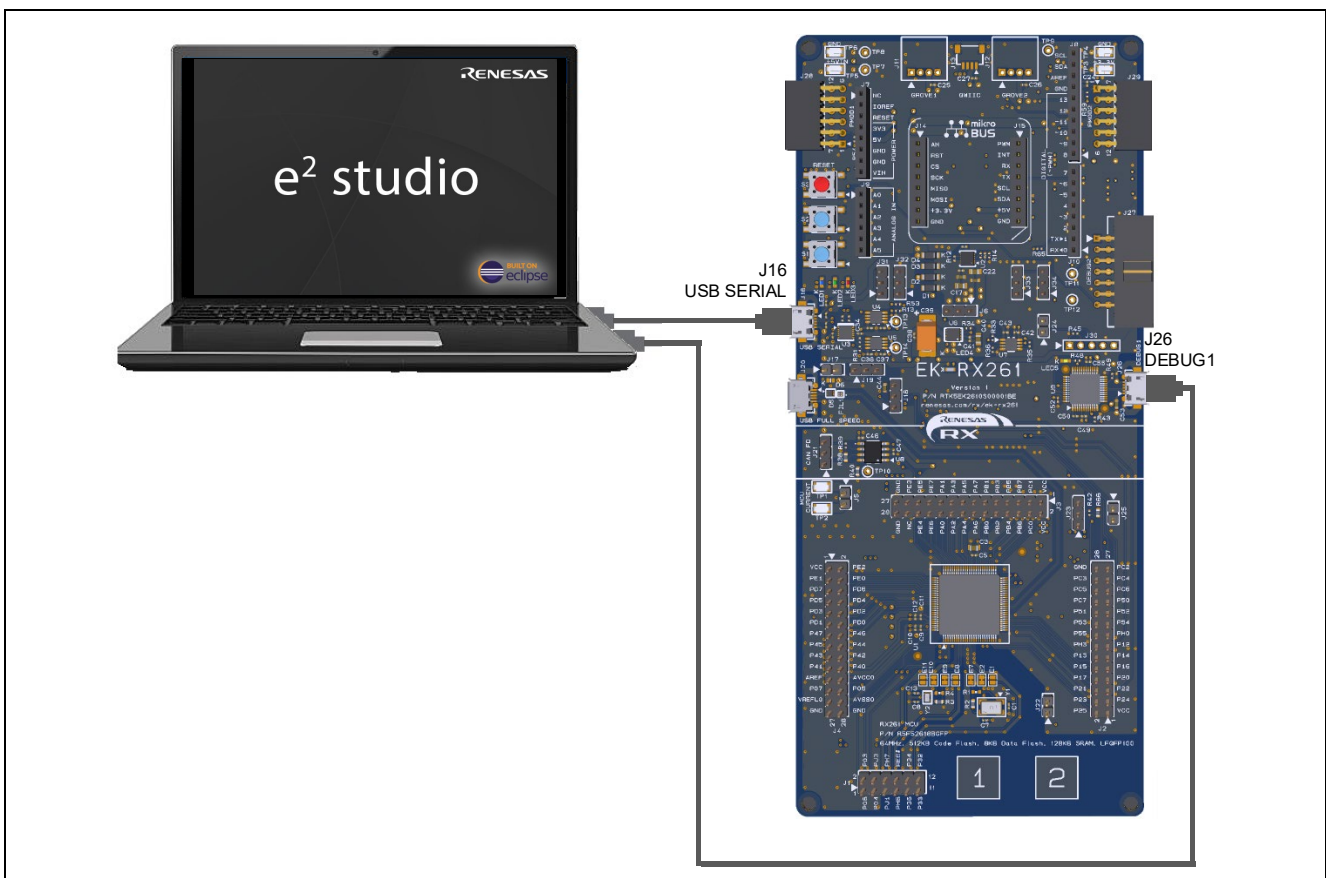
1. Configure the pin header jumpers on the EK-RX261 as following table.

**Table 2. Pin header configuration for Debug On-Board**

J22	J23	J24	J25
Open	Jumper on pins 2-3	Open	Open

2. Connect the Micro USB side of two Micro USB function cables, one to the EK-RX261 USB connector (J16) and the other to the DEBUG1 connector (J26).

Note: The EK-RX261 supports 2 debugging modes. In this section and the following sections, default debugging mode, Debug On-Board, is used. More information on debugging modes is available in EK-RX261 user’s manual.

