

# **RX Family**

RX Driver Package Ver.1.14

R01AN4191EJ0114 Rev.1.14 Mar 31, 2018

# Introduction

This document is the RX Family RX Driver Package User's Manual, version 1.14.

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.

Note that older versions of the RX Driver Package can be obtained by clicking the "Sample Code" link after accessing the following URL.

RX Driver Package webpage: https://www.renesas.com/rdp

# **Target Devices**

RX110, RX111, RX113, RX130 Group RX210, RX230, RX231, RX23T, RX24T, RX24U 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.

# Version of e<sup>2</sup> studio Used for Operation Confirmation

Operation of the RX Driver Package has been confirmed on  $e^2$  studio V. 6.2.0.

The RX Driver Package can be obtained from within e<sup>2</sup> studio. Instructions are provided in section 4, Usage.

# **Related Documents**

- RX Family Board Support Package Module Using Firmware Integration Technology (R01AN1685EJ)
- 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	3
1.1	Applicability	3
1.2	Operating Environment	3
2.	About RX Driver Package	4
2.1	System Structure	4
2.2	RX Driver Package Features	5
3.	Structure of the RX Family RX Driver Package	6
3.1	Folder Structure	6
3.2	FIT Modules	7
4. 4.1 4.1 4.2 4.3	Usage Adding FIT Modules to Your Project 1 Smart Configurator 2 FIT Configurator Create an LED Driving Program Build and Try Running the Program	10 10 11 28 43 44
5.	RX Driver Package Application	48
5.1	RX Driver Package Application Structure	48
6. 6.1 6.2 6.3 6.4 6.5 6.5 6.5 6.6 6.6 6.6	Supplement Commercial Version of Middleware and Drivers Supporting FIT Sample Program Location of the API Information for FIT Module Check the RX Driver Package Downloaded Update FIT Module 1 Environment Used for the Description 2 Add FIT Module Confirm the FIT Module Added in FIT Configurator Screen 1 Smart Configurator	49 49 50 50 51 51 51 52 52 55
Web	site and Support	57



# 1. Overview

# 1.1 Applicability

This User's Manual applies to the RX Family RX Driver Package, version 1.14.

# 1.2 **Operating Environment**

This package runs under the operating environment described below.

# Table 1-1 Operating Environment

ltem	Contents
Integrated development environment	Renesas Electronics e <sup>2</sup> studio V6.2.0
C compiler	Renesas Electronics C/C++ compiler for RX Family V. 2.08.00
	Compiler options: The integrated development environment default settings are used, with the following option added.
	-lang = c99
Endian order	Big-endian/Little-endian
RDP version	Ver. 1.14
Board used	Renesas Starter Kit for RX64M (product No.: R0K50564MSxxxBE)
	Renesas Starter Kit for RX231 (product No.: R0K505231SxxxBE)
	Renesas Starter Kit for RX130-512KB (product No.: RTK5051308SxxxxxBE)
	Renesas Starter Kit for RX65N-2MB (product No.: RTK50565N2SxxxxBE)



# 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.

RX Driver Package		
Middleware Socket API (X35-TFA-Tiny) TCP/IP (M35-TFA-Tiny) TTP Server (M35-TFA-Tiny) TTP Server (M35-TFA-Tiny) FILE Driver Memory Driver I/F Module Device Driver Communication SCI SCIF SIMPLE IZC USB BASIC USB HCDC USB PMSC USB PHID ETHERC CAN ETHERC CAN Analog Unique ID SRC SI LCDC USB PMSC USB PHID ETHERC CAN Analog Unique ID SRC SI LCDC USB VBATT IRQ GPIO MPC DTC DMAC Timer Memory Safety Timage capture Other Board Support Package	User System (Server System) Application RX Driver Package FAT File System (M3S-TFAT-Tiny) Memory Driver I/F Module USB USB CMT GPIO MPC Board Support Package	Applic Categ Middle Inter Devic Driv

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 **FIT Modules**

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

After the release of RX Family RX Driver Package Ver. 1.13 (R01AN3859), many Firmware Integration Technology (FIT) modules have been updated. Differences from Family RX Driver Package Ver. 1.13 are shown in Table 3-1, Table 3-2 and Table 3-3.

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 3-1 Board Support Package (BSP)

Module	FIT Module Name	Rev	Update Information
Board Support Package (BSP)	r_bsp	3.71	Updated

### (2) **Device Driver**

### Table 3-2 Device Driver

Module	FIT Module Name	Rev	Update Information
Voltage Detection Circuit (LVD)	r_lvd_rx	2.31	Updated
Low Power Consumption (LPC)	r_lpc_rx	1.40	Same
Battery Backup (VBATT)	r_vbatt_rx	1.01	Same
Interrupt Controller (IRQ)	r_irq_rx	2.21	Updated
Data Transfer Controller (DTC)	r_dtc_rx	2.08	Same
DMA Controller (DMAC)	r_dmaca_rx	1.05	Same
I/O Ports (GPIO)	r_gpio_rx	2.31	Updated
Multi-Function Pin Controller (MPC)	r_mpc_rx	2.31	Updated
Compare Match Timer (CMT)	r_cmt_rx	3.21	Updated
Compare Match Timer W (CMTW)	r_cmtw_rx	1.31	Updated
Real-Time Clock (RTC)	r_rtc_rx	2.72	Updated
Low Power Timer (LPT)	r_lpt_rx	1.21	Updated
Independent Watchdog Timer (IWDT)	r_iwdt_rx	1.81	Updated
Watchdog Timer (WDT)	r_wdt_rx	1.20	Updated
Serial Communications Interface (SCI: Asynchronous/Clock Synchronous)	r_sci_rx	2.01	Updated
Serial Communications Interface with FIFO (SCI: Asynchronous/Clock Synchronous)	r_scif_rx	1.20	Same
Serial Communications Interface with FIFO (SCIF: Device Driver for Serial Memory Control)	r_scifa_smstr_rx	1.09	Same
Serial Communications Interface (SCI: Simple I <sup>2</sup> C Bus)	r_sci_iic_rx	2.20	Same



