RX Family

RX Driver Package Ver.1.11

R01AN3467EJ0111
Rev.1.11
Oct 13, 2016

Introduction

This document is the RX Family RX Driver Package User's Manual, version 1.11.

This User's Manual describes basic structures, features and usage of RX Driver Package applications, and about the sample application program using the FIT modules included in this package.

Target Device

RX110, RX111, RX113, RX130 Group

RX210, RX230, RX231, RX23T, RX24T Group

RX63N, RX64M, RX65N, RX651 Group

RX71M Group

For Evaluation board, Renesas Starter Kit is used.

When using this application note with your product, careful evaluation is recommended.

And when using this application note with other Renesas MCUs, careful evaluation is recommended after making modifications to comply with the alternate MCU.

e² studio used for operation confirmation

V.5.2.0 is used. The latest RX Driver Package is available on the current e² studio without access to the Web page.

The detail is described in 4.Usage Procedures explains.

Related Documents

- RX Family Board Support Package Module Using Firmware Integration Technology (R01AN1685EU)
- Firmware Integration Technology User's Manual (R01AN1833EU)
- RX Family Adding Firmware Integration Technology Modules to Projects (R01AN1723EU)
- RX Family Adding Firmware Integration Technology Modules to CS+ Projects (R01AN1826EJ)
- The User's Manual provided with the RX Driver Package Application.

Contents

1. Overview

1.1 Applicability

This User's Manual applies to the RX Family RX Driver Package, version 1.11.

1.2 Operating Environment

This package runs under the operating environment described below.

Table 1-1 Operating Environment (RX110)

Microcontroller	RX110 Group
Evaluation board	Renesas Starter Kit for RX110
Integrated development environment (IDE)	e^2 studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-2 Operating Environment (RX111)

Microcontroller	RX111 Group
Evaluation board	Renesas Starter Kit for RX111
Integrated development environment (IDE)	e^2 studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-3 Operating Environment (RX113)

Microcontroller	RX113 Group
Evaluation board	Renesas Starter Kit for RX113
Integrated development environment (IDE)	e^2 studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-4 Operating Environment (RX130)

Microcontroller	RX130 Group
Evaluation board	Renesas Starter Kit for RX130
Integrated development environment (IDE)	e^2 studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-5 Operating Environment (RX210)

Microcontroller	RX210 Group
Evaluation board	Renesas Starter Kit for RX210
Integrated development environment (IDE)	e^2 studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-6 Operating Environment (RX230)

Microcontroller	RX230 Group
Evaluation board	Renesas Starter Kit for RX230
Integrated development environment (IDE)	e² studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-7 Operating Environment (RX231)

Microcontroller	RX231 Group
Evaluation board	Renesas Starter Kit for RX231
Integrated development environment (IDE)	e² studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-8 Operating Environment (RX23T)

Microcontroller	RX23T Group
Evaluation board	Renesas Starter Kit for RX23T
Integrated development environment (IDE)	e² studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-9 Operating Environment (RX24T)

Microcontroller	RX24T Group
Evaluation board	Renesas Starter Kit for RX24T
Integrated development environment (IDE)	e² studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-10 Operating Environment (RX63N)

Microcontroller	RX63N Group
Evaluation board	Renesas Starter Kit for RX63N
Integrated development environment (IDE)	e² studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-11 Operating Environment (RX64M)

Microcontroller	RX64M Group
Evaluation board	Renesas Starter Kit+ for RX64M
Integrated development environment (IDE)	e² studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-12 Operating Environment (RX65N)

Microcontroller	RX65N Group
Evaluation board	Renesas Starter Kit+ for RX65N
Integrated development environment (IDE)	e^2 studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

Table 1-13 Operating Environment (RX71M)

Microcontroller	RX71M Group
Evaluation board	Renesas Starter Kit+ for RX71M
Integrated development environment (IDE)	e^2 studio, V5.2.0 or later
Cross tools	RX Family C/C++ Compiler Package V2.05.00 or later
Emulator	E1, E2 emulator Lite, E20

2. About RX Driver Package

The RX Driver Package is a software platform (framework) that combines the following modules to be required for development in a single package. Since the package contains multiple modules, you can start developing immediately without having to obtain each module separately.

- Board Support Package (BSP) module
- FIT peripheral function modules (free version)
- FIT middleware modules (free version)
- FIT interface modules

You can develop the user application layer with ease by using the Sample Application Program (RX Driver Package Application) which utilizes the RX Driver Package.

2.1 System Structure

The figure below shows the system structure of the RX Driver Package.

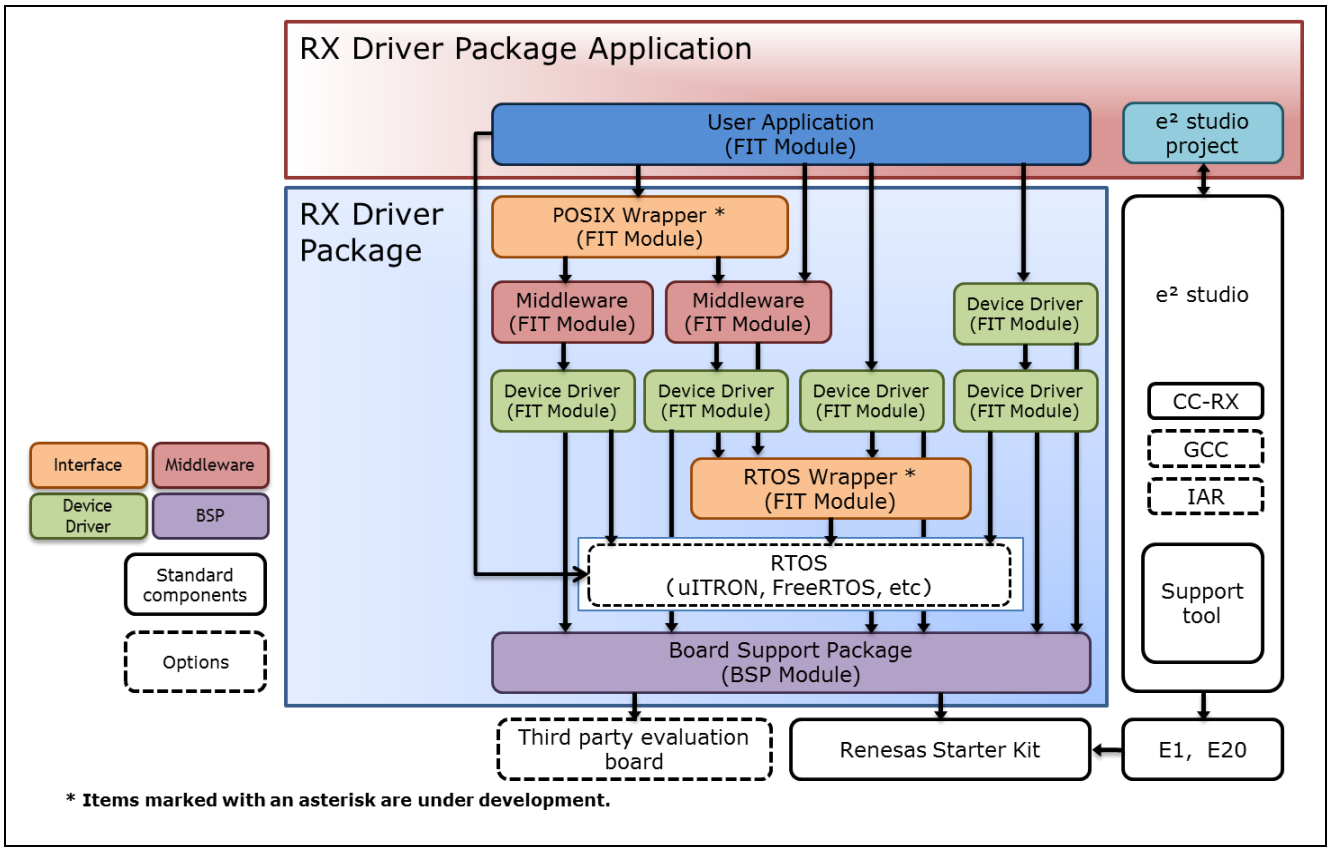


Figure 2-1 System Structure

2.2 RX Driver Package Features

The RX Driver Package has the following features.

(a) Select necessary modules and start developing immediately the application program

You can easily build a system simply by selecting the modules you need from the package. After that, all you have to do is develop the application program.

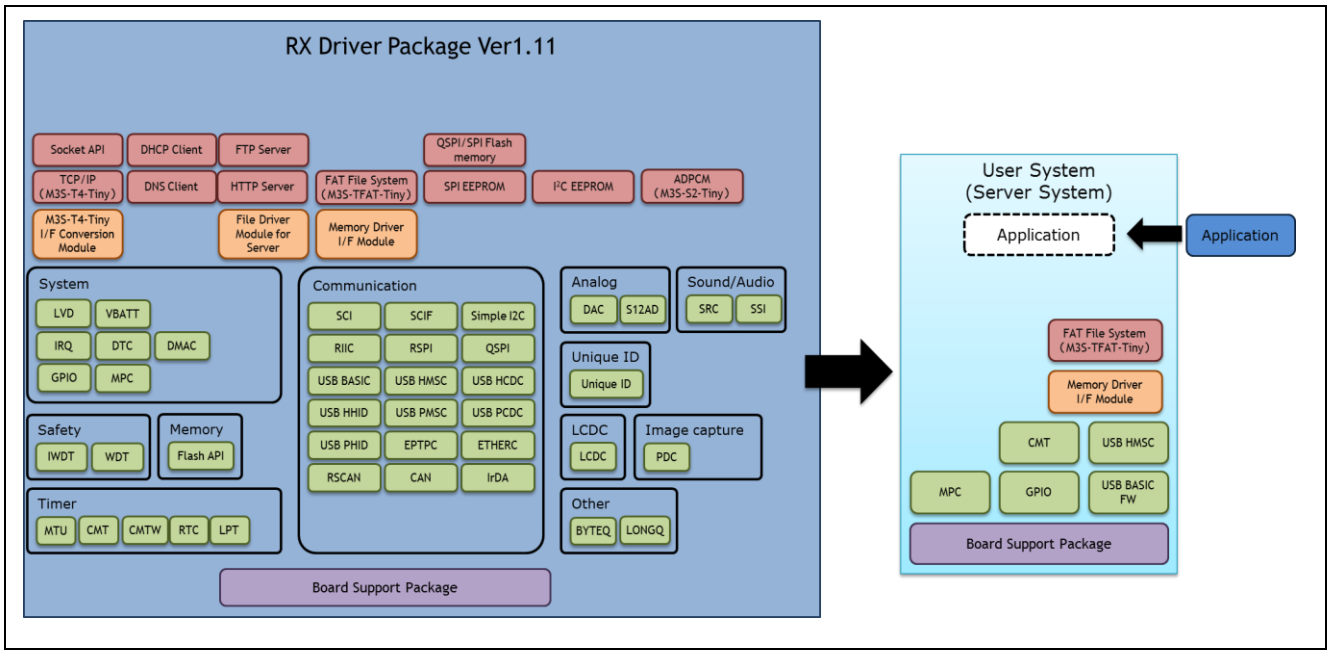


Figure 2-2 An example of system build

(b) Free to use

All the modules included in the RX Driver Package can be used free of charge. Free versions of middleware modules such as TCP/IP and file system are included.

(c) Can upgrade to paid versions of modules

The free versions of modules in the RX Driver Package can be replaced with commercial (paid) versions. By using a commercial (paid) version, all the functionality of the module will be available, as well as support about a commercial version.

For commercial version (paid) modules, see 6.1 for separate purchase.

(d) Check operation including user application

The RX Driver Package Application is provided as a sample user application that uses the RX Driver Package. The RX Driver Package Application consists of programs for operating each module in the RX Driver Package, and the project files for building the programs. It enables you to start checking the operation of your user application immediately.

3. Structure of the RX Family RX Driver Package

3.1 Folder Structure

The folder structure used in this package is shown below.

When the ZIP file for this package is downloaded from the Renesas web site and decompressed, a folder of the same name will be present and it will contain a **FITModules** folder, a **reference_documents** folder, and this document.

The **FITModules** folder contains the Firmware Integration Technology (FIT) modules shown in Table 3-1, Table 3-2, Table 3-3 (as ZIP files and XML files). For the FIT module supporting pin setting function, MDF file is contained.

The **reference_documents** folder contains the documentation for using this package in various development

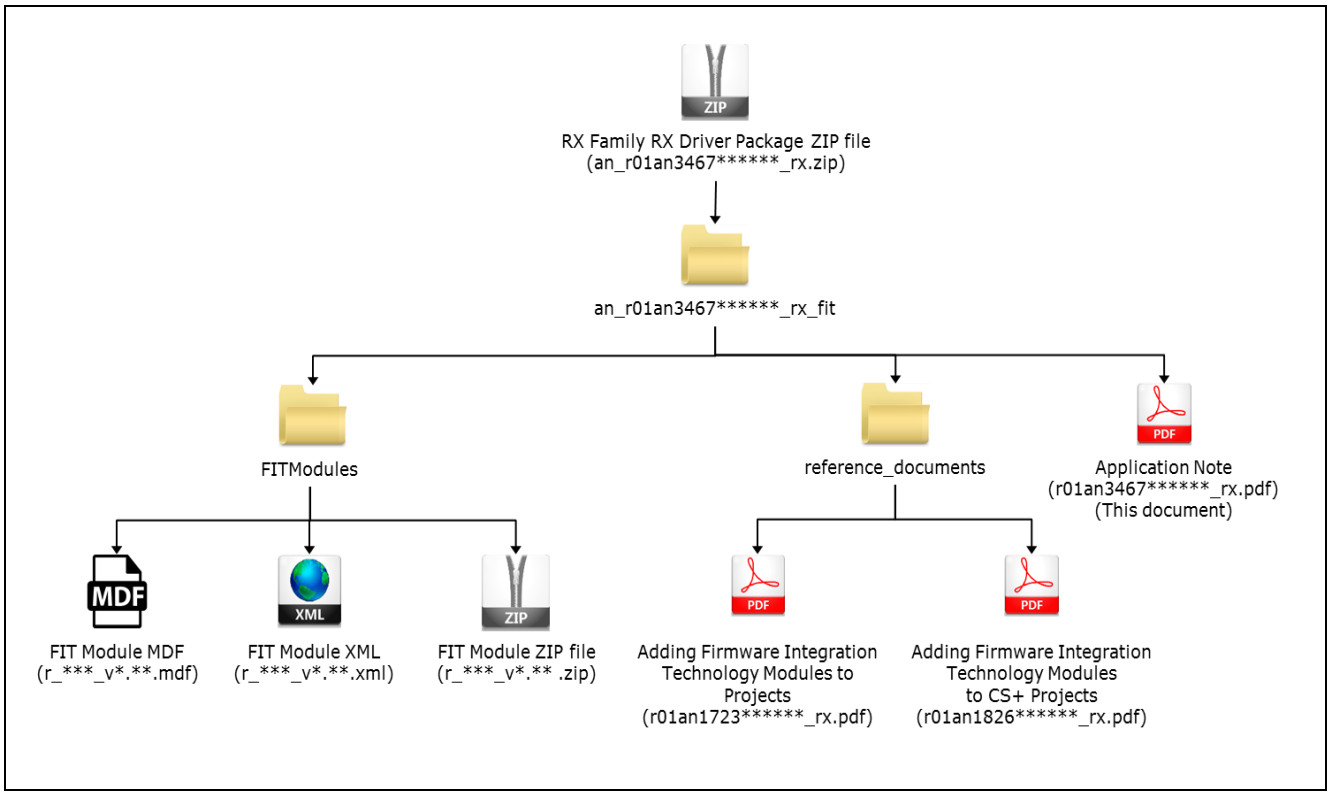


Figure 3-1 Folder Structure of the RX Family RX Driver Package

3.2 Module Structure

The figure below shows the types and structure of the FIT modules included in this package.