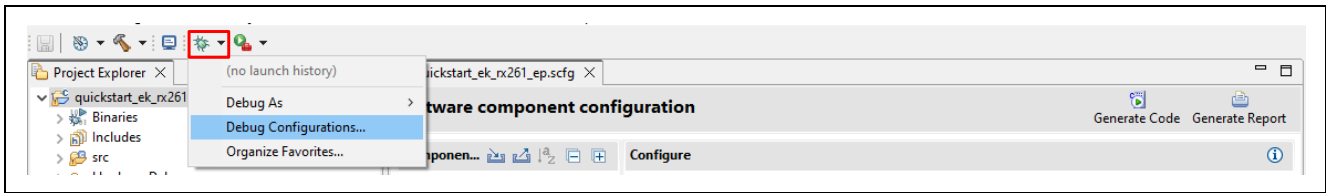


**Figure 23. Connecting the EK-RX261 to the Host PC via USB Debug Port**

3. The debug LED (LED5) flashes yellow to indicate that the E2OB driver has been detected by the EK-RX261.

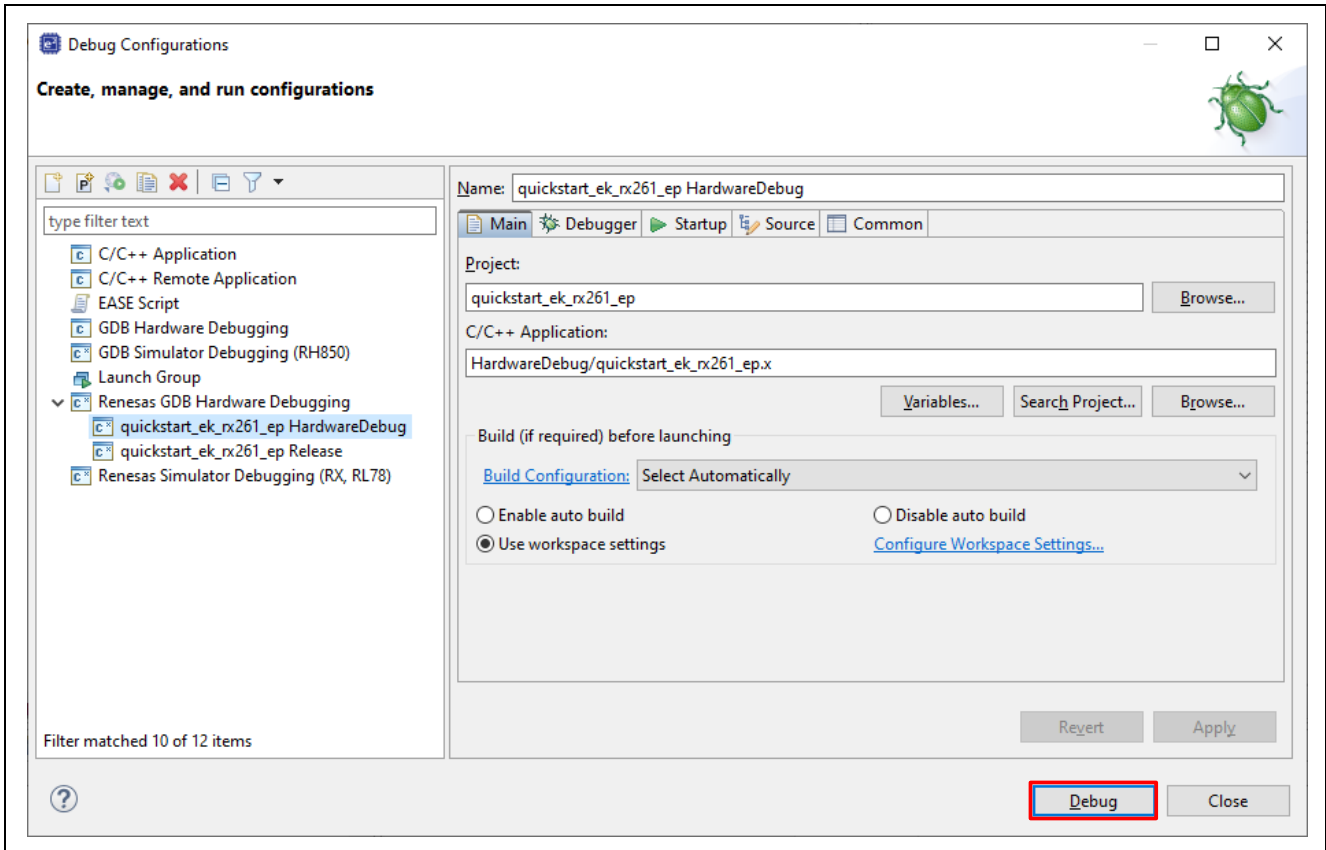
### 5.5 Downloading and Running the Modified Quick Start Example Project

1. In e<sup>2</sup> studio, click the drop-down menu for the debug icon, select **Debug Configurations** option.



**Figure 24. Selecting the Debug Option**

2. In the dialogue, on the left-hand pane, expand the **Renesas GDB Hardware Debugging** and select the built image to debug. In this case, the **quickstart\_ek\_rx261\_ep HardwareDebug**.



**Figure 25. Selecting the Debug Image**

3. If the firewall does not allow '**e2-server-gdb.exe**' to communicate, a confirmation dialog will be displayed. Check the '**Private networks, such as my home or work network**' box and click '**Allow access**'.
4. A user account control dialog may be displayed. Enter the administrator password and click **Yes**.
5. A dialog box may appear. Click **Switch**.