I <sup>2</sup> C Bus Interface (RIIC)	r_riic_rx	2.20	Same
Serial Peripheral Interface	r_rspi_rx	1.70	Same
Serial Peripheral Interface (RSPI: Device Driver for Serial Memory Control)	r_rspi_smstr_rx	1.14	Same
Quad Serial Peripheral Interface (QSPI: Device Driver for Serial Memory	r_qspi_smstr_rx	1.10	Same
Control)			
USB Basic Firmware	r_usb_basic	1.23	Updated
USB Host Mass Storage Class	r_usb_hmsc	1.23	Updated
USB Host Communication Device Class	r_usb_hcdc	1.23	Updated
USB Host Human Interface Device Class	r_usb_hhid	1.23	Updated
USB Peripheral Mass Storage Class	r_usb_pmsc	1.23	Updated
USB Peripheral Communications Device Class	r_usb_pcdc	1.23	Updated
USB Peripheral Human Interface Device Class	r_usb_phid	1.23	Updated
USB Basic Firmware mini	r_usb_basic_mini	1.02	Same
USB Host Mass Storage Class mini	r_usb_hmsc_mini	1.02	Same
USB Host Communication Device Class mini	r_usb_hcdc_mini	1.02	Same
USB Host Human Interface Device Class mini	r_usb_hhid_mini	1.02	Same
USB Peripheral Mass Storage Class mini	r_usb_pmsc_mini	1.02	Same
USB Peripheral Communications Device Class mini	r_usb_pcdc_mini	1.02	Same
USB Peripheral Human Interface Device Class mini	r_usb_phid_mini	1.02	Same
PTP Module for the Ethernet Controller (EPTPC)	r_ptp_rx	1.14	Same
EPTPC Light Module	r_ptp_light_rx	1.11	Same
Ethernet controller (ETHERC)	r_ether_rx	1.14	Updated
CAN Module (CAN)	r_can_rx	2.12	Same
CAN Module (RSCAN)	r_rscan_rx	1.10	Same
IrDA Interface (IrDA)	r_irda_sci_rx	1.10	Same
Parallel Data Capture Unit (PDC)	r_pdc_rx	2.01	Same
SD Host Interface (SDHI)	r_sdhi_rx	2.01	Updated
SD Slave Interface (SDSI)	r_sdsi_rx	2.00	Same
12-Bit A/D Converter (S12AD)	r_s12ad_rx	2.30	Same
D/A Converter (DAC)	r_dac_rx	3.11	Updated
Flash Memory (On-chip flash memory Programing)	r_flash_rx	3.30	Updated
Sampling Rate Converter (SRC)	r_src_api_rx	1.11	Same
Serial Sound Interface (SSI)	r_ssi_api_rx	1.21	Same
LCD Controller/Driver (LCDC)	r_lcdc_rx	1.00	Same
Graphic LCD Controller (GLCDC)	r_glcdc_rx	1.00	Same
Unique ID Read	r_uid_rx	1.10	Updated
Byte Queue Buffer (Data Management)	r_byteq	1.60	Same
Long Queue Buffer (Data Management)	r_longq	1.60	Same
Event Link Controller (ELC)	r_elc_rx	1.20	Same



### (3) Middleware/Interface Module

# Table 3-3 Middleware/Interface Module

Module	FIT Module Name	Rev	Update Information
TCP/IP M3S-T4-Tiny for Embedding	r_t4_rx	2.07	Updated
Interface conversion module for Ethernet Driver and Embedded system M3S-T4-Tiny	r_t4_driver_rx	1.06	Same
System Timer Module	r_sys_time_rx	1.00	Same
SPI Serial EEPROM Module	r_eeprom_spi	2.34	Same
SPI Serial Flash memory Module	r_flash_spi	2.34	Same
I <sup>2</sup> C Bus Interface (RIIC) Module for EEPROM Access	r_eeprom_riic_rx	1.40	Same
Simple I <sup>2</sup> C Module for EEPROM Access	r_eeprom_sci_iic_rx	1.30	Same
JPEG Decoder Module	r_jpegd_rx	2.06	Same
JPEG Encoder Module	r_jpege_rx	1.01	Same
Sound playback system and compression system (original ADPCM codec)	r_s2_rx	3.04	Same
M3S-TFAT-Tiny (FAT file system)	r_tfat_rx	3.03	Same
M3S-TFAT-Tiny Memory Driver Interface Module	r_tfat_driver_rx	1.03	Same

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/mw/t4



# 4. Usage

You can easily construct application programs incorporating the RX Driver Package by using the Smart Configurator or FIT Configurator function of  $e^2$  studio.

For instructions on using the RX Driver Package with CS+, refer to RX Family: Adding Firmware Integration Technology Modules to CS+ Projects (R01AN1826EJ), which is included in the RX Driver Package.

This section describes how to download the RX Driver Package and create a program for illuminating LEDs. You will need to log into My Renesas as part of the procedure.

# 4.1 Adding FIT Modules to Your Project

The procedure for using the functions of  $e^2$  studio to download the RX Driver Package and develop an application program are described below.

Different procedures are used for downloading the RX Driver Package and adding it to an application program using the Smart Configurator and FIT Configurator functions, respectively. The description is therefore divided into two parts: 4.1.1 describes how to download the RX Driver Package with Smart Configurator, and 4.1.2 describes how to download the RX Driver Package with Smart Configurator.



### 4.1.1 Smart Configurator

How to create a new workspace and download the RX Driver Package is described below.

In this example, "RX65N" is used as the target MCU and "Renesas Starter Kit+ RX65N-2MB" as the target board. If the environment to be used for the download is different, adjust the relevant parts of the description that follows to match the actual environment.

#### (1) Creating a New Workspace and Project

In order to download the RX Driver Package, you must create a new workspace and project.

# (a) Launching e<sup>2</sup> studio

From the Windows Start menu, launch  $e^2$  studio.

e<sup>2</sup> studio V.6.1.0 and CC-RX V.2.07.00 are used in the e<sup>2</sup> studio's screen in this application note.

#### (b) **Designating the Workspace**

The Select a directory as workspace dialog box appears.

- 1. Enter the name of the workspace folder of your choice in the  $\underline{W}$  orkspace field.
- 2. Click the **OK** button.

e <sup>2</sup> Eclipse Launcher							
Select a directory as workspace							
e2 studio uses the workspace directory to store its preference	es and development artifacts.						
Workspace: C:\sample_workspace	- Browse						
Use this as the default and do not ask again	1.Enter a workspace folder.						
Recent Workspaces	2.Click OK.						
	OK Cancel						

Figure 4-1 Designating the Workspace



#### (c) **Opening Workbench**

The Welcome to  $e^2$  studio window appears.

Click the Workbench icon in the top right corner of the Welcome tab.



Figure 4-2 Opening Workbench



### (d) Creating a C/C++ Project

#### Workbench starts.

From the menu bar, select  $\underline{File} > \underline{New} > C/C++$  Project.

e <sup>2</sup>	e² workspace - C/C++ - sample2/sample2 HardwareDebug.launch - e² studio — 🛛 🗙														
File	Edit	Source	Refactor	Navigate	Search	Project	Renesas	Views	Run Wind	ow Help					
	New					Alt+	Shift+N >	C)	RZ/G C/C++	project					1
	Open	File						C	Synergy C Pro	oject					
	Open	Projects	from File Sy	stem				C.	Synergy C++	Project					233
	Close						Ctrl+W		Makefile Proj	ect with Exist	ting Code				Ľ.
	Close	All				Ctrl+	Shift+W	Ċ	C/C++ Projec	t					Þ
	Save						Ctrl+S		Project		$\rightarrow$				
	Save /	As						C++	Convert to a (	C/C++ Projec	:t (Adds C/	C++ Nature)			able.
	Save /	AII				Ctrl	+Shift+S	62	Source Folde	r	Click	here			
	Rever	t							Folder						
	Move							Ċ	Source File						
-9	Renar	ne					F2	h	Header File	-l-t-					
\$	Refres	sh					F5		Class	ipiate					
	Conve	ert Line De	elimiters To				>	0 00	Code Generat	tor					
æ	Print.						Ctrl+P		Task						
	Swite	h Worksp	ace				>		Other				Ctrl	+N	
	再開	, nonsp						-	outchin				Car		1
2.0	Impor	+						ヨブ	D 🔋 Xモ	월 <u>ス</u> タ (	🧼 S	🌄 Fl 🌼	₽¥		
<u> </u>	Expor	t									Ē	• 🔒 🛃	2	- 🗾	•
	Drope	rtion				٨	It. Entor	H							~
	Fiope	intes					art+Einei								
	1 sam	ple2 Harc	lwareDebug	glaunch [sa	ample2]										
	2 sam	ple1 Hard	lwareDebug	glaunch [sa	ample1]										
	3 sam	piez.c [sa	ample2/src]												
	4 sam	pienc (sa	imple (/srcj												$\sim$
	Exit														>
1		<b>e %</b> (	۵ 🔊												

Figure 4-3 Creating a C/C++ Project



(e) Selecting a Project Template

The Templates for New C/C++ Project dialog box appears.