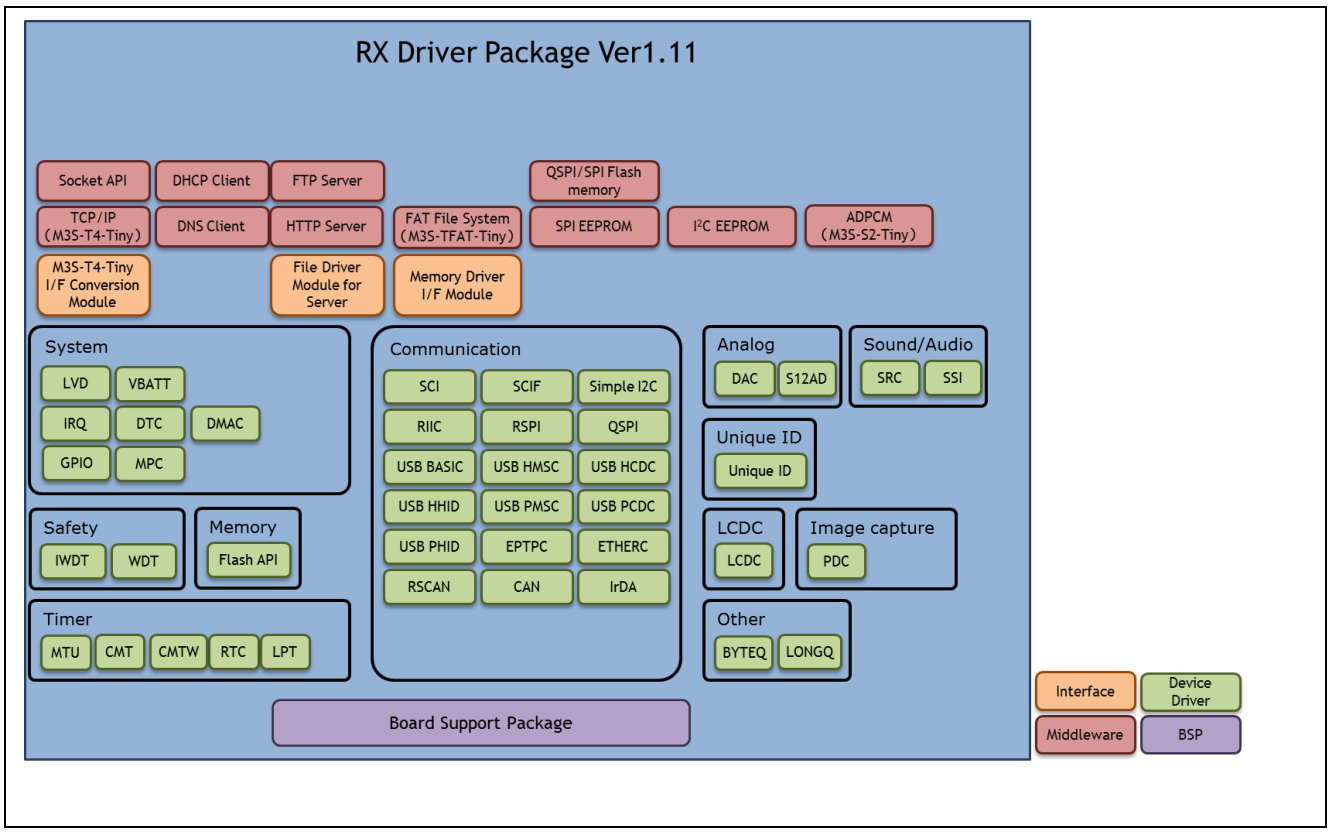


Figure 3-2 RX Family RX Driver Package FIT Module Structure

3.3 FIT Modules

The table below lists the FIT modules included in this package.

(1) Board Support Package (BSP)

Table 3-1 Board Support Package (BSP)

Module	FIT Module Name	Rev
Board Support Package (BSP)	r_bsp	3.40

(2) Device Driver

Table 3-2 Device Driver

Module	FIT Module Name	Rev
Voltage Detection Circuit (LVD)	r_lvd_rx	2.10
Battery Backup (VBATT)	r_vbatt_rx	1.01
Interrupt Controller (IRQ)	r_irq_rx	2.00
Data Transfer Controller (DTC)	r_dtc_rx	2.05
DMA Controller (DMAC)	r_dmaca_rx	1.04
I/O Ports (GPIO)	r_gpio_rx	2.10
Multi-Function Pin Controller (MPC)	r_mpc_rx	2.10
Multi-pulse Timer Unit (MTU2a)	r_mtu_rx	1.20
Compare Match Timer (CMT)	r_cmt_rx	3.00
Compare Match Timer W (CMTW)	r_cmtw_rx	1.20
Real-Time Clock (RTC)	r_rtc_rx	2.50
Low Power Timer (LPT)	r_lpt_rx	1.10
Independent Watchdog Timer (IWDT)	r_iwdt_rx	1.60
Watchdog Timer (WDT)	r_wdt_rx	1.00
Serial Communications Interface (SCI: Asynchronous/Clock Synchronous)	r_sci_rx	1.80
Serial Communications Interface with FIFO (SCIF: Asynchronous/Clock Synchronous)	r_scif_rx	1.10
Serial Communications Interface with FIFO (SCIF: Device Driver for Serial Memory Control)	r_scifa_smstr_rx	1.09
Serial Communications Interface (SCI: Simple I²C Bus)	r_sci_iic_rx	2.00
I²C Bus Interface (RIIC)	r_riic_rx	2.00
Serial Peripheral Interface	r_rspi_rx	1.50
Serial Peripheral Interface (RSPI: Device Driver for Serial Memory Control)	r_rspi_smstr_rx	1.12
Quad Serial Peripheral Interface (QSPI: Device Driver for Serial Memory Control)	r_qspi_smstr_rx	1.09
USB Basic Firmware	r_usb_basic	1.20
USB Host Mass Storage Class	r_usb_hmsc	1.20
USB Host Communication Device Class	r_usb_hcdc	1.20
USB Host Human Interface Device Class	r_usb_hhid	1.20
USB Peripheral Mass Storage Class	r_usb_pmsc	1.20
USB Peripheral Communications Device Class	r_usb_pcdc	1.20
USB Peripheral Human Interface Device Class	r_usb_phid	1.20

USB Basic Firmware mini	r_usb_basic_mini	1.02
USB Host Mass Storage Class mini	r_usb_hmsc_mini	1.02
USB Host Communication Device Class mini	r_usb_hcdc_mini	1.02
USB Host Human Interface Device Class mini	r_usb_hhid_mini	1.02
USB Peripheral Mass Storage Class mini	r_usb_pmsc_mini	1.02
USB Peripheral Communications Device Class mini	r_usb_pcdc_mini	1.02
USB Peripheral Human Interface Device Class mini	r_usb_phid_mini	1.02
PTP Module for the Ethernet Controller (EPTPC)	r_ptp_rx	1.11
EPTPC Light Module	r_ptp_light_rx	1.10
Ethernet controller (ETHERC)	r_ether_rx	1.11
CAN Module (CAN)	r_can_rx	2.10
CAN Module (RSCAN)	r_rscan_rx	1.00
IrDA Interface (IrDA)	r_irda_sci_rx	1.01
Parallel Data Capture Unit (PDC)	r_pdc_rx	2.00
12-Bit A/D Converter (S12AD)	r_s12ad_rx	2.11
12-Bit A/D Converter (S12AD) <RX65N>	r_s12ad_rx65n	1.00
D/A Converter (DAC)	r_dac_rx	2.91
Flash Memory (Flash API)	r_flash_rx	1.70
Sampling Rate Converter (SRC)	r_src_api_rx	1.11
Serial Sound Interface (SSI)	r_ssi_api_rx	1.20
LCD Controller/Driver (LCDC)	r_lcdc_rx	1.00
Unique ID Read	r_uid_rx	1.00
Byte Queue Buffer (Data Management)	r_byteq	1.60
Long Queue Buffer (Data Management)	r_longq	1.60
Event Link Controller (ELC)	r_elc_rx	1.10

(3) Middleware/Interface Module

Table 3-3 Middleware/Interface Module

Module	FIT Module Name	Rev
TCP/IP M3S-T4-Tiny for Embedding	r_t4_rx	2.05
Interface conversion module for Ethernet Driver and Embedded system M3S-T4-Tiny	r_t4_driver_rx	1.05
Embedded TCP/IP M3S-T4-Tiny Socket API Module	r_socket_rx	1.31
DHCP client using the embedded TCP/IP M3S-T4-Tiny Module	r_t4_dhcp_client_rx	1.04
DNS client using the embedded TCP/IP M3S-T4-Tiny Module	r_t4_dns_client_rx	1.03
FTP server using the embedded TCP/IP M3S-T4-Tiny Module	r_t4_ftp_server_rx	1.04
Web server using the embedded TCP/IP M3S-T4-Tiny Module	r_t4_http_server_rx	1.05
File driver for FTP server and Web server Module	r_t4_file_driver_rx	1.02
Sound playback system and compression system (original ADPCM codec)	r_s2_rx	3.04
M3S-TFAT-Tiny (FAT file system)	r_tfat_rx	3.03
M3S-TFAT-Tiny Memory Driver Interface Module	r_tfat_driver_rx	1.03
Simple I2C Module for EEPROM Access	r_eeprom_sci_iic_rx	1.30
I2C Bus Interface (RIIC) Module for EEPROM Access	r_eeprom_riic_rx	1.40
SPI Serial EEPROM Module	r_eeprom_spi	2.33
SPI Serial Flash memory Module	r_flash_spi	2.33

Note: This package includes the M3S-T4-Tiny (TCP/IP protocol stack library) of evaluation version. For the commercial version, please go to the below URL.
https://www.renesas.com/en-us/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html
https://www.renesas.com/pt-br/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html
https://www.renesas.com/en-eu/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html
https://www.renesas.com/ja-jp/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html
https://www.renesas.com/en-sg/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html
https://www.renesas.com/en-in/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html
https://www.renesas.com/ko-kr/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html
https://www.renesas.com/zh-tw/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html

4. Usage Procedures

The RX Driver Package allows programs to be easily constructed by using the FIT Configurator included in e^2 studio. The remainder of this section presents a simple usage example using e^2 studio. To use CS+, see the document “RX Family Adding Firmware Integration Technology Modules to CS+ Projects (R01AN1826EJ)” included in this package.

4.1 Application Creation

In this section, create a simple application that drives an LED.

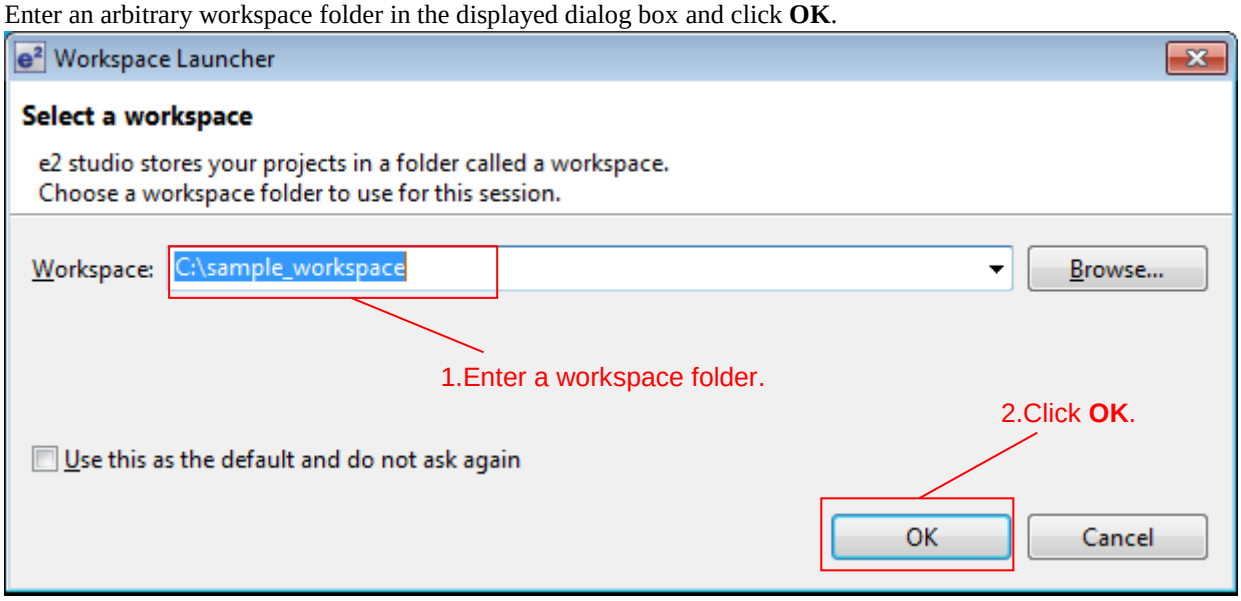
4.1.1 Environment Used

The RX64M is used as the target microcontroller and the Renesas Starter Kit+ RX64M is used as the target board. If different environment is used, replace the descriptions used in the example according to the environment you use.

