

R01AN1723EU0121

Adding Firmware Integration Technology Modules to Projects June 30, 2017

Summary

This document describes the procedure to obtain the firmware integration technology (FIT) module and add it to e^2 studio projects.

Products

Supported devices depend on the FIT modules.

Refer to the device list in the readme.txt file provided with the FIT module to see the supported devices.

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1. Overview

This application note describes how to manually add a FIT module in an e² studio project.

Refer to the e^2 studio user's manual for information on how to use e^2 studio. Note that the version of e^2 studio used in this application note is version v5.3.0.023.

1.1 Terminology

Term	Meaning
FIT	Acronym for firmware integration technology.
e ² studio	e ² studio is an integrated development environment tool for the Renesas RX Family. It is based on Eclipse, the globally popular open source integrated development environment, along with the CDT plug-in, which facilitates C/C++ development.
BSP	Acronym for board support package. This is a module that performs microcontroller initial settings, clock settings, and board settings. The BSP is the foundation of any project that uses FIT modules. The FIT module for the BSP is "r_bsp".
CMTW	Acronym for compare match timer W. The FIT module for the RX CMTW is "r_cmtw_rx".
Platform	Means the same as target board.



1.2 FIT Structure

The FIT consists of BSP, peripheral, middleware, and interface modules.

- BSP: Module that performs microcontroller initialization, clock settings, and board settings.
- FIT peripheral function module: Driver that controls the RX microcontroller peripheral functions.
- FIT middleware module: Middleware that implements TCP/IP, file system, and other functions.
- FIT interface module: Interface that provides the Socket API and other functions.

Software development is made easier by using these components.

Figure 1.1 shows the FIT Structure.



Figure 1.1 FIT Structure



1.3 File Structure of the FIT Module Application Note

The FIT module application note is a single ZIP file that can be downloaded from the Renesas website.

The FIT module application note includes common subsets for files and folders.

Figure 1.2 shows a dummy FIT module application note that includes the FIT module with the peripheral function "abc".



Figure 1.2 Contents of the FIT Module Application Note





Figure 1.3 Contents of the Dummy FIT Module "r_abc_rx"

Figure 1.3 shows a typical file structure of a FIT module.

The names of any FIT modules begin with the prefix "r_" which represents the module is a Renesas module. The "r_" prefix is followed by the module function and "_rx" all in lower-case letters. "_rx" represents the RX Family.

The "doc" folder contains documents relating to the FIT module.

All of the source and header files required for the FIT module are stored in the "src" folder. The "src" folder may contain subfolders if necessary.

The "ref" folder contains configuration header files with the suffix "_config". This is the FIT module configuration file. It includes several macros for figuring code to meet the user's needs.

Two files are contained directly under the FIT module folder begin with the "r_".

One is a header file with the suffix "_if". This file includes an interface (e.g. prototype declarations for the API functions, type definitions, macros) required for using the FIT module.

The other is the readme.txt file. This file includes information such as the FIT module version and functions.



2. Procedure for Adding FIT Modules Using the FIT Configurator

2.1 Creating an e² studio Project

The procedure for creating a new e² studio project and using the FIT Configurator to added FIT modules for the BSP and CMTW will now be described.

In this section, an example is presented in which the Renesas Starter Kit+ for RX64M (referred to below as "RSK+RX64M") is used as the platform. If another platform is to be used, substitute the information for that platform as appropriate.

Figure 2.1 shows the flow of the new project configuration procedure.



Figure 2.1 Flow of New Project Configuration Procedure



2.1.1 Create a New Project

- 1. Launch e² studio, and open the new project creation wizard using one of the following methods. In this example, the project is taken to be a C project.
 - Select "File" > "New" > "C Project" from the menu bar [1].
 - Click the 🖸 button on the toolbar [1], select "C Project" from the wizard selection screen [2], and click the "Next" button [3].
 - Click the \checkmark button next to the 🔂 button on the toolbar [1], and select "C Project" [2].