- 1. Select **Renesas RX** on the left side of the dialog box.
- 2. Select **Renesas CC-RX C/C++ Executable Project** on the right side of the dialog box.
- 3. Click the <u>Next</u> button.



Figure 4-4 Selecting a Project Template



# **RX** Family

### (f) Entering a Project Name

The Renesas CC-RX Executable Project dialog box appears.

- 1. Enter the name of the project into the **Project name:** field.
- 2. Click the **<u>N</u>ext** button.

e <sup>2</sup>			
New Renesas CC-R	X Executable Project (Executable Project	1.Enter the project name.	
Project name: led_	sample		
✓ Use <u>d</u> efault loca	ition		
Location:	C:\sample_workspace\led_sample		B <u>r</u> owse
Choose file system:	Create Directory for Project		
Working sets			
🔲 Add projec <u>t</u> to	working sets		Ne <u>w</u>
W <u>o</u> rking sets:			S <u>e</u> lect
		2.Click here.	
?	< <u>B</u> ack <u>N</u>	ext >	Cancel

Figure 4-5 Entering a Project Name



#### (g) Selecting a Toolchain and Device

The **Select toolchain**, **device & debug settings** dialog box appears, allowing you to specify the toolchain, device, and debug settings.

- 1. From the **Toolchain:** dropdown list, select **Renesas CCRX**. $*^1$
- 2. From the Toolchain Version: dropdown list, select v2.08.00.\*1
- 3. Click the ... button next to the Target Device: field, and select R5F565NEDxFC.\*<sup>1</sup>
- 4. Click the <u>N</u>ext button.

<b>e</b> <sup>2</sup>	
New Renesas CC-RX Executable Project Select toolchain, device & debug settings	
Toolchain Settings Language:	1.Select a Toolchain.
Toolchain: Renesas CCRX   Toolchain Version: v2.07.00  Manage Toolchains	2.Select a Toolchain Version.
Device Settings Target Device: R5F565NEDxFC <u>Unlock Devices</u> Endian: Little Project Type: Default	Configurations Create Hardware Debug Configuration E1 (RX) Create Debug Configuration RX Simulator Create Release Configuration
? Sack Ne	3.Select "R5F565NEDxFC" from target device. 4.Click here. ext > Finish Cancel

Figure 4-6 Selecting a Toolchain and Device

Note 1. If necessary, modify these settings to match your environment.



### (h) **Finishing Creation of a Workspace and Project**

The Select Coding Assistant settings dialog box appears.

- 1. Check the box next to **Smart Configurator**.
- 2. Click the **<u>F</u>inish** button. The project is created.

New Renesas CC-RX Executable Project
Select Coding Assistant settings
Smart Configurator
Use Peripheral Code Generator <sup>(a)</sup>
Use FIT Module Download FIT Modules
Configurator which imports, configures and generates different types of drivers and middleware modules. Smart Configurator encompasses unified clock configuration view, interrupt configuration view and pin configuration view. Hardware resources conflict in peripheral modules, interrupts and pins occurred in different types of drivers and middleware modules will be notified. (Smart Configurator is available only for the supported devices)
User Application Driver and Middleware Driver Code Configured in GUI and Generated MCU Hardware
2.Click here.
? < Back Next > Finish Cancel

Figure 4-7 Finishing Creation of a Workspace and Project



#### (2) Downloading the RX Driver Package

Using the newly created workspace and project, you will download the RX Driver Package.

#### (a) Adding Components

The initial screen of Smart Configurator appears.

1. In the **led\_sample.scfg** tab, select the **Components** tab.

2. The Software component configuration dialog box appears. Click the Add component button.



Figure 4-8 Adding Components



# **RX** Family

# (b) Selecting Components

The Software Component Selection dialog box appears.

Click Download more software components.

e <sup>2</sup> New Component				- • •				
Software Component Selection								
Select component from those available in list								
Function All				•				
Type All								
Filter								
Filter								
Components		Туре	Versio	n 🔺				
🖶 8-Bit Timer		Code Generator	1.0.0	=				
Buses		Code Generator	1.0.0					
🖶 Clock Frequency	Accuracy Me	Code Generator	1.0.0					
🖶 Compare Match	Timer	Code Generator	1.2.0					
Complementary	PWM Mode Ti	Code Generator	1.0.0					
🖶 Continuous Scar	n Mode S12AD	Code Generator	1.0.0					
CRC Calculator		Code Generator	1.0.0					
🖶 D/A Converter		Code Generator	1.0.0					
🖶 Data Operation (	Circuit	Code Generator	1.0.0					
mart co		<u></u>	100					
				P				
Show only last ver	sion							
Description								
This software comp timer (TMR) module	onent generates t e that comprise tv	wo units (unit 0, u vo 8-bit counter ch	nit 1) of an on-chi annels, totaling f	ip 8-bit 🔺 our				
channels.				-				
Download more softw	ware components	i						
Configure general set	ttings							
			Click here.					
?	< Back	Next >	Finish	Cancel				

# **Figure 4-9 Selecting Components**



#### (c) Selecting a Module to Download

The FIT Module Download dialog box appears.

- 1. Check the box next to the RX Driver Package in order to download it.
- 2. Specify the FIT module location in the FIT Module Folder Path: field.\*<sup>1</sup>

#### 3. Click the **Download** button.



Figure 4-10 Selecting a Module to Download

#### Note 1. Specifying **FIT Module Folder Path:**

The downloaded RX Driver Package will be stored in the location specified in **FIT Module Folder Path:**. Any folder may be specified. The default setting is the **FITModules** folder (usually C:\Renesas\e2\_studio\FITModules).



#### (d) Logging into My Renesas

The My Renesas dialog box appears.

- 1. Enter your My Renesas email address and password.  $\ast^{1\ast^{2}}$
- 2. Click the **OK** button.

e <sup>2</sup> My Renesas	
My Renesas Enter the e-mail address and password that you registered for My Renesas. They allow you to download documents and software by using Smart Browser.	1.Enter email address and password.
Email Address Password: Create a My Renesas account to use our tool download services, receive Newsletter / Update Notice, and take ac Click [About My Renesas] to register it.	dvantage of our other services.
	2.Click here.

Figure 4-11 User authentication

- Note 1. It is necessary to first register as a member of My Renesas on the official Renesas website. Refer to **Website and Support** for details.
- Note 2. Once you have entered this information, the dialog box no longer appears.

#### (e) License Agreement

The End User License Agreement dialog box appears.