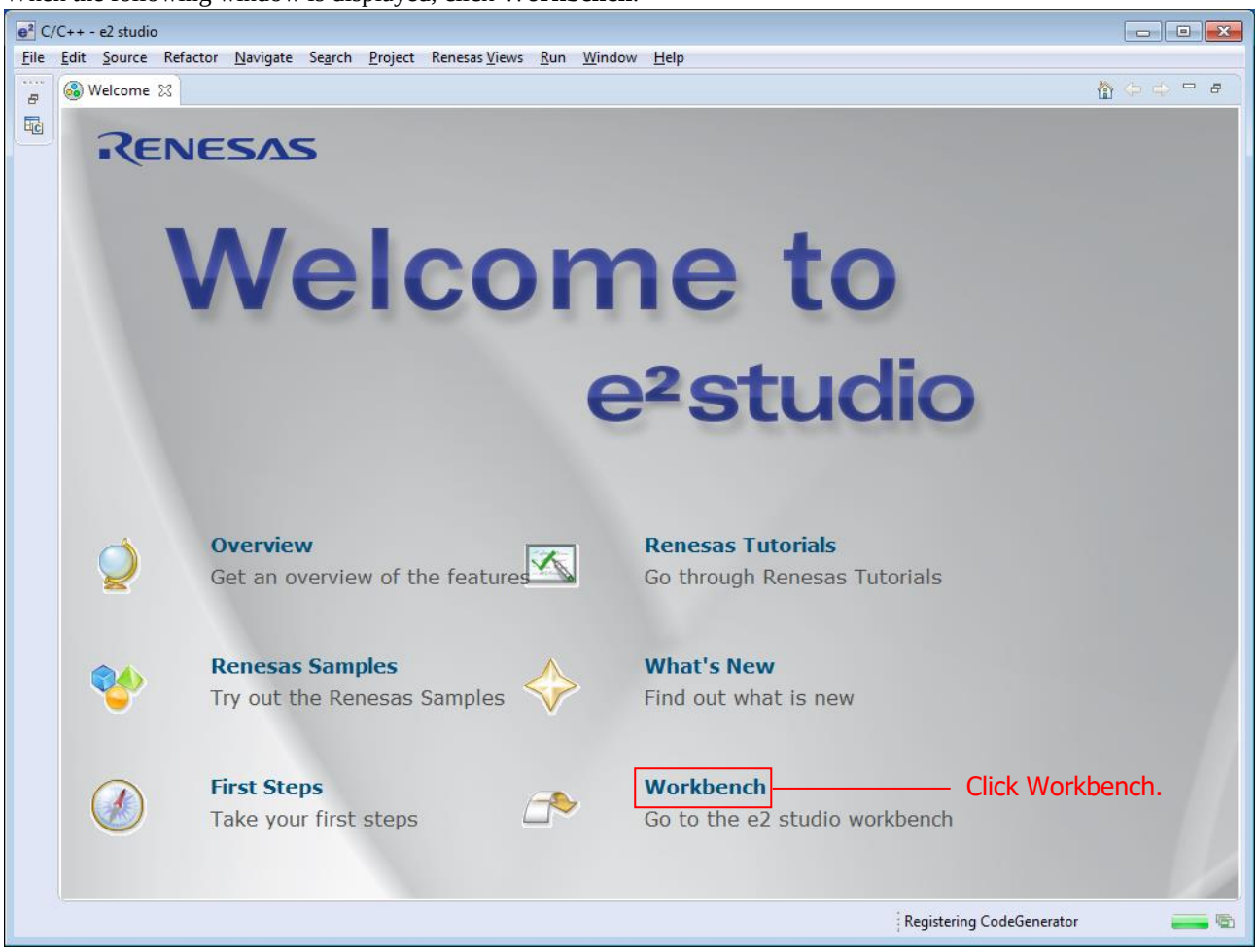
4.1.2 Create a Workspace and a Project

First, create a new workspace and a new project.

1. Start e^2 studio.
2. Enter an arbitrary workspace folder in the displayed dialog box and click **OK**.

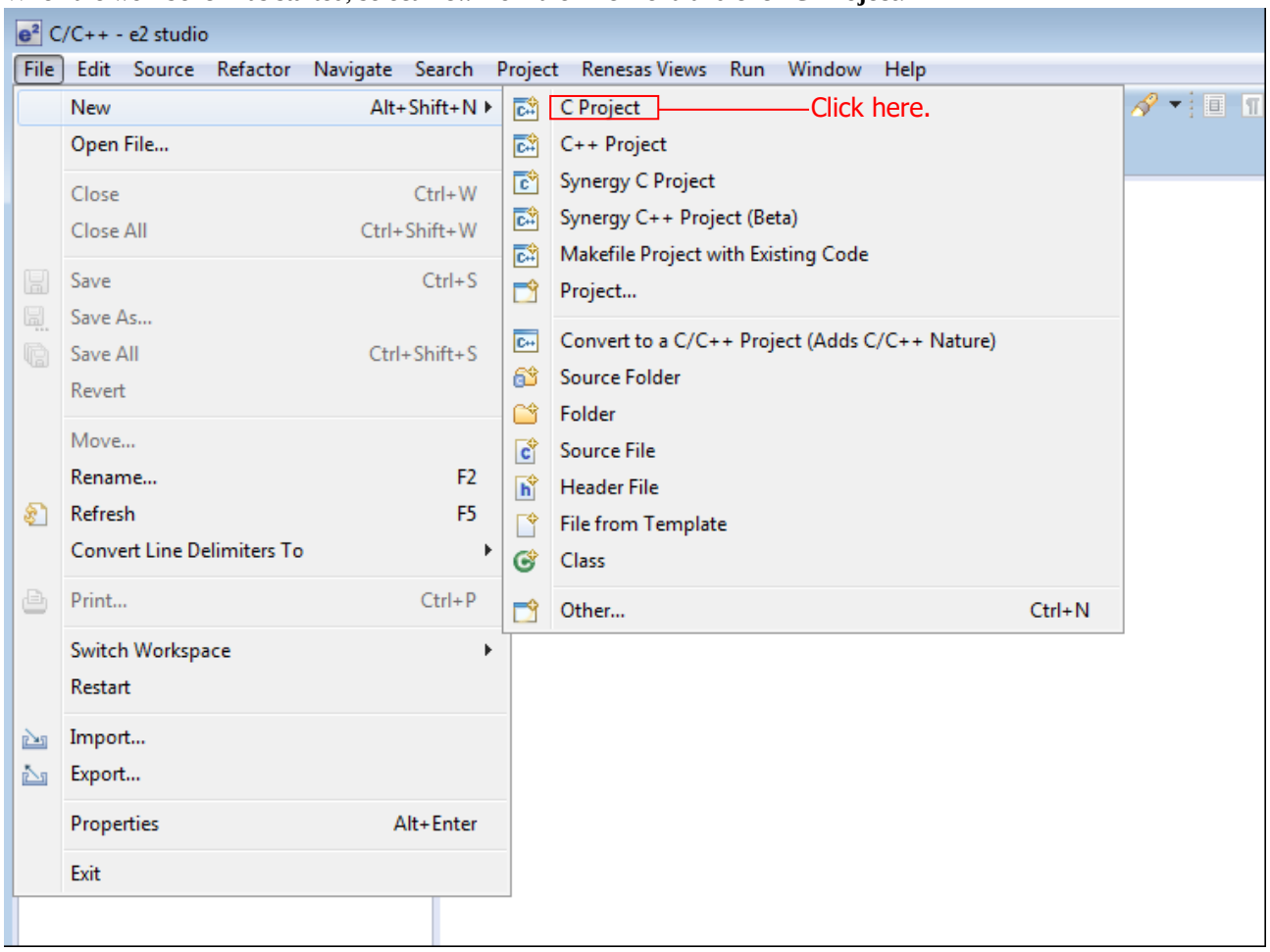


3. When the following window is displayed, click **Workbench**.

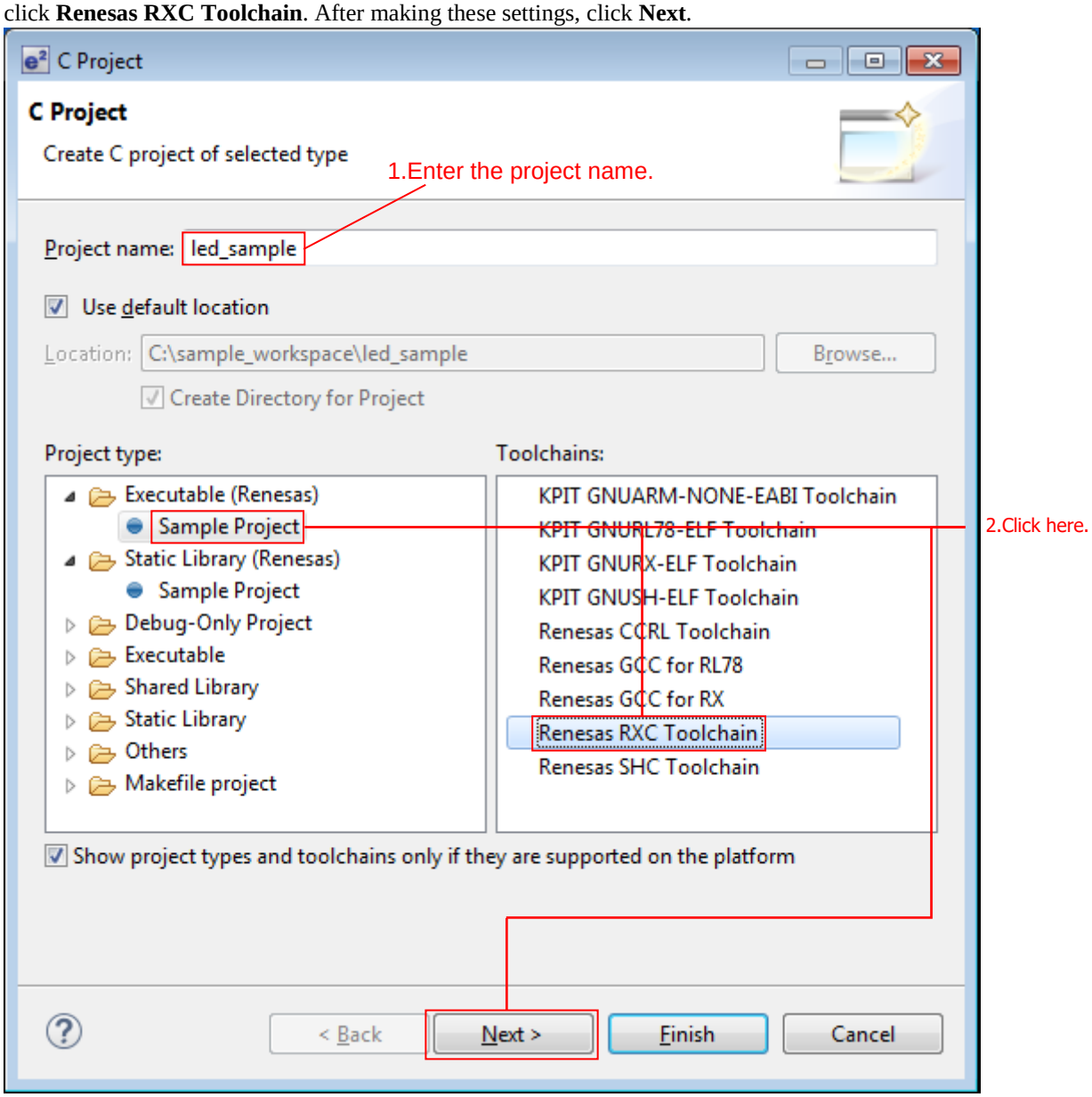


4.1.3 Create a Project and Download RX Driver Package

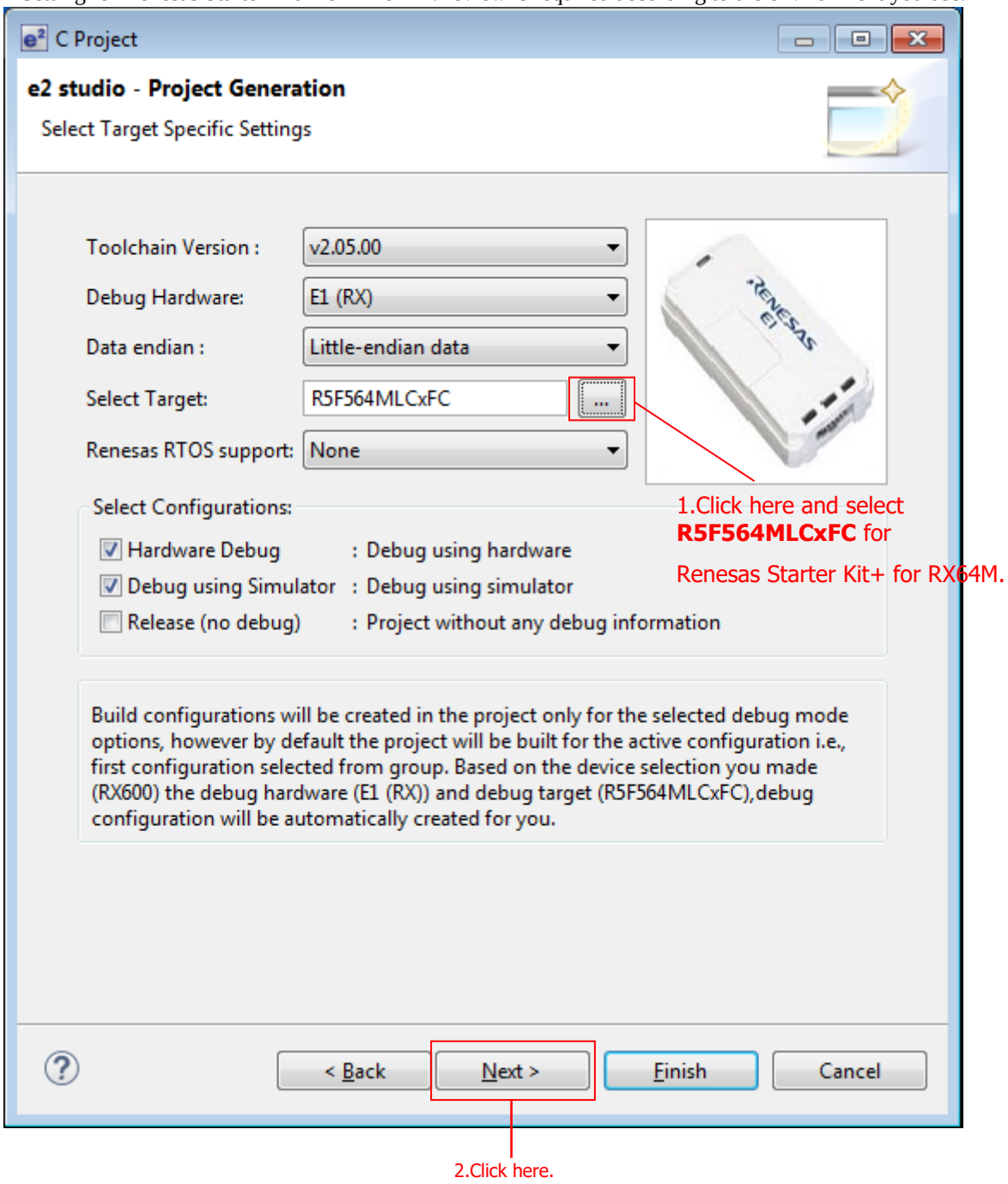
1. When the workbench has started, select **New** from the **File** menu and click **C Project**.