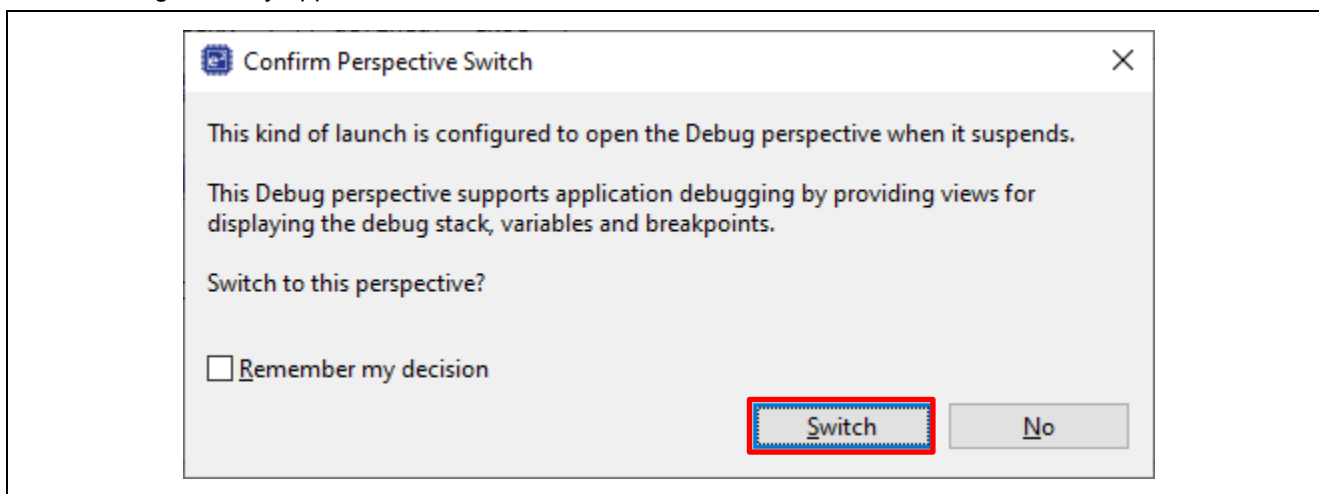
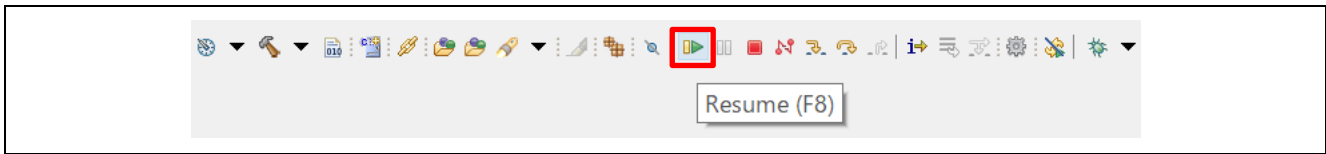


Figure 26. Opening the Debug Perspective

## 5.6 Running the Quick Start Example Project

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



**Figure 27. Executing the Project**

2. The modified Quick Start Example Project is programmed into the EK-RX261 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-RX261, refer to the EK-RX261 user's manual and design package available in the Documents and Download tabs respectively of the EK-RX261 webpage at [renesas.com/rx/ek-rx261](https://renesas.com/rx/ek-rx261)
2. Renesas provides several example projects that demonstrate different capabilities of the RX MCUs. These example projects can serve as a good starting point for users to develop custom applications.

## 7. Website and Support

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

EK-RX261 Resources	<a href="https://renesas.com/rx/ek-rx261">renesas.com/rx/ek-rx261</a>
RX Kit Information	<a href="https://renesas.com/rx/kits">renesas.com/rx/kits</a>
RX Product Information	<a href="https://renesas.com/rx">renesas.com/rx</a>
RX Product Support Forum	<a href="https://renesas.com/rx/forum">renesas.com/rx/forum</a>
RX Videos	<a href="https://renesas.com/rx/videos">renesas.com/rx/videos</a>
RX Kit Feedback and Feature Request	<a href="https://renesas.com/rx/kitfeedback">renesas.com/rx/kitfeedback</a>
Renesas Support	<a href="https://renesas.com/support">renesas.com/support</a>

### Provide Feedback/Request a Feature

Renesas aims to provide the best microcontroller kit experience to help our customers jumpstart innovation and take products to market faster with the RX family of microcontrollers. The Renesas RX microcontroller kits have been designed with a lot of attention to detail and customer-centered thinking in every aspect of the design. Renesas aims to exceed customer expectation.

Renesas looks forward to hearing your feedback and learning how we can enhance your experience. Please share your feedback at [renesas.com/rx/kitfeedback](https://renesas.com/rx/kitfeedback).

**Revision History**

Rev.	Date	Description	
		Page	Summary
1.00	Jul.31.24	—	Initial release



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