After reading and agreeing to the content of the agreement, click the Agree button.

e <sup>a</sup> End User License Agreement (Sample Code)	<b>—</b>
END USER LICENSE AGREEMENT	* III
This End User License Agreement (this "EULA") is between you, on behalf of yourself and the company or other entity on whose behalf you are acting (together, "you" and "your") and Renesas Electronics Corporation, a Japanese corporation, with a principal place of business at 6-2 Otemachi 2-chome, Chiyoda-Ku, Tokyo, Japan ("Renesas") and is effective from the date on which you click "I AGREE." In consideration of the mutual promises and covenants herein, you and Renesas hereby agree as follows:	
1. Definitions.	-
Click here. Agree Disagree	e

Figure 4-12 License Agreement



# (f) **Finishing the Download**

The **Download FIT Module** dialog box appears.

Click the **OK** button.



# **RX** Family

### (3) Installing FIT Modules

After creating a project, you can use Smart Configurator to install the necessary FIT modules.

In this example, we will install the CMT FIT module (r\_cmt\_rx).

#### (a) **Opening the Component Preferences Dialog Box**

The Software Component Selection dialog box appears.

Click **Configure general settings...** to open the component preferences dialog box.

e <sup>2</sup> New Cor	mponent							
Software	Component Selection		+					
Select component from those available in list								
Function	All		•					
T								
Туре	All		•					
Filter								
Compor	A	Type	Version					
R-Rit	Timer	Code Generator	100					
Buse		Code Generator	1.0.0					
Clock	, Frequency Accuracy Me	Code Generator	1.0.0					
Com	pare Match Timer	Code Generator	1.2.0					
Com	, plementary PWM Mode Ti	Code Generator	1.0.0					
🖶 Conti	inuous Scan Mode S12AD	Code Generator	1.0.0					
CRC	Calculator	Code Generator	1.0.0					
🖶 D/A 🤇	Converter	Code Generator	1.0.0					
🖶 Data	Operation Circuit	Code Generator	1.0.0					
<	* * * * *	<u> </u>	100					
Show o	only last version							
Descriptio	n							
This soft	ware component generates t	wo units (unit 0, unit 1) of a	n on-chin 8-hit					
timer (TI	MR) module that comprise tv	vo 8-bit counter channels, to	otaling four					
channels								
			Ŧ					
Download	I more software components		L. h. see					
<u>Configure</u>	general settings		K nere.					
2	Rack	Next > Einiel	Cancel					
$\odot$	< Dack	rinisi	Cancer					

Figure 4-13 Opening the Component Preferences Dialog Box



#### (b) **Displaying All FIT Modules**

The component preferences dialog box appears.

- 1. Under Blocked list settings, check the box next to Allow blocked FIT modules to be displayed.
- 2. Click the **OK** button.

e <sup>2</sup> Preferences	
type filter text	Component $\Leftrightarrow \checkmark \bullet \checkmark \checkmark$
<ul> <li>General</li> <li>C/C++</li> <li>Help</li> <li>Install/Update</li> <li>Java <ul> <li>Library Hover</li> <li>LinkerScript</li> <li>Remote Development</li> <li>Run/Debug</li> </ul> </li> <li>Smart Configurator <ul> <li>Component</li> <li>Pin</li> </ul> </li> <li>Team <ul> <li>Terminal</li> <li>Toolchains</li> <li>Tracing</li> </ul> </li> </ul>	Dependency settings Change these options to control how a component is added Adding dependency: Add dependent component (1st level) • Checking dependency: Ignore if dependent component is newer • Location settings Specify location of FIT modules to show in [New Component] dialog Component location: C:/e2studio_6.0.0/FITModules/ Browse Blocked list settings I allow blocked FIT modules to be displayed 1.Check the box. 2.Click here. Restore Defaults Apply
?	OK Cancel

Figure 4-14 Displaying All FIT Modules



# **RX** Family

# (c) Select r\_cmt\_rx

The Software Component Selection dialog box appears.

Components downloaded in the procedure of "4.1.1(2)" are displayed as "FIT" type.

Please select r\_cmt\_rx in the following procedure.

1. Select **r\_cmt\_rx** from the list of components.\*<sup>1</sup>

2. Click the **<u>F</u>inish** button.

e <sup>2</sup> New Cor	nponent											
Software	Component Selection		-									
Select con	nponent from those availabl	e in list										
Function	ΔΙΙ		•									
т	A.II.											
Туре	All		•									
Filter		1.5	elect the r_cmt_tx									
Compor	▲	Type	Version									
t can	ry .	FIT	210									
r cmt		FIT	3.10									
tr cmt	tw rx	FIT	1.20									
r_dac	_rx	FIT	3.00									
🖶 r_dm	aca_rx	FIT	1.04									
🖶 r_dtc	_rx	FIT	2.07									
🖶 r_eep	rom_spi	FIT	2.33									
🖶 r_elc_	,rx	FIT	1.10									
🖶 r_eth	er_rx	FIT	1.12									
A 100 A 1			4									
Show o	only last version											
Descriptio	n											
Depende	ncv : r. hsn version(s) 2.90.3	00 3 01 3 10 3 20 3 30 3 40	3.50									
This mod	dule creates a timer tick usin	g a CMT channel based on a	frequency input by									
the user.												
			Ŧ									
<u>Download</u>	I more software components	5										
Configure	general settings											
		2.0	Click here.									
?	< Back	Next > Finis	h Cancel									

Figure 4-15 Adding r\_cmt\_rx to the Available Components

Note 1. Software component list items

a.Components

Multiple components are listed, such as "DMA controller" and "interrupt controller."

b.Type

There are two types, "code generation" and "FIT." Components can conform to any of the following three patterns:

· Code generation-only components

- $\cdot$  FIT-only components
- $\cdot$  Code generation and FIT components

When specifying components, select the type that matches your requirements.

c.Version

The component version numbers are listed. Make sure to select the version that matches your requirements.



### (d) Generating Code

The Software component configuration dialog box reappears.

- 1. Confirm that **r\_cmt\_rx** has been added as a component.
- 2. Click the Generate Code button.

e <sup>2</sup> workspace - Smart Configurator - led_s	ample/led_sample.scfg - e2 studio		- • ×
File Edit Navigate Search Project	Renesas Views Run Window Help		
🐔 🎋 🔳 🎋 Debug	✓ Ied_sample HardwareDebug		) 🕶 🔨 🕶 🔜
05 <b>-</b> % ⊪ Ⅲ ¥ & & # # ¶	<b>  ∥</b>   ⊂   ☆ • � •   <b>∧</b> •   ½ • {	<b>▼ ↔ ↔ ↔ →</b>	Quick Access
📳 🏟 *led_sample.scfg 🛛			
<b>Software component co</b>	nfiguration		
	Configure		
÷ •	Property	Value	
type filter text	There are no configurable items.		
🔺 🗁 Startup			
∠ Generic		2 Click boro	
▲ ➢ Drivers		Z.CIICK HELE.	
⊿ 🤁 Timers			
Middleware		1.Plese check	that
Application		r_cmt_rx has	been added.
	Note:		
	r_cmt_rx_config.h file generated to r_confi For how to modify, refer to application no	g folder needs to be modified man te in "doc" folder of each FIT modi	ually to configure FIT module in the project tree.
	•	III	4
Overview Board Clocks Compor	ents Pins Interrupts		
(1) ≠ 2 (2)	° 🔞		

Figure 4-16 Generating Code

If you use the Smart Configurator to install the FIT module skip the "4.1.2 FIT Configurator". Proceed to "4.2 Create an LED Driving Program".