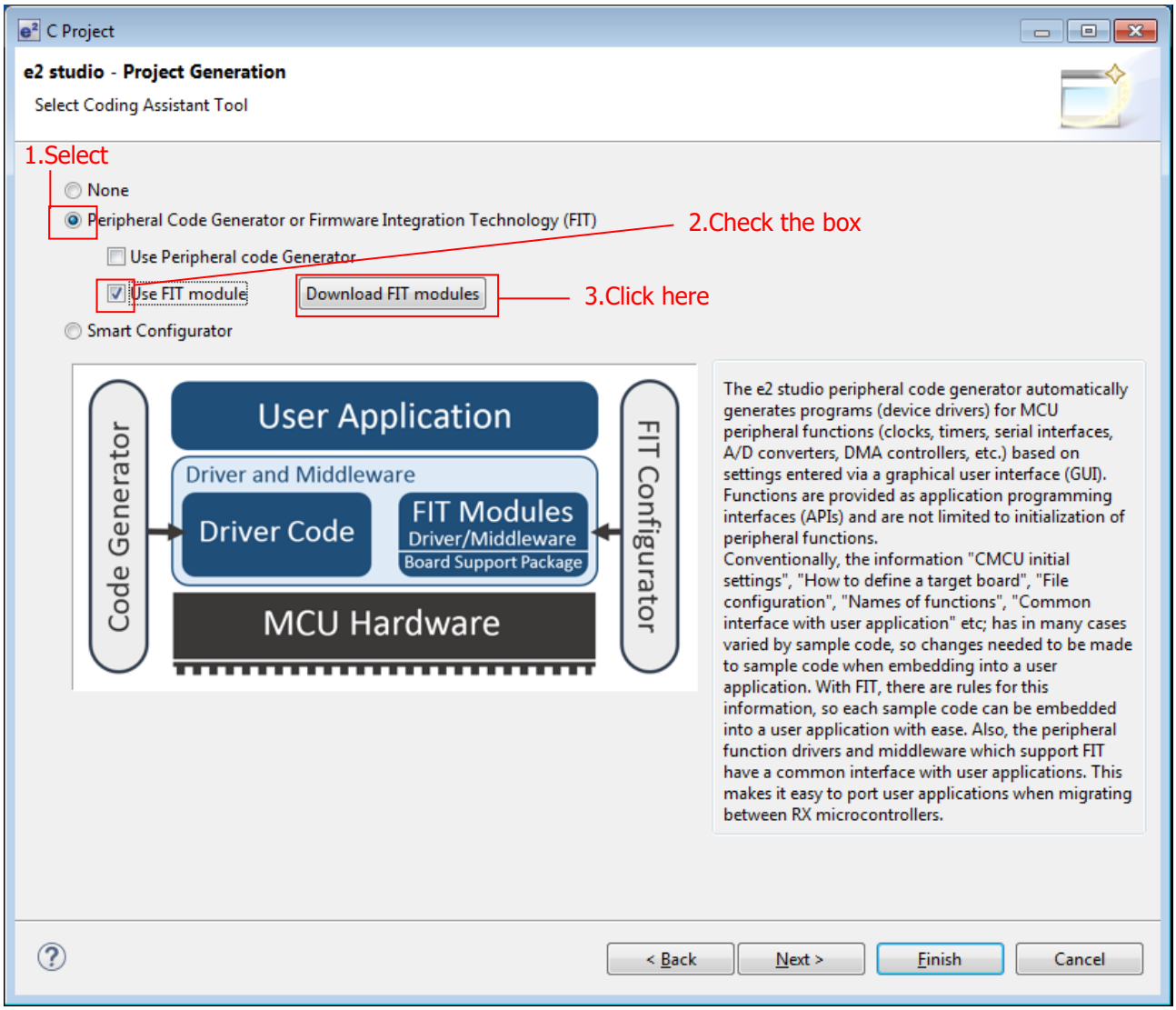
2. Enter the project name. For the project type, click **Sample Project** under **Executable (Renesas)**. For the tool chain, click **Renesas RXC Toolchain**. After making these settings, click **Next**.



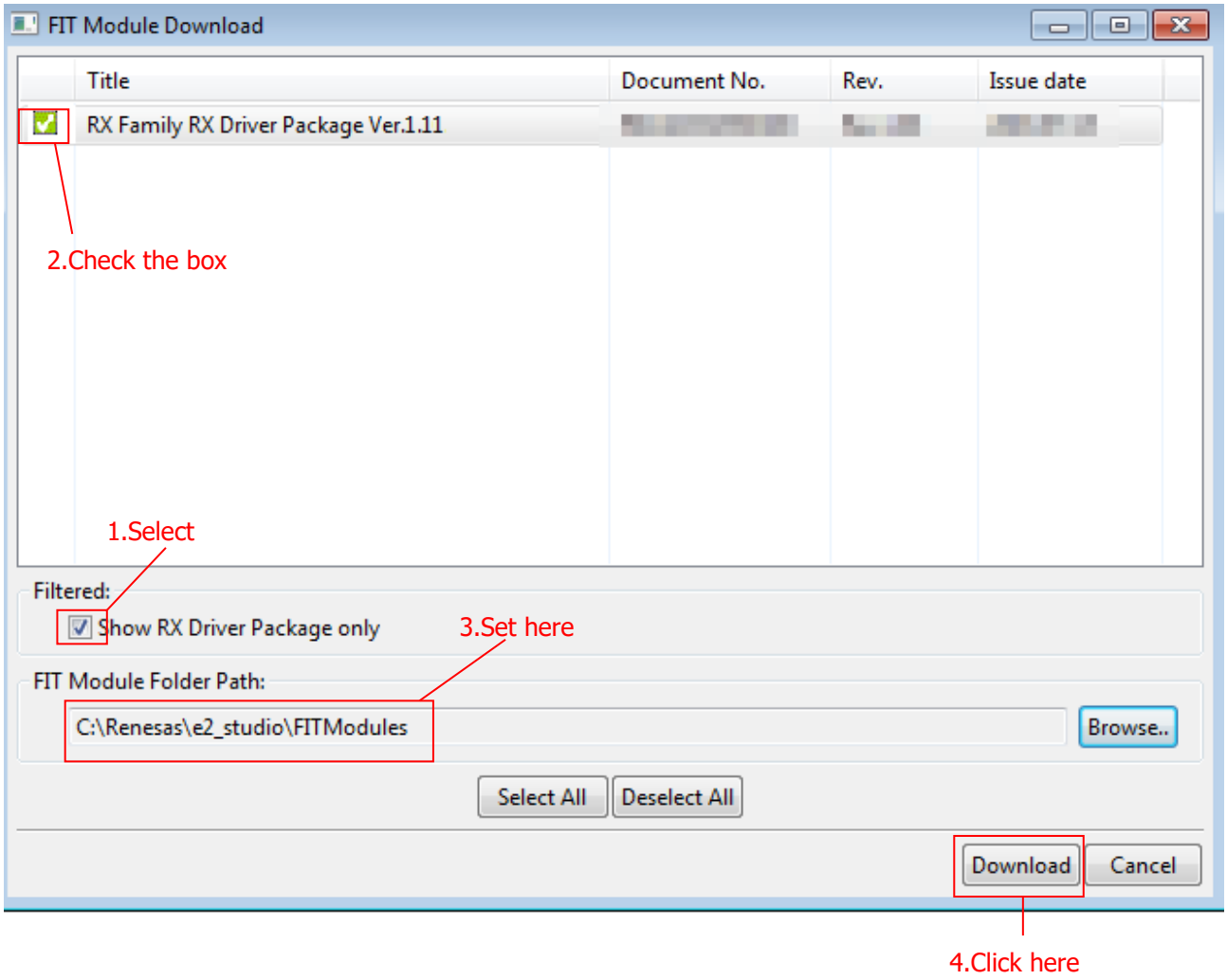
3. Select the target. Click the "..." button under **Target Selection** and select **R5F564MLCxFC (*)**. After making these settings, click **Next**.
   * Setting for Renesas Starter Kit+ for RX64M : review is required according to the environment you use.



4. Select “Peripheral Code Generator or Firmware Integration Technology (FIT)”, and check the box of “Use FIT module” and click “Download **FIT modules”**.

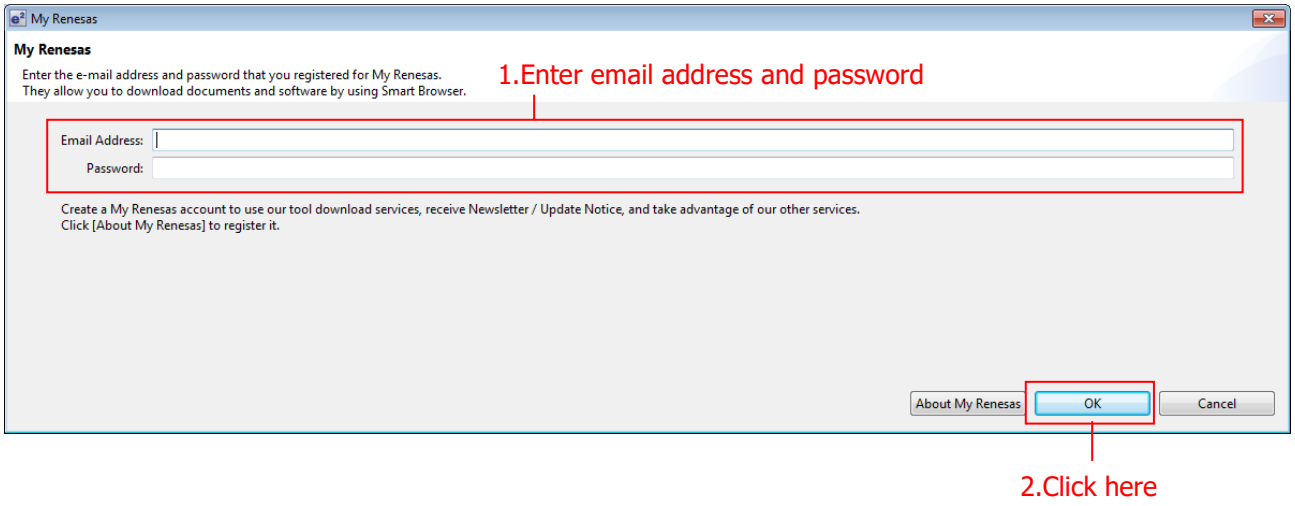


5. Select RX Driver Package to be downloaded. Check the box of ”Show RX Driver Package only” in ”Filtered:”. Then, check the box of the RX Driver Package you download. Set the “FIT Module Folder Path:” (*), and click **Download**.

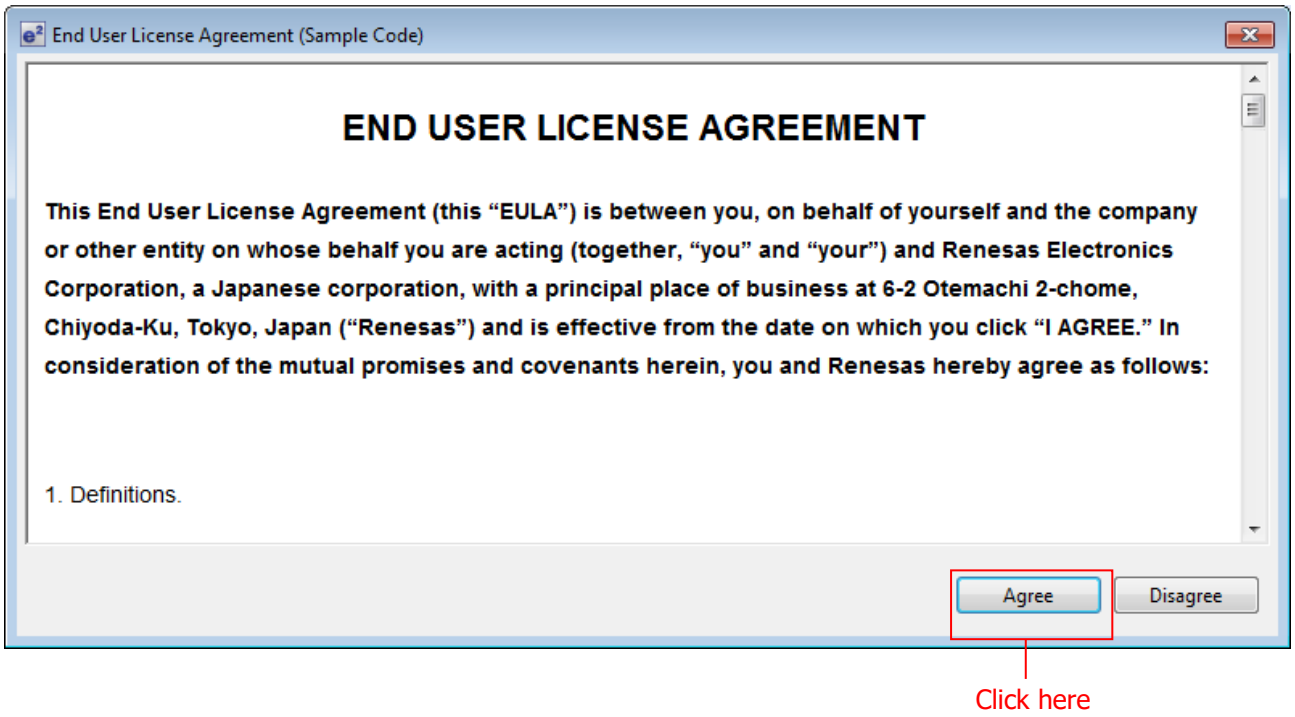


* Setting of “FIT Module Folder Path:”
The RX Driver Package downloaded is stored in the folder specified in “FIT Module Folder Path:”.
Arbitrary folder can be specified.
In the default setting, “FITModules” folder is specified. (generally, C:\Renesas\e2_studio\FITModules).
“FITModules” folder is automatically created by clicking ” Download **FIT modules**” described in ”0 – 4”.

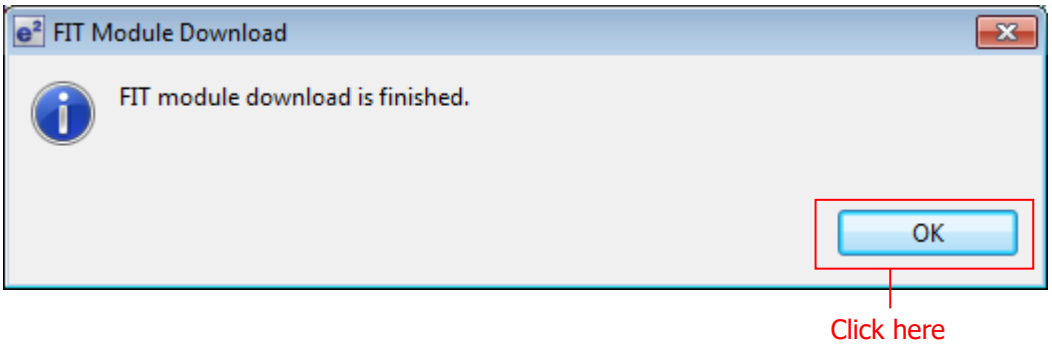
6. Enter My Renesas email address and password and click **OK**. This screen does not appear if you have already entered them.



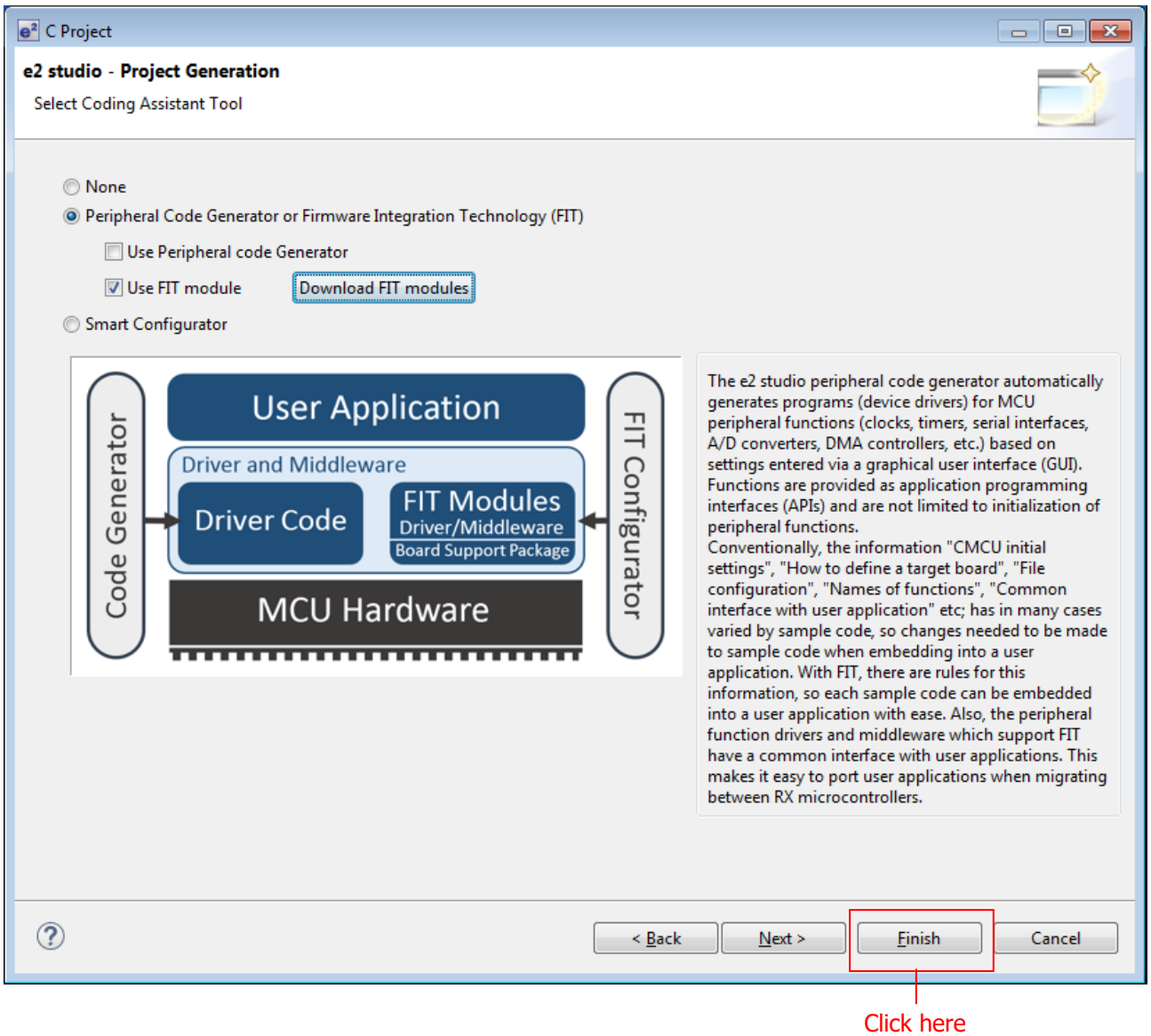
7. Check the contents and click **"Agree"**.



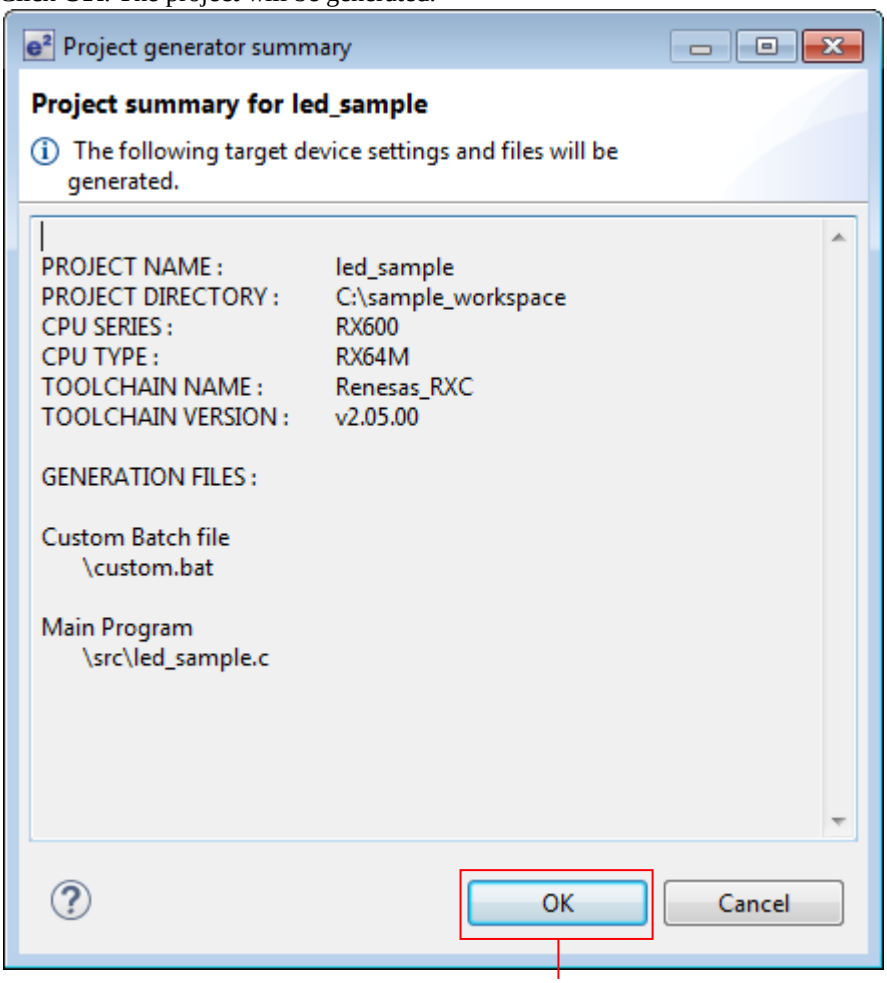
8. Click **OK**.



9. Click **Finish**.



10. Click **OK**. The project will be generated.

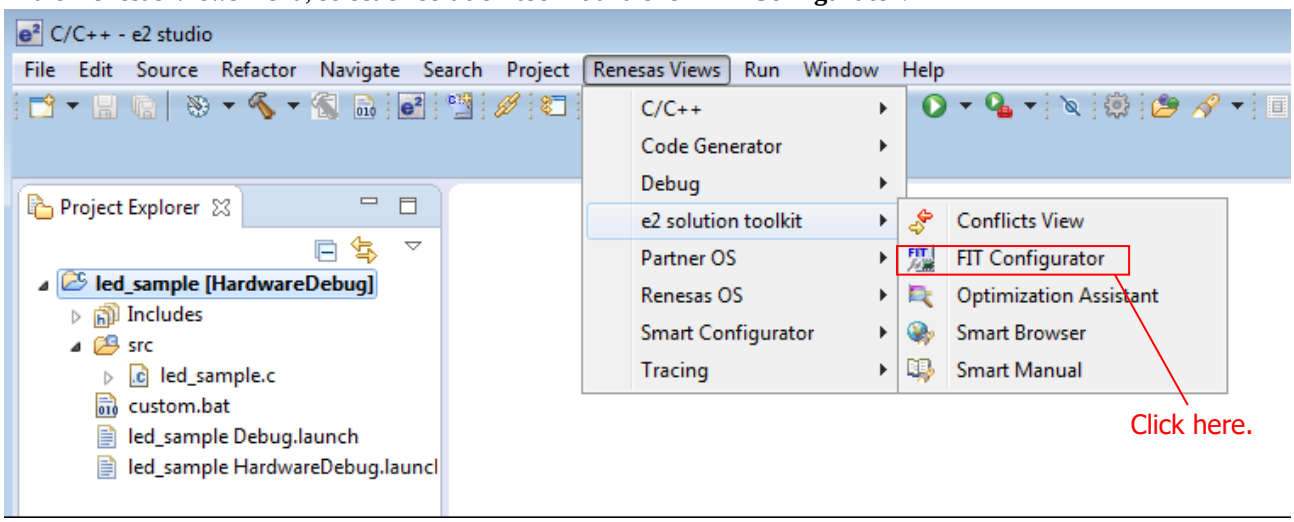


4.1.4 Install the FIT Modules with the FIT Configurator

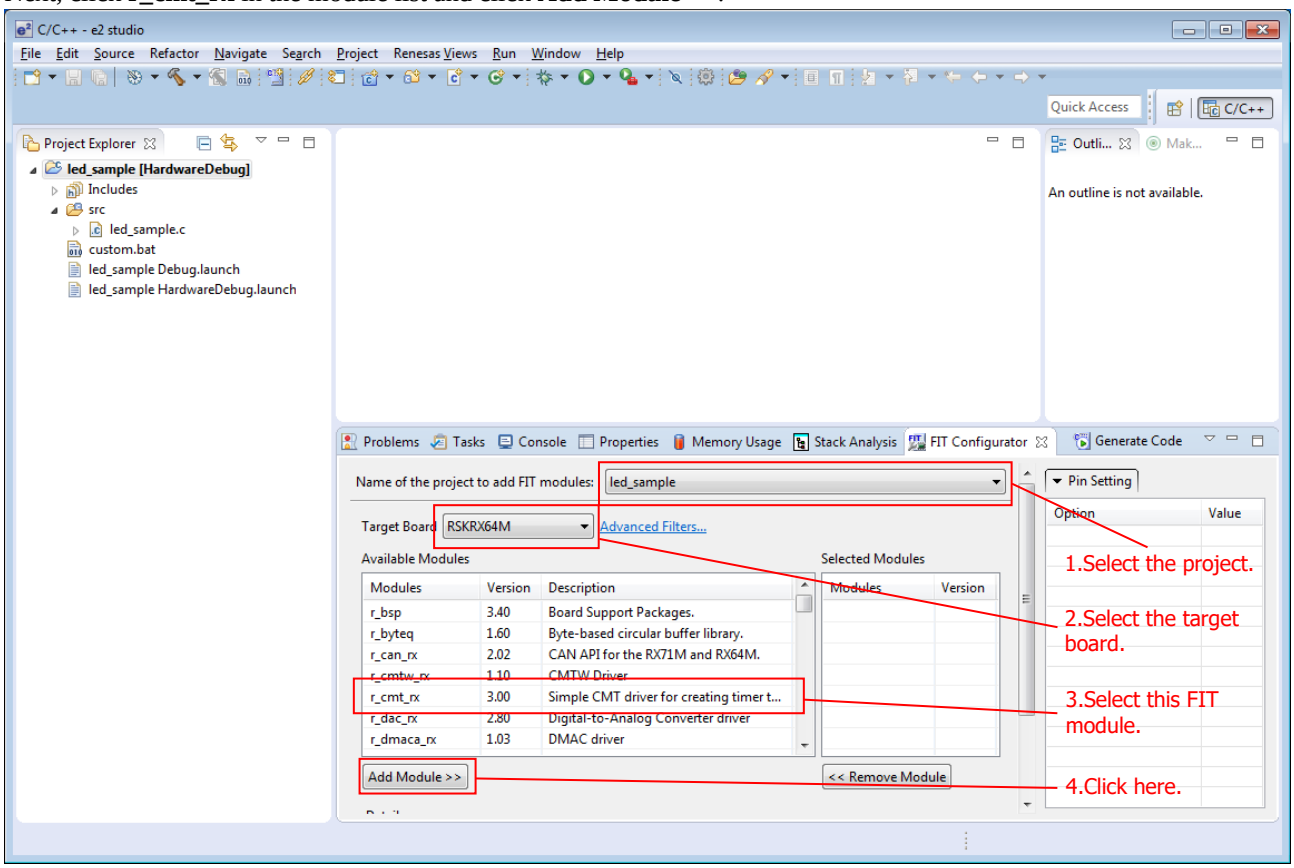
Install the required modules with the FIT Configurator into the created project.

Here, install the CMT FIT module (r_cmt_rx).

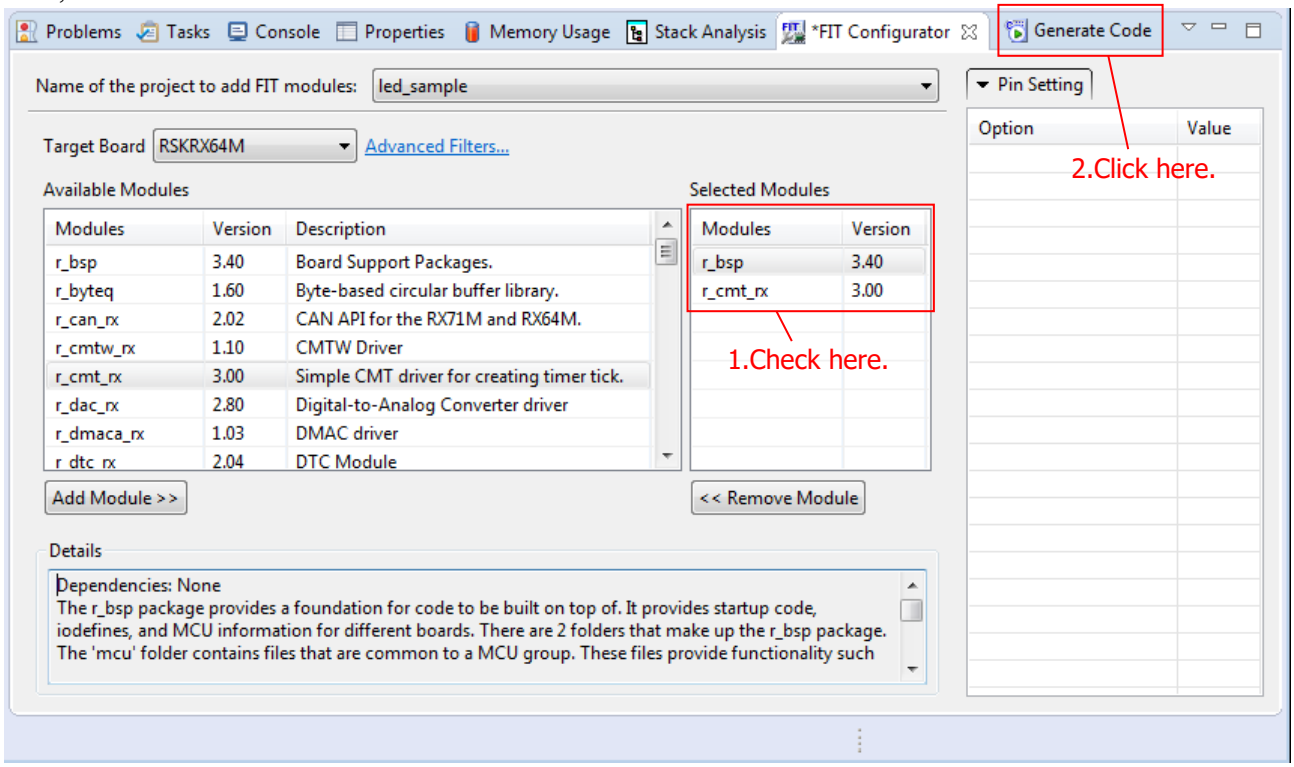
1. In the **Renesas Views** menu, select **e2 solution toolkit** and click **FIT Configurator**.



2. In the **FIT Configurator** tab,
   Select the created project with **Project to Add FIT Module** to.
   Next, select **RSKRX64M** from **Target Board**.
   Next, click **r_cmt_rx** in the module list and click **Add Module** >>.

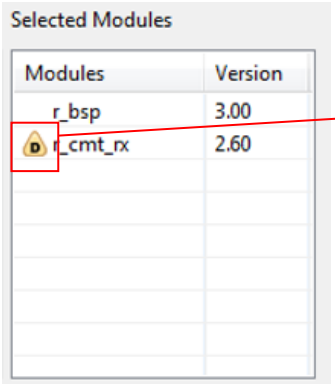


3. Check **r_bsp** and **r_cmt_rx** are added in **Selected Modules***.
   Then, click **Generate Code**.



* Supplementary note

The mark ⓓ may appear in ”Selected Modules”. It shows that the Warning has occurred in the added FIT module. The contents of the Warning can be checked from “Console” tab. The occurrence of Warning is caused mainly by version mismatch of ”r_bsp” that has dependencies with FIT module, and it occurs when the dependent information of the FIT module is not updated for the commonly updated ”r_bsp”. The Warning can be ignored, as the updated ”r_bsp” has backward compatibility.