### 4.1.2 **FIT Configurator**

How to create a new workspace and download the RX Driver Package is described below.

In this example, "RX111" is used as the target MCU and "Renesas Starter Kit+ RX111" as the target board. If the environment to be used for the download is different, adjust the relevant parts of the description that follows to match the actual environment.

#### (1) Creating a New Workspace and Project

In order to download the RX Driver Package, you must create a new workspace and project.

### (a) Launching $e^2$ studio

From the Windows Start menu, launch  $e^2$  studio.

#### (b) **Designating the Workspace**

The Select a directory as workspace dialog box appears.

### 1. Enter the name of the workspace folder of your choice in the $\underline{W}$ orkspace field.

2. Click the **OK** button.

e <sup>2</sup> Eclipse Launcher									
Select a directory as workspace									
e2 studio uses the workspace directory to store its preferences	e2 studio uses the workspace directory to store its preferences and development artifacts.								
Workspace: C:\sample_workspace	- Browse								
	1.Enter a workspace folder.								
Use this as the default and do not ask again									
Recent Workspaces	2.Click OK.								
	/								
	OK Cancel								

Figure 4-17 Designating the Workspace



#### (c) **Opening Workbench**

The Welcome to  $e^2$  studio window appears.

Click the Workbench icon in the top right corner of the Welcome tab.



Figure 4-18 Start workbench



### (d) Creating a C/C++ Project

#### Workbench starts.

From the menu bar, select  $\underline{File} > \underline{New} > C/C++$  **Project**.

e	2 V	/orksp	ace - C/C	++ - sampl	e2/sample2	Hardwar	eDebug.la	aunch - e² s	tudio					_	0		×
Fil	e	Edit	Source	Refactor	Navigate	Search	Project	Renesas	Views	Run V	Window	Help					
		New					Alt+	-Shift+N >	Ċ	RZ/G C/G	'C++ proje	ct					
		Open	File						Ċ	Synergy	C Project						
	4	Open	Projects f	from File Sy	stem				C.	Synergy	C++ Proje	ect					202
		Close						Ctrl+W	<u>a</u>	Makefile	e Project w	ith Existir	g Code				<b>*</b>
		Close	All				Ctrl+	Shift+W	Ċ	C/C++ P	Project						
		Save						Ctrl+S		Project	•						
		Save A	4s						C++	Convert	to a C/C+	+ Project	(Adds C/C	++ Nature)			able.
G		Save A	AII				Ctrl	+Shift+S	62	Source F	Folder		N Click h	nere			L .
		Rever	t							Folder			onorr i				L .
		Move							C	Source F	File						L .
-4	2	Renar	ne					F2	h	Header F	File						L .
F		Refres	sh					F5		File from	n lemplate	•					L .
		Conve	ert Line De	elimiters To				>	(1) (1)	Class Code Co	norstor						L .
		Print.						Ctrl+P		Task	enerator						L .
_										TO SK							
		Switci as ee	n worksp	ace				,		Other				_	Ctr	I+N	J
		円開							17	o 🔋 >	XT 皆	スタ 🍳	s 💯	Fl 🐎	呼		
2		Impor -	t										Ē.		<b>-</b>	I + 🗖	9 🛨
$\geq$		Expor	t														
		Prope	rties				۵	lt+Enter									$\sim$
		1 sam	ple2 Hard	lwareDebug	g.launch [sa	ample2]											
		2 sam	ple1 Hard	lwareDebug	g.launch [sa	ample1]											
		3 sam	ple2.c [sa	ample2/src]					ι.								
		4 sam	ple1.c [sa	ample1/src]													
		Exit															>
_	-								_		1						
ৰ			= % (	۵ 🔊													

Figure 4-19 Creating a C/C++ Project



(e) Selecting a Project Template

The Templates for New C/C++ Project dialog box appears.

- 1. Select **Renesas RX** on the left side of the dialog box.
- 2. Select **Renesas CC-RX C/C++ Executable Project** on the right side of the dialog box.
- 3. Click the <u>Next</u> button.



Figure 4-20 Selecting a Project Template



# **RX** Family

### (f) Entering a Project Name

The New Renesas CC-RX Executable Project dialog box appears.

- 1. Enter the name of the project into the **Project name:** field.
- 2. Click the **<u>N</u>ext** button.

e <sup>2</sup>			
New Renesas CC-R	<b>X Executable Project</b> K Executable Project	1.Enter the project name.	
<u>P</u> roject name: ed_	sample		
✓ Use <u>d</u> efault loca	ation		
Location:	C:\sample_workspace\led_sample		B <u>r</u> owse
	Create Directory for Project		
Choose file system:	default 🔻		
Working sets			
Add projec <u>t</u> to	working sets		Ne <u>w</u>
Working sets:		~	S <u>e</u> lect
		/	
		2.Click here.	
?	< <u>B</u> ack	<u>N</u> ext > <u>F</u> inish	Cancel

Figure 4-21 Entering a Project Name



#### (g) Selecting a Toolchain and Device

The **Select toolchain**, **device & debug settings** dialog box appears, allowing you to specify the toolchain, device, and debug settings.

- 1. From the **Toolchain:** dropdown list, select **Renesas CCRX**.\*<sup>1</sup>
- 2. From the Toolchain Version: dropdown list, select v2.08.00.\*1
- 3. Click the ... button next to the Target Device: field, and select R5F51115AxFM.\*<sup>1</sup>
- 4. Click the <u>N</u>ext button.

New Renesas CC-RX Executable Project Select toolchain, device & debug settings
Toolchain Settings       1.Select a Toolchain.         Language: <ul> <li>C</li> <li>C++</li> </ul> 1.Select a Toolchain.           Toolchain:         Renesas CCRX <ul> <li>Select a Toolchain.</li> </ul> Toolchain Version:              v2.07.00                2.Select a Toolchain Version.             Manage Toolchains <ul> <li>Manage Toolchains</li> </ul>
Device Settings Target Device: RSF51115AxFM Unlock Devices Endian: Little Project Type: Default Create Debug Configuration RX Simulator Create Release Configuration 3.Select "RSF51115AxFM" from target device. 4.Click here.
? < Back Next > Finish Cancel

Figure 4-22 Selecting a Toolchain and Device

Note 1. If necessary, modify these settings to match your environment.



#### (h) Selecting Coding Assistant Settings

The Select Coding Assistant settings dialog box appears.

- 1. Check the box next to Use FIT Module.
- 2. Click the Download FIT Modules button. The FIT Module Download dialog box appears.

New Renesas CC-RX Executable Project
Select Coding Assistant settings
Smart Configurator <sup>(a)</sup> 1.Check the box.
Use Peripheral Code Generator
Image: Use FIT Module         Download FIT Modules         2.Click here.
The e2 studio peripheral code generator automatically generates programs (device drivers) for MCU peripheral functions (clocks, timers, serial interfaces, A/D converters, DMA controllers, etc.) based on settings entered via a graphical user interface (GU). Functions are provided as application programming interfaces (APIs) and are not limited to initialization of peripheral functions. Conventionally, the information "CMCU initial settings", "How to define a target board", "File configuration", "Names of functions", "Common interface with user application" etc, has in many cases varied by sample code, so changes needed to be made to sample code when embedding into a user application. With FIT, there are rules for this information, so each sample code can be embedded into a user application with ease. Also, the peripheral function drivers and middleware which support FIT have a common interface with user applications. This makes it easy to port user applications when migrating between RX microcontrollers.
(?) < Back Next > Finish Cancel

Figure 4-23 Selecting Coding Assistant Settings



#### (2) Downloading the RX Driver Package

Using the newly created workspace and project, you will download the RX Driver Package.

#### (a) Selecting a Module to Download

The FIT Module Download dialog box appears.

- 1. Under Filtered: check the box next to Show RX Driver Package only.
- 2. Check the box next to the RX Driver Package in order to download it.
- 3. Specify the FIT module location in the **FIT Module Folder Path:** field.\*<sup>1</sup>

#### 4. Click the **Download** button.



Figure 4-24 Selecting a Module to Download

#### Note 1. Specifying **FIT Module Folder Path:**

The downloaded RX Driver Package will be stored in the location specified in **FIT Module Folder Path:** Any folder may be specified. The default setting is the **FITModules** folder (usually C:\Renesas\e2\_studio\FITModules).

The **FITModules** folder is created automatically when you click the **Download FIT Modules** button as described in 4.1.2(1)(g).



#### (b) Logging into My Renesas

The My Renesas dialog box appears.

- 1. Enter your My Renesas email address and password.  $\ast^{1\ast^{2}}$
- 2. Click the **OK** button.

e <sup>2</sup> My Renesas	
My Renesas Enter the e-mail address and password that you registered for My Renesas. They allow you to download documents and software by using Smart Browser.	1.Enter email address and password.
Email Address   Password Create a My Renessa account to use our tool download services, receive Newsletter / Update Notice, and t Click (About My Renesas) to register it.	ake advantage of our other services.
	2.Click here.

Figure 4-25 User Authentication

- Note 1. It is necessary to first register as a member of My Renesas on the official Renesas website. Refer to **Website and Support** for details.
- Note 2. Once you have entered this information, the dialog box no longer appears.

#### (c) License Agreement

The End User License Agreement dialog box appears.

After reading and agreeing to the content of the agreement, click the Agree button.

<sup>2</sup> End User License Agreement (Sample Code)	×							
END USER LICENSE AGREEMENT								
This End User License Agreement (this "EULA") is between you, on behalf of yourself and the company or other entity on whose behalf you are acting (together, "you" and "your") and Renesas Electronics Corporation, a Japanese corporation, with a principal place of business at 6-2 Otemachi 2-chome, Chiyoda-Ku, Tokyo, Japan ("Renesas") and is effective from the date on which you click "I AGREE." In consideration of the mutual promises and covenants herein, you and Renesas hereby agree as follows:								
1. Definitions.	-							
Click here. Agree Disagree	e							

Figure 4-26 License Agreement



#### (d) **Finishing the Download**

The **Download FIT Module** dialog box appears.

Click the **OK** button.



Figure 4-27 Finishing the Download

#### (e) Finishing Creation of a Workspace and Project

The **Select Coding Assistant settings** dialog box appears.

- 1. Confirm that the box next to Use FIT Module is checked.
- 2. Click the **<u>F</u>inish** button. The project is created.

New Renesas CC-RX Executable Project
Select Coding Assistant settings
Smart Configurator <sup>a</sup> 1.Make sure that it is checked.
Use Peripheral Code Generator
Use FIT Module Download FIT Modules
The e2 studio peripheral code generator automatically generates programs (device drivers) for MCU peripheral functions (clocks, timers, serial interfaces, A/D converters, DMA controllers, etc.) based on settings entered via a graphical user interface (GUD). Functions are provided as application programming interfaces (APIs) and are not limited to initialization of peripheral functions. Conventionally, the information "CMCU initial settings," 'How to define a target board", "File configuration", "Names of functions," "Common interface with user application" etc; has in many cases varied by sample code, so changes needed to be made to sample code when embedding into a user application. With FIT, there are rules for this information, so each sample code can be embedded into a user applications. This makes it easy to port user applications when migrating between RX microcontrollers.
2.Click here.
?       < Back

Figure 4-28 Finishing Creation of a Workspace and Project

#### (3) Installing FIT Modules

After creating a project, you can use FIT Configurator to install the necessary FIT modules.

In this example, we will install the CMT FIT module ( $r_cmt_rx$ ).

#### (a) **Opening FIT Configurator**

From the  $e^2$  studio menu, select **Renesas Views** > e2 solution toolkit > FIT Configurator.



Figure 4-29 Opening FIT Configurator



# **RX** Family

# (b) Adding Modules

FIT Configurator is displayed in the lower right of the workspace window.

- 1. Open the **FIT Configurator** tab.
- 2. From the Name of the project to add FIT modules: dropdown list, select the newly created project led\_sample.
- 3. From the **Target Board:** dropdown list, select **RSKRX111**.
- 4. From the **Available Modules** list, select **r\_cmt\_rx**.
- 5. Click the **Add Module** >> button.

Target Board RSKR	(111	✓ Advanced Filters		Selected Modules	
Modules	Version	Description	*	Modules	Version
r_bsp	3.50	Board Support Packages.	Ξ	2.Select the project.	
r_byteq	1.60	Byte-based circular buffer	$\searrow$	2 Colort the termst h	u d
r_cmt_rx	3.10	Simple CMT driver for cre		3.Select the target b	bard.
r_dac_rx	3.00	Digital-to-Analog Conver		<ul> <li>4.Select this FIT mod</li> </ul>	dule.
r_dtc_rx	2.07	DTC driver		5.Click here.	
r_eeprom_riic_rx	1.40	EEPROM RIIC Middleware.			
r_eeprom_sci_iic	1.30	EEPROM Simple IIC Middl	Ŧ		
Add Module >>				< Remove Modu	ıle

Figure 4-30 Adding Modules



# **RX** Family

### (c) Generating Code

The module added by following the steps in Adding Modules appears in the Selected Modules list.

- 1. Confirm that both **r\_bsp** and **r\_cmt\_rx** appear in the **Selected Modules**\*<sup>1</sup> list.
- 2. Click the Generate Code button.