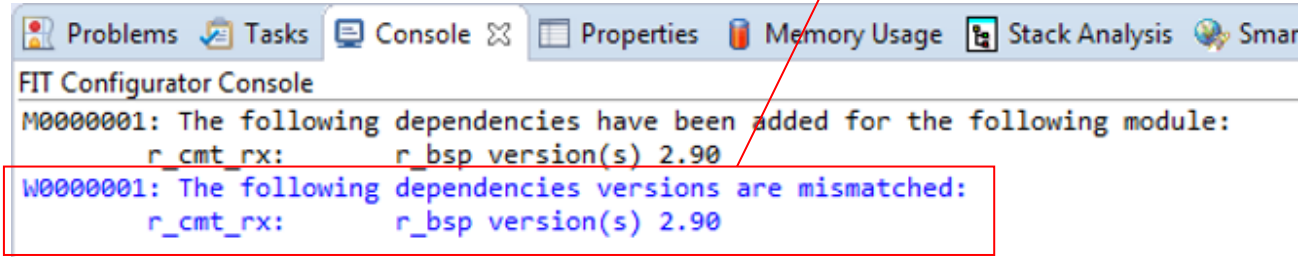


Shows the occurrence of Warning.

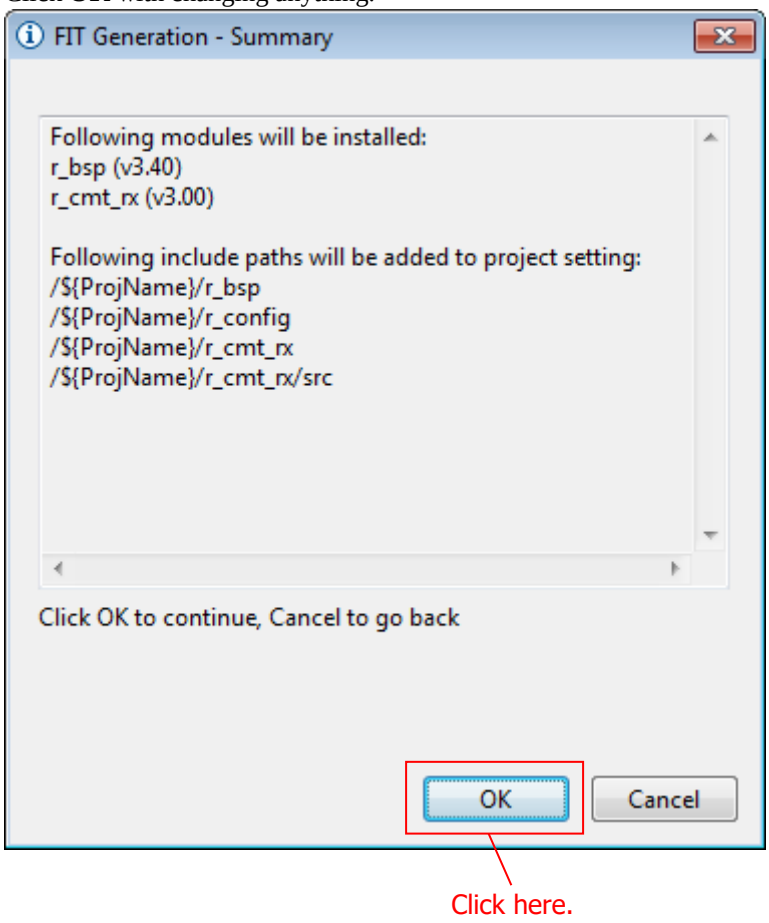
Check the contents on Console screen.

Example of CMT FIT module specifying the r_bsp ver.2.90

For the added r_bsp with ver.2.9 or later, the Warning can be ignored due to backward compatibility.



4. Click **OK** with changing anything.



4.1.5 Create an LED Driving Program

Create a program that toggles the LED0 on/off state every 0.5 seconds using the compare match timer.

Open the file src/(the project name).c and modify it as shown below.

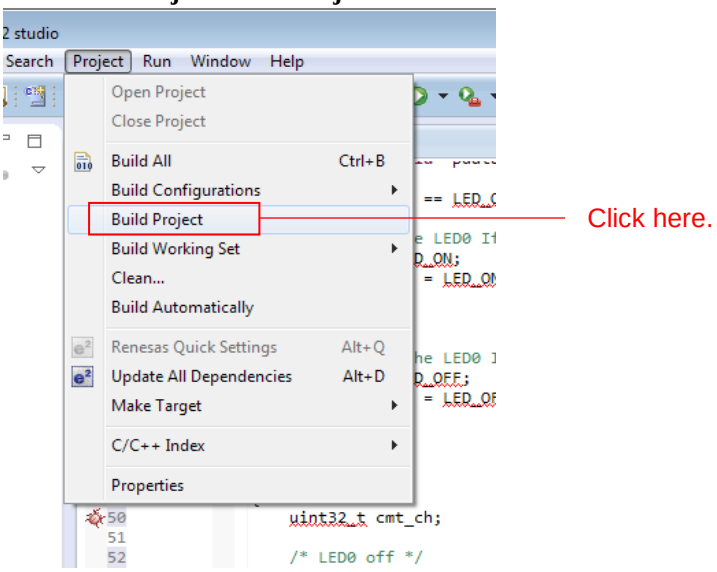
src/(the project name).c

```
#include "platform.h"
#include "r_cmt_rx_if.h"

/* LED Currently status */
uint32_t ledstatus = LED_OFF;

void call_back(void *pdata)
{
      if (ledstatus == LED_OFF)
      {
            /* Turn ON the LED0 If the status is LED_OFF */
            LED0 = LED_ON;
            ledstatus = LED_ON;
      }
      else
      {
            /* Turn OFF the LED0 If the status is LED_ON */
            LED0 = LED_OFF;
            ledstatus = LED_OFF;
      }
}

void main(void)
{
      uint32_t cmt_ch;

      /* LED0 off */
      LED0 =LED_OFF;
      /* Create of 0.5 second(2Hz) cyclic timer. */
      R_CMT_CreatePeriodic(2, &call_back, &cmt_ch);

      while(1);
}
```

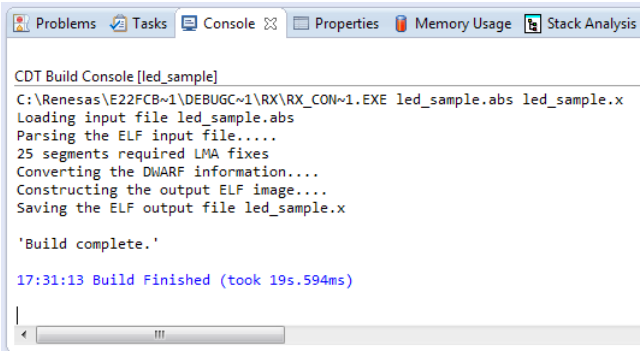
4.1.6 Build and Try Running the Program

Build the program just created and verify that it runs.

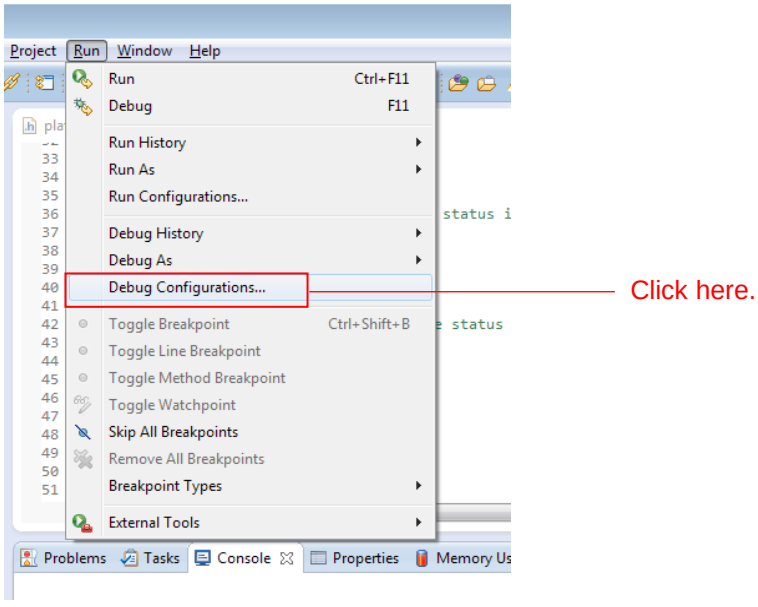
1. Click **Build Project** on the **Project** menu.



2. When the build completes, the following will be displayed in **Console** view.

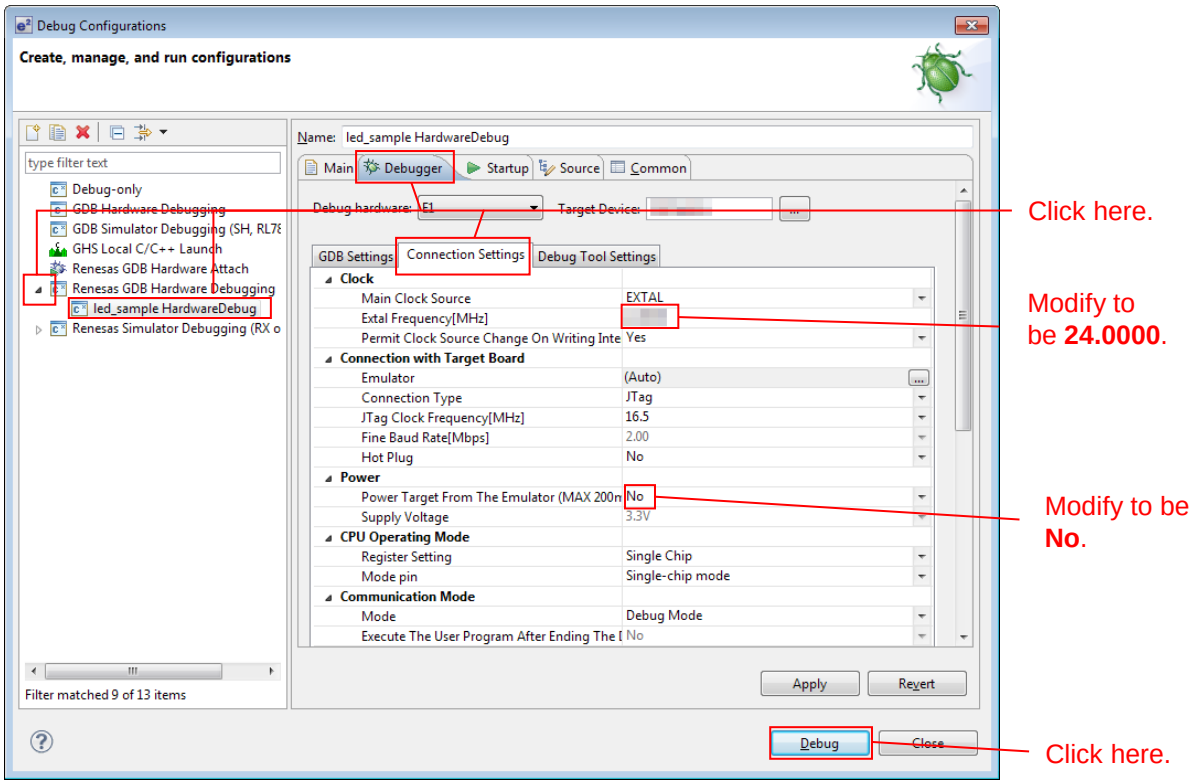


3. Click **Debug Build** on the **Run** menu.

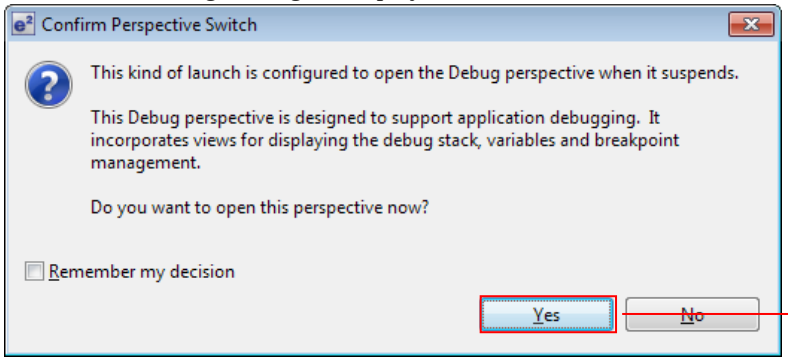


4. Click ◢ under the **Renesas GDB Hardware Debugging and c**lick **<project name> HardwareDebug**. Click the **Debugger** tab and click **Connection Setting**.
   Modify **EXTAL Frequency** to be **8.0000** and change **Provide Power from Emulator** to **No ***.
   When these changes have been made, click **Debug**.

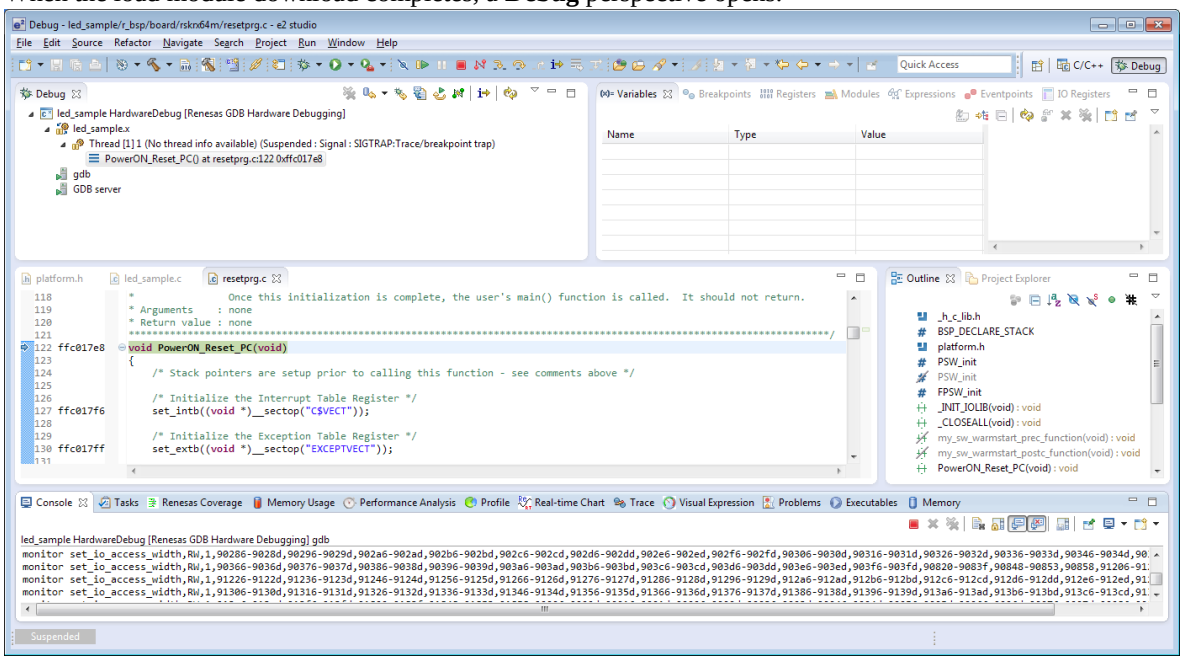
   Note : This is setting when using an external power supply. When supplying power from the emulator, select **Yes.**



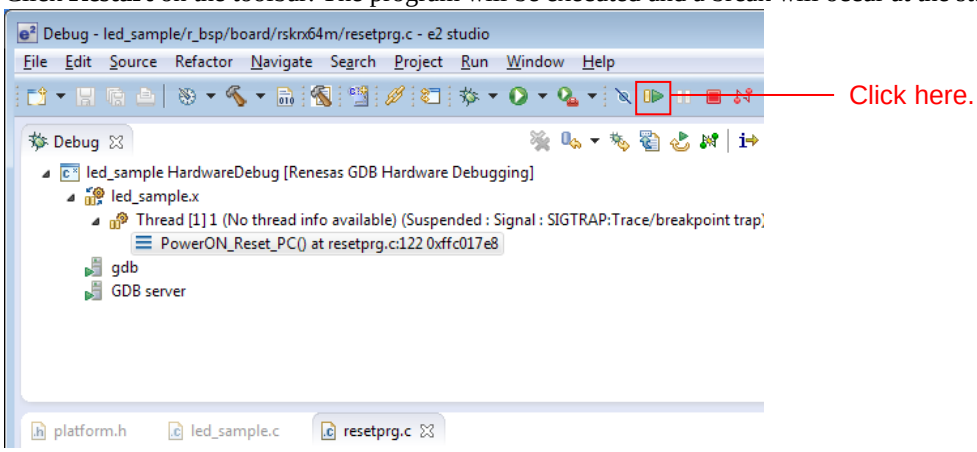
5. When the following message is displayed, click **Yes**.