e² wo	rkspace - Smart Configu	rator - e2	studio							×
File	Edit Navigate Search	n Project	t Renesas Views Run Wind	dow	Help					
«	🎄 🔳 🔯 De	bug	∨ 💽 led_sample Ha	rdw	areDebug	× 🌣 🗄 🗖	- 1	💼 🛛 🕶 🔨 🕶	010	
<b>0</b> ₀ -	🎭 🗰 💷 😭 🦓	5 🕸 i	뺼 🥖 🐑 🔅 🕶 💁 🔹	R	• 🖢 • 🖗 •	*⇔ ⇔ ▼	⇒ -	Quick Acces	s   🗈   🖬	c 🖹
8	🔝 Configuration Probl	ems 💯	*FIT Configurator 🛛			2- -	2	😼 Generate Code	~ - 8	
<u></u>	Name of the project	to add FIT	modules: [led_sample				-	▼ Pin Setting		
8	Target Board RSKR	X111	✓ Advanced Filters					Option	Value	Ð
	Available Modules				Selected Module	s		2.Click here.		
	Modules	Version	Description	*	Modules	Version				
	r_bsp	3.50	Board Support Packages.	Ε	r_bsp	3.50				
	r_byteq	1.60	Byte-based circular buffer		r_cmt_rx	3.10				
	r_cmt_rx	3.10	Simple CMT driver for cre		1 Charle	44000	-			
	r_dac_rx	3.00	Digital-to-Analog Conver		T.Check	these.	=			
	r_dtc_rx	2.07	DTC driver							
	r_eeprom_riic_rx	1.40	EEPROM RIIC Middleware.							
	r_eeprom_sci_iic	1.30	EEPROM Simple IIC Middl	Ŧ						
	Add Module >>				< < Remove Mo	dule	, 			
	Details									
	Dependency: r_bsp This module creat	version(s	) 2.90, 3.00, 3.01, 3.10, 3.20, 3.30, tick using a CMT channel base	, 3.4 1 on	0, 3.50 a frequency innu	t by the				
	user.	co a cimer	lick using a civit channel base		a nequency mpa	c by the				
							Ŧ			
		m -	2 0			1				
100	u 🖻 🗸 🕲 [198]									

Figure 4-31 Generating Code



### Note 1. Supplementary

The mark **(b)** 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.

Figure 4-32 Supplementary: Selected Modules List

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.



Figure 4-33 Supplementary: Console Tab



(d) Code Generation - Summary Dialog Box

In the Code Generation - Summary dialog box, click the OK button.

i) FIT Generation - Summary	×
Following modules will be installed: r_bsp (v3.50) r_cmt_rx (v3.10) Following include paths will be added to project setting:	*
/\${ProjName}/r_bsp /\${ProjName}/r_config /\${ProjName}/r_cmt_rx /\${ProjName}/r_cmt_rx/src	
	-
Click OK to continue, Cancel to go back	el

Figure 4-34 Code Generation - Summary Dialog Box



# 4.2 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.\*<sup>1</sup>

```
#include "platform.h"
#include "r_cmt_rx_if.h"
#define RDP_LED_OFF 1U
#define RDP_LED_ON OU
/* Define PODR for LED0. In the case of RSKRX65N-2MB it will be as follows. */
/* #define LED0
                            PORT7.PODR.BIT.B3 */
#define RDP LED0
                           LED0
/* Define PDR for LED0_PDR. In the case of RSKRX65N-2MB it will be as follows.
* /
/* #define LED0_PDR
                             PORT7.PDR.BIT.B3 */
#define RDP_LED_PDR
                           LED0_PDR
/* LED Currently status */
uint32_t ledstatus = RDP_LED_OFF;
void call_back(void *pdata)
{
      if (ledstatus == RDP_LED_OFF)
      {
            /* Turn ON the LEDO If the status is LED_OFF */
            RDP LED0 = RDP LED ON;
            ledstatus = RDP_LED_ON;
      }
      else
      {
            /* Turn OFF the LED0 If the status is LED_ON */
            RDP_LED0 = RDP_LED_OFF;
            ledstatus = RDP_LED_OFF;
      }
}
void main(void)
{
      uint32_t cmt_ch;
      /* LED0 off */
      RDP_LED0 = RDP_LED_OFF;
      /* Create of 0.5 second(2Hz) cyclic timer. */
      R_CMT_CreatePeriodic(2, &call_back, &cmt_ch);
      while(1);
}
```

#### Figure 4-35 Sample program

Note 1. When using Smart Configurator it is necessary to enter a PODR setting in line 7 and a PDR setting in line 11 to match your environment. For details, refer to the user's manual: Hardware and Circuit diagram of your MCU.



# 4.3 **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.

🖹 Problems	🖉 Tasks	📮 Console 🛛	Properties	🔋 Memory Usage	🔓 Stack Analysis		
CDT Build Co	nsole (led. s	ample]					
CDT Build Console[led_sample] C:\Renesas\E22FCB~1\DEBUGC~1\RX\RX_CON~1.EXE led_sample.abs led_sample.x Loading input file led_sample.abs Parsing the ELF input file 25 segments required LMA fixes Converting the DWARF information Constructing the output ELF image Saving the ELF output file led_sample.x							
'Build com	plete.'						
17:31:13 B	uild Fini	shed (took 19	9s.594ms)				
 ∢							

Figure 4-37 Console View



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

ienu.			
Run	Window Help		
1	TraceX	>	
Q	Run	Ctrl+F11	
楤	Debug	F11	
	Run History	>	
	Run As	>	
	Run Configurations		
	Debug History	>	
	Debug As	>	Click bere
	Debug Configurations		Click here.
<b>Q</b>	External Tools	>	
I	Figure 4-38 Debug Confi	guration	

When these changes have been made, click **Debug**.

e <sup>2</sup> Debug Configurations			×	
Create, manage, and run configurations			1	
Image: Second system         Image: Second system	Name: led_sample HardwareDebug  Main Debugger  Debug hardware EI  GDB Settings Connection Settings Debug Tool S  GDB Settings Connection Settings Debug Tool S  GDB Connection Settings Debug Tool S  A Connection Settings A Connection Settings A Connection Settings A COUPCASE  A COUP	Common vice   EXTAL  Vice  Ves (Auto) JTag 16.5 2.00 No No No Single Chip Single Chip Single -chip mode		<ul> <li>Click here.</li> <li>Modify to be 24.0000*1.</li> <li>Modify to be No*2.</li> </ul>
	Execute The User Program After Ending The	[ No	* * *	
Filter matched 9 of 13 items		Apply	Revert	
?		Debug	Close	Click here.

Figure 4-39 Debug Configuration

Note 1. Setting for Renesas Starter Kit+ for RX64M: review is required according to the environment you use. Note 2. 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**.



**Figure 4-40 Confirm Perspective Switch** 

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



Figure 4-41 Debug



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



**Figure 4-42 Restart Program** 

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.



# 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.

### https://www.renesas.com/rdp



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. <u>https://www.renesas.com/mw</u>

#### 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	https://www.renesas.com/mw/t4	Available
M3S-T4-Tiny		

# 6.2 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<sup>\*1</sup>. FIT module unit package has "FITDemos" folder an includes sample program or sample project.

Note 1. Note that some FIT modules may not provide sample program.



# 6.3 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.

# 6.4 Check the RX Driver Package Downloaded

When successfully downloaded, FIT module is stored in the folder specified in "FIT Module Folder Path:" described in "4.1.1(2)(c)"(Smart Configurator) "4.1.2(2)(a)"(FIT Configurator)(generally, C:\Renesas\e2\_studio\ FITModules).

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



Figure 6-1 RX Driver Package

ZIP file of the package is stored. (an\_r01an\*\*\*\*ej\*\*\*\*\_rx\_fit.zip)



#### 6.5 **Update FIT Module**

The following describes how to update the FIT module.

#### 6.5.1 **Environment Used for the Description**

Upgraded IRQ FIT module Ver.9.99 (r\_irq\_rx\_v9.99) is used as an example.

#### 6.5.2 **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.



Folder specified in "FIT Module Folder Path:"





# 6.6 **Confirm the FIT Module Added in FIT Configurator Screen**

# 6.6.1 Smart Configurator

Please restart e2studio. The module is updated to the latest state.