6. When the load module download completes, a **Debug** perspective opens.



7. Click **Restart** on the toolbar. The program will be executed and a break will occur at the start of the main function.



8. After the break at the start of the main function, click **Restart** on the tool bar again.
   The project will be run and the program will iterate toggling LED0 with a period of 0.5 seconds.

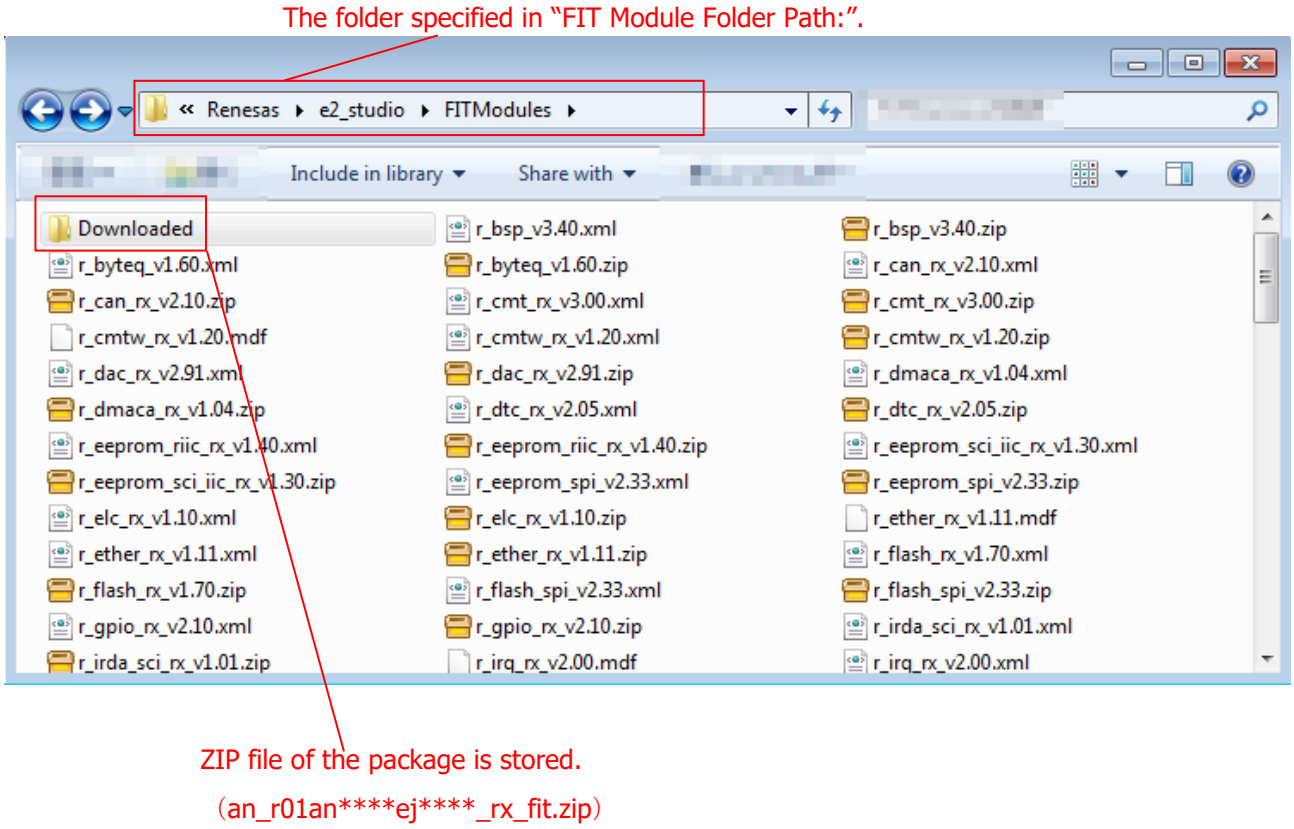
4.1.7 Location of the API Information for FIT Module

For the API information of FIT module embedded in the project, refer to the **doc** folder of each FIT module folder.

4.2 Check the RX Driver Package Downloaded

When successfully downloaded, FIT module is stored in the folder specified in ”FIT Module Folder Path:” described in “0 – 5” (generally, C:\Renesas\e2_studio\ FITModules).

In “FITModules\Downloaded” folder, ZIP file of the package is stored.



4.3 Update FIT Module

The following describes how to update the FIT module.

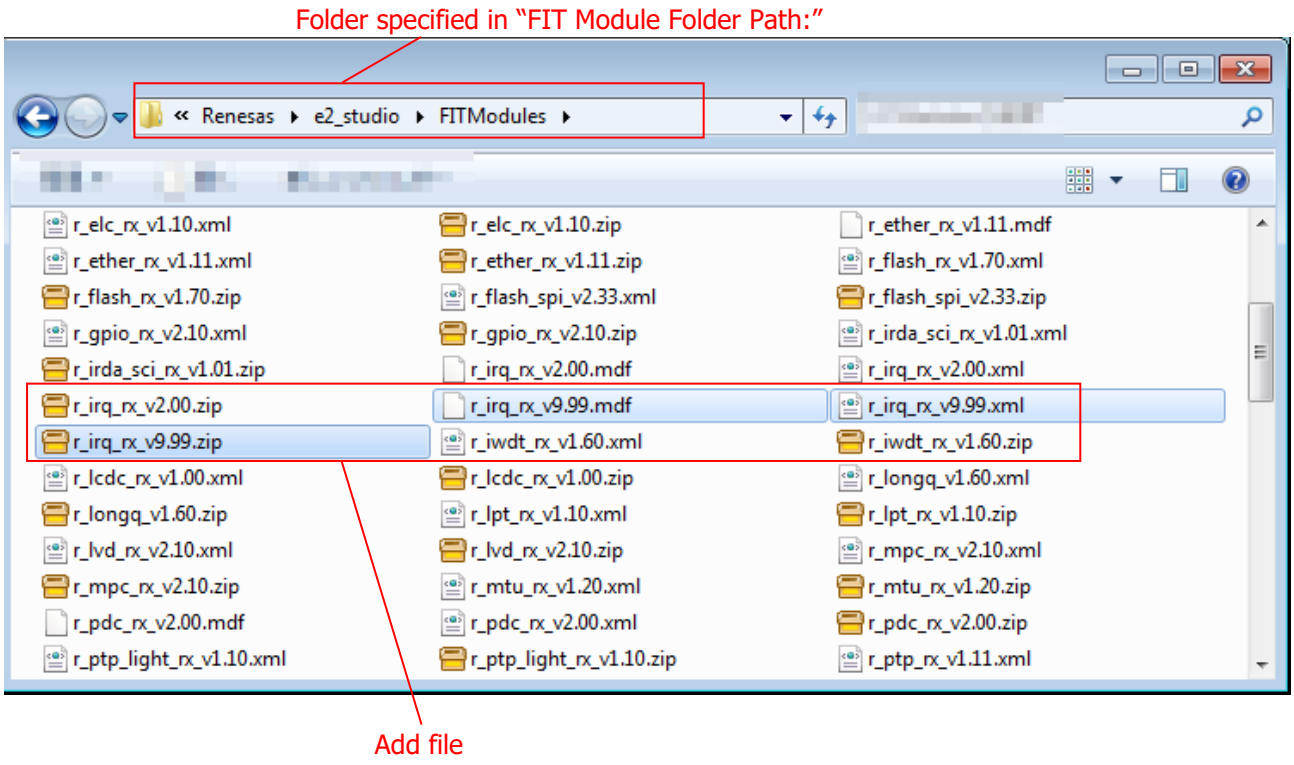
4.3.1 Environment Used for the Description

Upgraded IRQ FIT module Ver.9.99 (r_irq_rx_v9.99) is used as an example.

4.3.2 Add FIT Module

An intended FIT module is added to the folder specified in “FIT Module Folder Path:”.

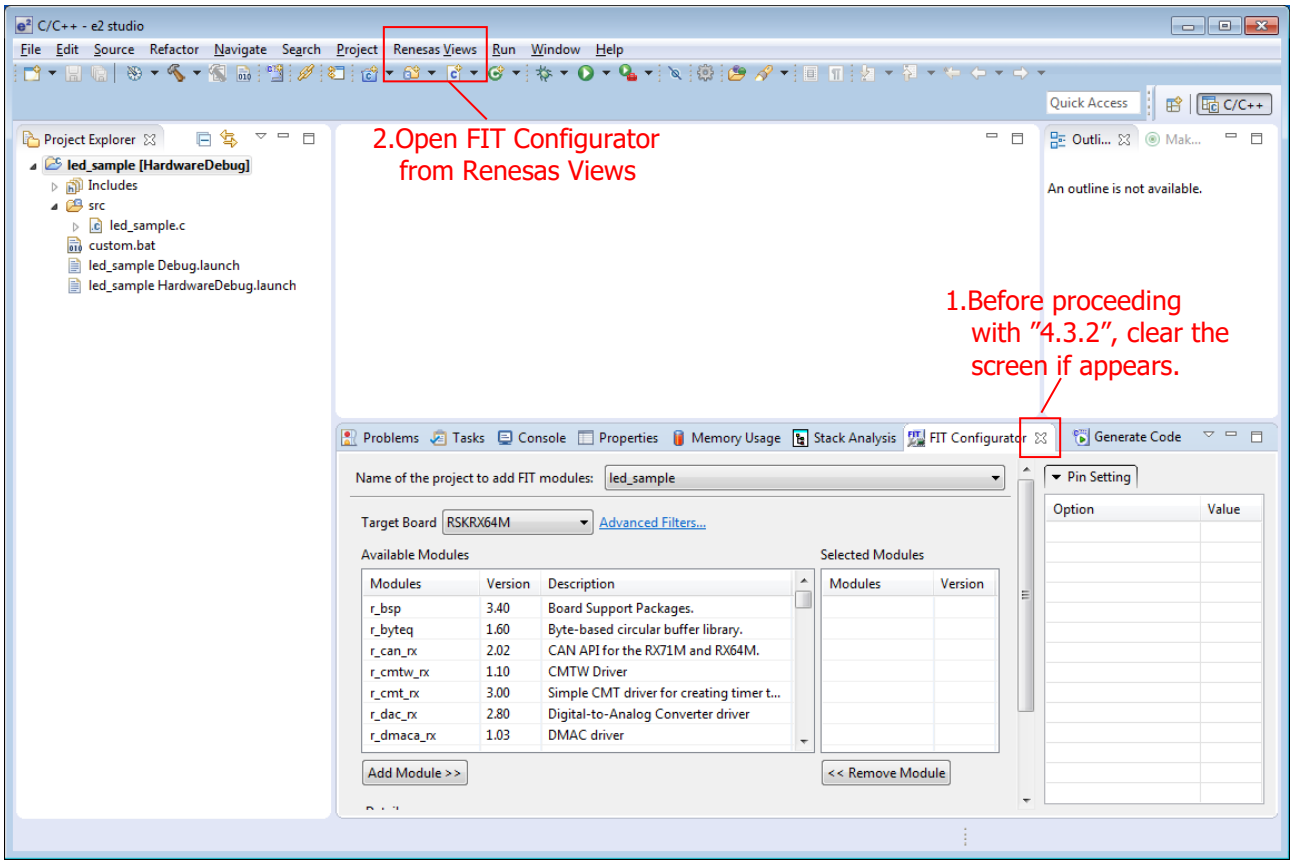
For the file to be stored, ZIP file r_***_v*.**.zip and XML file r_***_v*.**.xml are mandatory, and MDF file r_***_v*.**.mdf are mandatory, if they exist.



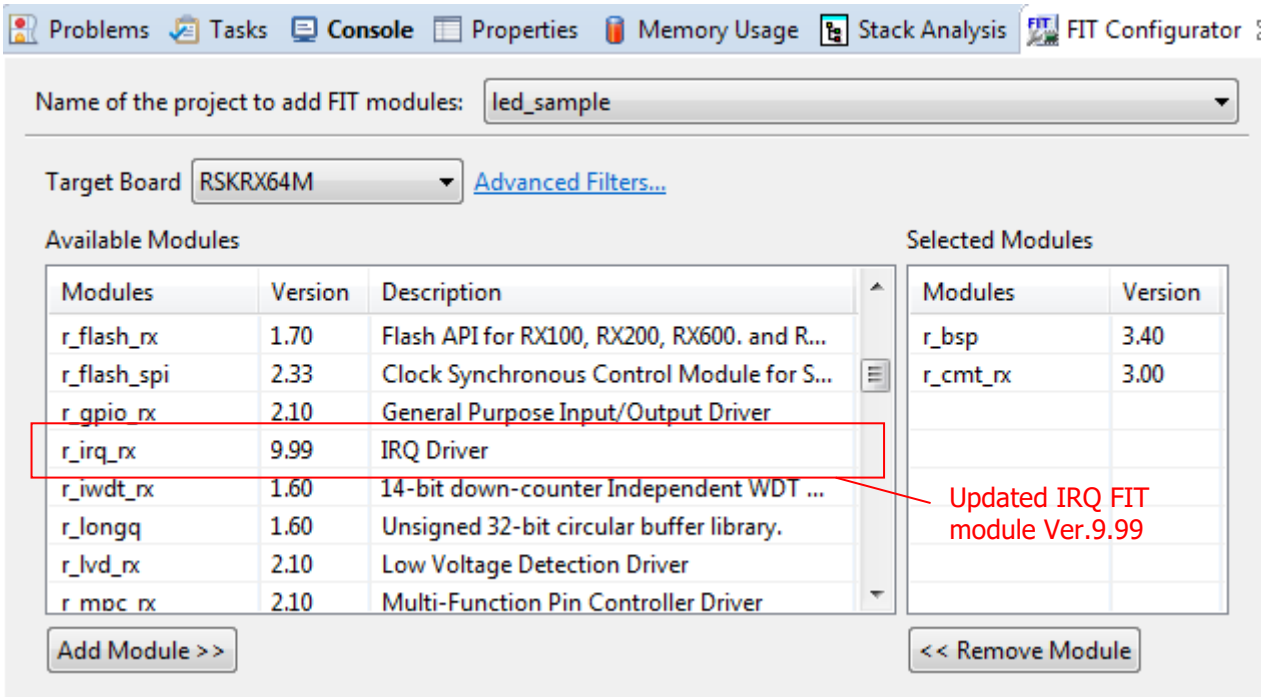
4.3.3 Confirm the FIT Module Added in FIT Configurator Screen

1. Open FIT Configurator

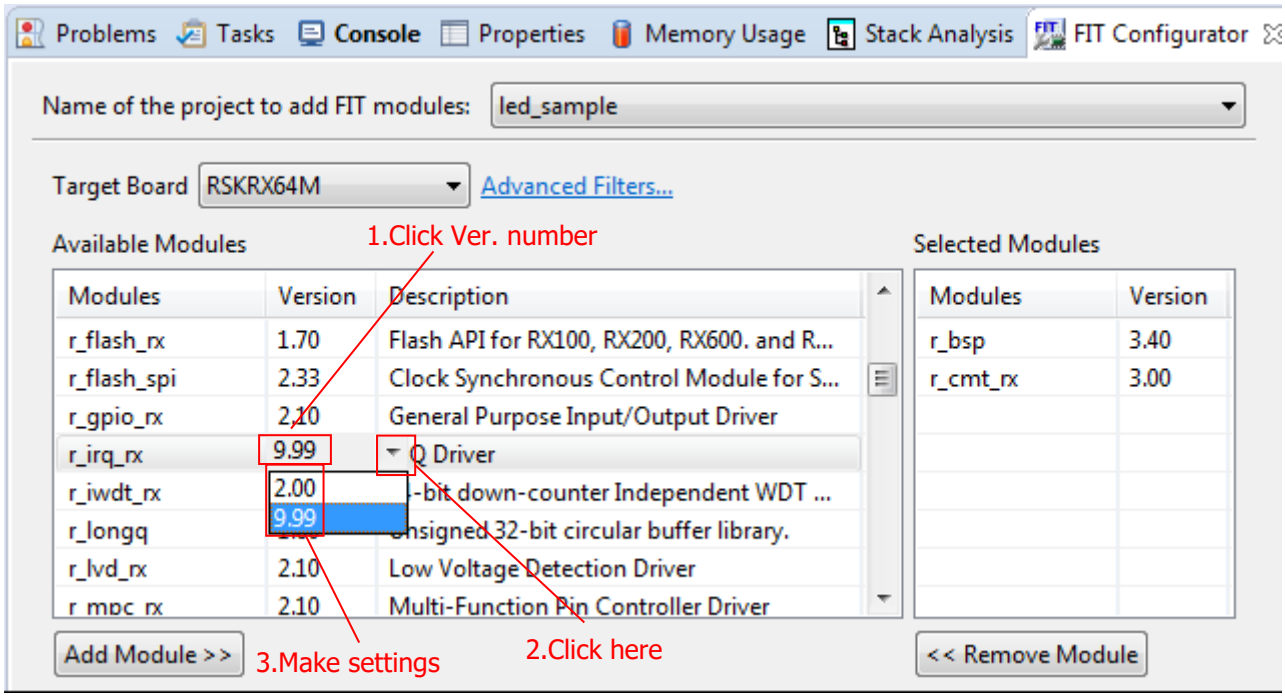
Before proceeding with “4.3.2”, if FIT Configurator screen is displayed, clear this screen, then, reopen it. The screen information is not updated unless reopened.



2. Confirm the FIT module added. Latest Ver. will appear on FIT Configurator screen (*).
See “4.1.4” from then on to install the target FIT module.



* To select old Ver. :
Pulldown appears by clicking the FIT module Ver. Number. Then, click pulldown to show old Ver.



5. RX Driver Package Application

5.1 RX Driver Package Application Structure

The RX Driver Package Application is a sample application program provided so that users can use the RX Driver Package easily. The RX Driver Package Application consists of an application program that operates using device drivers and middleware included in the RX Driver Package and a project file for building that application. This allows users to start evaluation quickly.

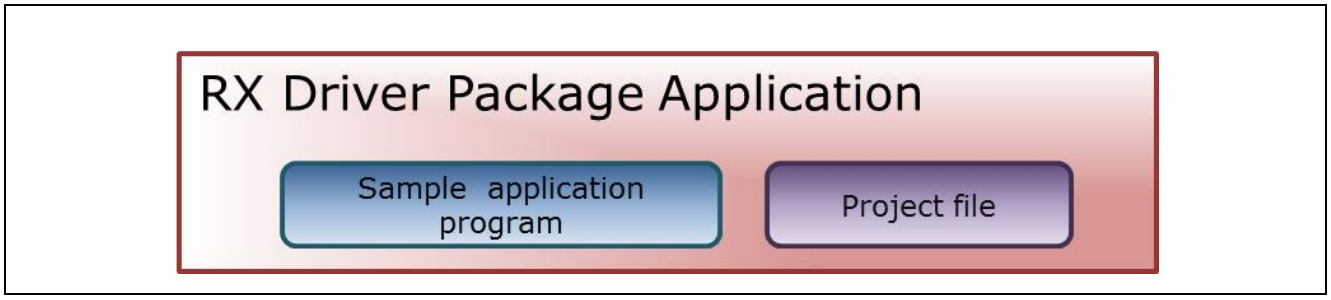


Figure 5-1 RX Driver Package Application Structure

Renesas plans to release a variety of types of this RX Driver Package Application in the future, such as system programs that operate using a combination of multiple drivers and middleware and evaluation programs for independent modules from the RX Driver Package.

For information of the latest RX Driver Package Application, refer to the “Products Supporting RX Driver Package Application” shown in the following URL.

http://www.renesas.com/products/mpumcu/rx/child/fit.jsp

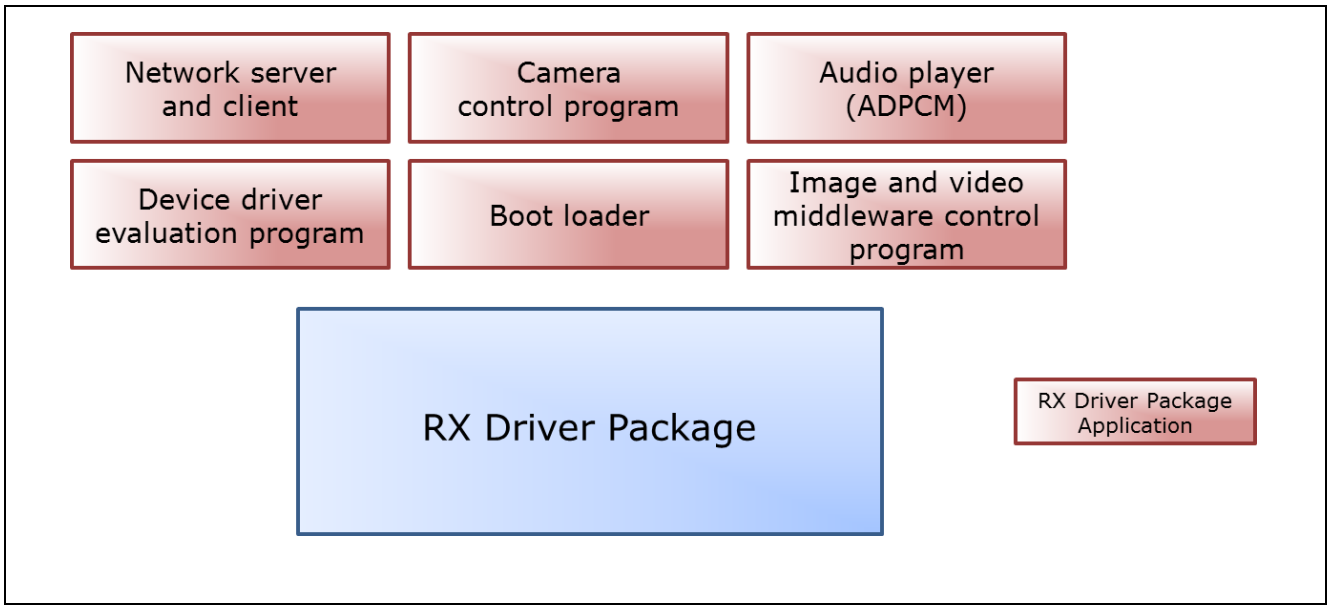


Figure 5-2 Types of RX Driver Package Application

6. Supplement

6.1 Commercial Version of Middleware and Drivers Supporting FIT

A list of the commercial version (paid) Middleware and Drivers for RX family is shown below.

For the information of the latest commercial version (paid) Middleware and Drivers, refer to the page of the Middleware and Drivers.

Table 6-1 list of the commercial version (paid) Middleware and Drivers for RX family

Commercial Version of Middleware and Drivers	URL	FIT Compliant
TCP/IP for Embedding M3S-T4-Tiny	https://www.renesas.com/en-us/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html https://www.renesas.com/pt-br/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html https://www.renesas.com/en-eu/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html https://www.renesas.com/ja-jp/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html https://www.renesas.com/en-sg/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html https://www.renesas.com/en-in/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html https://www.renesas.com/ko-kr/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html https://www.renesas.com/zh-tw/products/software-tools/software-os-middleware-driver/communication-software/m3s-t4-tiny.html	Available

6.2 Differences from Previous RDP for RX Family

After the release of RX Family RX Driver Package Ver.1.10 (R01AN3345EJ), many Firmware Integration Technology (FIT) modules have been updated.

Differences from Family RX Driver Package Ver.1.10 (R01AN3345EJ0100) are shown in Table 6-2, Table 6-3 and Table 6-4.

The meaning of the terms shown in differences columns are as follows:

“Same”	Includes the same module as previous.
“Updated”	Includes updated modules. Updated contents differ depending on the driver used. Check with the driver’s document.
“Added”	Includes the added modules this time.

(1) Board Support Package (BSP)

Table 6-2 Board Support Package (BSP)

Module	Update Information	Rev
Board Support Package (BSP)	Updated	3.40

(2) Device Driver

Table 6-3 Device Driver

Module	Update Information	Rev
Voltage Detection Circuit (LVD)	Updated	2.10
Battery Backup (VBATT)	Same	1.01
Interrupt Controller (IRQ)	Updated	2.00
Data Transfer Controller (DTC)	Updated	2.05
DMA Controller (DMAC)	Updated	1.04
I/O Ports (GPIO)	Updated	2.10
Multi-Function Pin Controller (MPC)	Updated	2.10
Multi-pulse Timer Unit (MTU2a)	Same	1.20
Compare Match Timer (CMT)	Updated	3.00
Compare Match Timer W (CMTW)	Updated	1.20
Real-Time Clock (RTC)	Updated	2.50
Low Power Timer (LPT)	Updated	1.10
Independent Watchdog Timer (IWDT)	Updated	1.60
Watchdog Timer (WDT)	Added	1.00
Serial Communications Interface (SCI: Asynchronous/Clock Synchronous)	Updated	1.80
Serial Communications Interface with FIFO (SCIF: Asynchronous/Clock Synchronous)	Same	1.10
Serial Communications Interface with FIFO (SCIF: Device Driver for Serial Memory Control)	Updated	1.09
Serial Communications Interface (SCI: Simple I2C Bus)	Updated	2.00
I2C Bus Interface (RIIC)	Added	2.00
Serial Peripheral Interface (RSPI)	Added	1.50
Serial Peripheral Interface (RSPI: Device Driver for Serial Memory Control)	Updated	1.12
Quad Serial Peripheral Interface (QSPI: Device Driver for Serial Memory Control)	Updated	1.09

Module	Update Information	Rev
USB Basic Firmware	Updated	1.20
USB Host Mass Storage Class	Updated	1.20
USB Host Communication Device Class	Updated	1.20
USB Host Human Interface Device Class	Updated	1.20
USB Peripheral Mass Storage Class	Updated	1.20
USB Peripheral Communications Device Class	Updated	1.20
USB Peripheral Human Interface Device Class	Updated	1.20
USB Basic Firmware mini	Same	1.02
USB Host Mass Storage Class mini	Same	1.02
USB Host Communication Device Class mini	Same	1.02
USB Host Human Interface Device Class mini	Same	1.02
USB Peripheral Mass Storage Class mini	Same	1.02
USB Peripheral Communications Device Class mini	Same	1.02
USB Peripheral Human Interface Device Class mini	Same	1.02
PTP Module for the Ethernet Controller (EPTPC)	Same	1.11
EPTPC Light Module	Same	1.10
Ethernet controller (ETHERC)	Updated	1.11
CAN Module (CAN)	Updated	2.10
CAN Module (RSCAN)	Same	1.00
IrDA Interface (IrDA)	Same	1.01
Parallel Data Capture Unit (PDC)	Updated	2.00
12-Bit A/D Converter (S12AD)	Updated	2.11
12-Bit A/D Converter (S12AD) for RX65N	Added	1.00
D/A Converter (DAC)	Updated	2.91
Flash Memory (Flash API)	Updated	1.70
Sampling Rate Converter (SRC)	Updated	1.11
Serial Sound Interface (SSI)	Updated	1.20
LCD Controller/Driver (LCDC)	N/A	1.00
Unique ID Read	N/A	1.00
Byte Queue Buffer (Data Management)	Updated	1.60
Long Queue Buffer (Data Management)	Updated	1.60
Event Link Controller (ELC)	Added	1.10

(3) Middleware/Interface Module

Table 6-4 Middleware/Interface Module

Module	Update Information	Rev
TCP/IP M3S-T4-Tiny for Embedding	Same	2.05
Interface conversion module for Ethernet Driver and Embedded system M3S-T4-Tiny	Updated	1.05
Embedded TCP/IP M3S-T4-Tiny Socket API Module	Updated	1.31
DHCP client using the embedded TCP/IP M3S-T4-Tiny Module	Updated	1.04
DNS client using the embedded TCP/IP M3S-T4-Tiny Module	Updated	1.03
FTP server using the embedded TCP/IP M3S-T4-Tiny Module	Updated	1.04
Web server using the embedded TCP/IP M3S-T4-Tiny Module	Updated	1.05
File driver for FTP server and Web server Module	Updated	1.02
Sound playback system and compression system (original ADPCM codec)	Updated	3.04
M3S-TFAT-Tiny (FAT file system)	Updated	3.03
M3S-TFAT-Tiny Memory Driver Interface Module	Updated	1.03
Simple I2C Module for EEPROM Access	Same	1.30
I2C Bus Interface (RIIC) Module for EEPROM Access	Same	1.40
SPI Serial EEPROM Module	Same	2.33
SPI Serial Flash memory Module	Same	2.33

6.3 Sample Program

RX Driver Package is composed of FIT module group in a package, which does not include the sample program for operation confirmation. If the sample program is required, download the FIT module unit package separately (*). FIT module unit package has ”FITDemos” folder and includes sample program or sample project.

* Note that some FIT modules may not provide sample program.

Website and Support

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

Inquiries
http://www.renesas.com/contact/

Revision History

		Description	
Rev.	**Date**	**Page**	**Summary**
1.11	Oct 13, 2016	-	First edition issued

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU 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. Handling of Unused Pins
   Handle unused pins in accord 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 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. Unused pins should be handled as described under Handling of Unused Pins in the manual.
2. Processing at Power-on
   The state of the product is undefined at the moment 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 moment 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 moment 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 moment when power is supplied until the power reaches the level at which resetting has been specified.
3. Prohibition of Access to Reserved Addresses
   Access to reserved addresses is prohibited.
   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.
4. Clock Signals
   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has 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. Moreover, 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.
5. Differences between Products
   Before changing from one product to another, i.e. to a product with a different type number, confirm that the change will not lead to problems.
   — The characteristics of an MPU or MCU in the same group but having a different part number may differ in terms of the 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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