#### (1) Display additional screen of software component

- 1. Select "Component" tab from "led\_sample.scfg".
- 2. The "Software Component Settings" window will be displayed. Click the "Add Component" button.



Figure 6-3 Display additonal screen of software component



# **RX** Family

### (2) Check the latest FIT module

1. The latest version is displayed on the software component selection window.

See "4.1.1(3)" from then on to install the target FIT module.

e <sup>2</sup> New Comp	e <sup>2</sup> New Component — 🗆 🗙									
Software Component Selection Select component from those available in list										
Function All Type All Filter						>				
Components r_flash_sp r_gpio_rx r_irq_rx r_iwdt_rx r_ipegd_r	x	Type FIT FIT FIT FIT FIT FIT		Version 2.33 2.20 9.99 1.70 2.06 1.01	Updated module	IRQ FI				
✓ Show only Description This software (TMR) modul           Download mo           Configure gen	last version component generates t le that comprise two 8-b <u>re software components</u> leral settings	wo units (unit 0, u it counter channe	unit 1) of an c	on-chip 8-l our channe	oit timer Is,	< >				
?	< Back	Next >	Finish		Cancel					

#### Figure 6-4 Check the latest FIT module



### (3) **To select old Ver.**

- 1. If you clear the "Show only last version" check box, the old version will be displayed.
- 2. Select the desired version from the list.

e <sup>2</sup> New Co	omponent		- 0	×
Software Select cor	Component Selection nponent from those availab	le in list		
Function Type Filter	All All			~
Compor r_flas r_gpi r_irq_ r_irq_ r_ivd r_ine Show o Description This soft Download Configure	hents h_spi o_rx rx rx rx lt_rx only last version on <b>1.Uncheck</b> ware component provides of d more software componen e general settings	Type FIT FIT FIT FIT FIT FIT FIT EIT	Version 2.33 2.20 2.10 9.99 1.70 <b>2.avalav</b> 2.06	/le >
?	< Back	Next > F	inish Ca	incel

#### Figure 6-5 To select old Ver.



# 6.6.2 **FIT Configurator**

If FIT Configurator screen is displayed, clear this screen, then, reopen it. The screen information is not updated unless reopened.

# $(1) \qquad \textbf{Update the screen of FIT Configurator to the latest state}$

- 1. Close the FIT Configurator tab.
- 2. Open FIT Configurator from Renesas view.

e <sup>2</sup> C/C++ - e2 studio		7							
<u>File Edit Source Refactor Navigate Search</u>	Project Renesas View	s <u>R</u> un <u>N</u>	<u>W</u> indow <u>H</u> elp						
i 📑 🛨 🔚 🕼   🗞 🕶 🌾 🕶 🕵 🖬 i 🖼 i 🖉 i 🤻	🛯 🔂 🕶 🗗	<u>-</u> © -	☆ ▼ 🔾 ▼ 隆 ▼ 💊   戀   😕 🔗 ▼	1	II: 2 ▼ P		> -	•	
								Quick Access	C/C++
🎦 Project Explorer 🛛 📄 🔄 🄝 🗖 🗖	2.Open	FIT Co	onfigurator			-		🗄 Outli 🔀 🛞 M	ak
Ied_sample [HardwareDebug]     Mincludes	from I	Renes	as Views					An outline is not availa	ible.
<ul> <li>∠ src</li> <li>▷ (all ed_sample.c)</li> <li>□ custom.bat</li> <li>□ ed_sample Debug.launch</li> <li>□ led_sample HardwareDebug.launch</li> </ul>									
							1.0	Close the tab	)
							/	,	
	📳 Problems 🧔 Tas	iks 📃 Co	nsole 🔲 Properties 🔋 Memory Usage	te :	Stack Analysis 🙎	FIT Configu	rator §	🕱 🛛 🔂 Generate Code	
	Name of the projec	t to add FIT	modules: led_sample			•	) ^	▼ Pin Setting	
	Target Board RSK	RX64M	✓ Advanced Filters					Option	Value
	Available Modules				Selected Module	s			
	Modules	Version	Description	-	Modules	Version	-		
	r_bsp	3.40	Board Support Packages.				-		
	r_byteq	1.60	Byte-based circular buffer library.						
	r_can_rx	2.02	CAN API for the RX71M and RX64M.						
	r_cmtw_rx	1.10	CMTW Driver						
	r_cmt_rx	3.00	Simple CMT driver for creating timer t						
	r_dac_rx	2.80	Digital-to-Analog Converter driver						
	r_dmaca_rx	1.03	DMAC driver	-					
	Add Module >>				<< Remove Mo	dule			
	<b>N</b> + 1						-		

Figure 6-6 Update the screen of FIT Configurator to the latet state



### (2) Check the latest FIT module

1. Confirm the FIT module added. Latest Ver. will appear on FIT Configurator screen (\*).

See "4.1.2(3)" from then on to install the target FIT module.

ame of the proje	ect to add FIT	modules: led_sample			
arget Board RS	SKRX64M	<ul> <li>Advanced Filters</li> </ul>			
vailable Module	es			Selected Module	s
Modules	Version	Description	*	Modules	Version
r_flash_rx	1.70	Flash API for RX100, RX200, RX600. and R		r_bsp	3.40
r_flash_spi	2.33	Clock Synchronous Control Module for S	Ξ	r_cmt_rx	3.00
r_gpio_rx	2.10	General Purpose Input/Output Driver			
r_irq_rx	9.99	IRQ Driver			
r_iwdt_rx	1.60	14-bit down-counter Independent WDT	$\prec$	Updated IR	O FIT
r_longq	1.60	Unsigned 32-bit circular buffer library.		module Ver	.9.99
r_lvd_rx	2.10	Low Voltage Detection Driver			
r mpc rx	2.10	Multi-Function Pin Controller Driver	Ŧ		

Figure 6-7 Check the latest FIT module

- (3) **To select old Ver.**
- 1. Pulldown appears by clicking the FIT module Ver. Number.
- 2. Click pulldown to show old Ver.
- 3. Select the desired version from the pulldown.

me of the proje	ect to add FIT	modules: led_sample			
arget Board RS	SKRX64M	<ul> <li>Advanced Filters</li> </ul>			
vailable Modul	es 1	I.Click Ver. number		Selected Modu	les
Modules	Version	Description	*	Modules	Version
r_flash_rx	1.70	Flash API for RX100, RX200, RX600. and R		r_bsp	3.40
r_flash_spi	2.33	Clock Synchronous Control Module for S		r_cmt_rx	3.00
r_gpio_rx	2,10	General Purpose Input/Output Driver			
r_irq_rx	9.99	▼ Q Driver			
r_iwdt_rx	2.00	-bit down-counter Independent WDT			
r_longq	9.99	onsigned 32-bit circular buffer library.			
r_lvd_rx	2.10	Low Voltage Retection Driver			
r mpc rx	2.10	Multi-Function Pin Controller Driver	Ŧ		

Figure 6-8 To select old Ver.

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

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# **Revision History**

Rev. Date	Page	Summary	
	i ugo	Summary	
1.14 Mar 31	1, 2018 -	First edition issued	

# 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. 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 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.
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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.
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