e²	C/C++ - e2 stud	io					_
File	Edit Source	Refactor Navigate Search	Project Renes	as Vi	ews Run Window Help		
	New		Alt+Shift+N >	C+	Makefile Project with Existing Code	[1]	- O - 💁 - 🖄 🖨 🖉 - 🗐 🔳 🖢 🖉 - 🤤 -
	Open File				C Project		Quick Access 🛛 😰 🛛 🔂 C/C
	Close		Ctrl+W		C++ Project		
	Close All		Ctrl+Shift+W	Ľ	Project		
	Save		Ctrl+S	C++	Convert to a C/C++ Project (Adds C/C++	Nature)	
	Save As			_	Source Folder		
B	Save All		Ctrl+Shift+S		Folder		
	Revert				Source File		
	Move			ĥ	Header File File from Template		
	Rename		F2	G	Class		
8	Refresh		F5		Task		
	Convert Line De	elimiters To	>			0.1 N	
8	Print		Ctrl+P		Other	Ctrl+N]
	Switch Workspa	ace	>	1			
	Restart			L .			
~	Immont						
File	Project Explorer	Net Select a wizard Create a new C Project Wizards: type filter text [2] Create a new C Project Create C Project Create C Project Create C Project Class Convert to a C/C File from Templa Folder Folder Makefile Project Source File Source File Show All Wizards.	ite		++ Nature)	· € · C ·	
			Back Nex	[3] t>	Finish Cancel		



C/C····→ ^{2→±} udio File E [1] e Refactor Navigate Search Project Renesas	Viewe Run Window Heln
Image: Second state of the second s	
Project Convert to a C/C++ Project (Adds C/C++ Nature) Source Folder Folder Source File Converte	
 Header File File from Template Class Task 	
Ctrl+N	

- 2. In "Project name" in the new project wizard (C Project), enter the project name [4]. In this example, the project name is taken to be "rskrx64m_fitcfg_demo".
- 3. From "Toolchains", select "Renesas RXC Toolchain" [5], and click the "Next" button [6].

C Project C Project Create C project of selected type	- · · ×
Project name: rskrx64m_fitcfg_demo	
Use default location Location: C:\Workspace\rsknx64m_fitcfg_der	no Browse
Project type: Executable (Renesas) Sample Project Sample Project Sample Project Debug-Only Project Executable Shared Library Static Library Makefile project	Toolchains: KPIT GNUARM-NONE-EABI Toolchain KPIT GNURL78-ELF Toolchain KPIT GNURX-ELF Toolchain Renesas CCRL Toolchain Renesas GCC for RL78 Renesas GCC for RX Renesas RXC Toolchain
Show project types and toolchains only if t	Image: hey are supported on the platform [6] Next > Finish Cancel



- 4. From "Toolchain Version" in the new project wizard (Select Target Specific Settings), select the version [7]. In this example, the version is taken to be "v2.06.00".
- 5. From "Debug Hardware", select the debugger [8]. In this example, the debugger is taken to be "E1 (RX)".
- 6. From "Data endian", select the endian order [9]. In this example, the endian order is taken to be "Little-endian data".
- 7. From "Select Target", select MCU [10]. In this example, the target is taken to be "R5F564MLCxFC".
- 8. Click the "Next" button [11].

e²	C Project – 🗆 🗙	
e2	studio - Project Generation 🛛 🛁	
Se	lect Target Specific Settings	
[7]	Toolchain Version : v2.06.00 🗸	
[8]	Debug Hardware: E1 (RX)	
[9]	Data endian : Little-endian data 🗸	
[10]	Select Target: R5F564MLCxFC	
	Select Configurations:	
	Hardware Debug : Debug using hardware	
	Debug using Simulator : Debug using simulator	
	Release (no debug) : Project without any debug information	
	Build configurations will be created in the project only for the selected debug mode	
	options, however by default the project will be built for the active configuration i.e.,	
	first configuration selected from group. Based on the device selection you made (RX600) the debug hardware (E1 (RX)) and debug target (RSF564MLCxFC), debug	
	configuration will be automatically created for you.	
	[11]	
C	<u>Back</u> <u>Next</u> <u>Finish</u> Cancel	



- 9. In the new project wizard (Select Coding Assistant Tool), select "Peripheral Code Generator or Firmware Integration Technology (FIT)" [12].
- 10. Select "Use FIT module" [13].
- 11. If it is necessary to download the FIT module, click "Download FIT modules" [14]. For details, see "2.1.2 Download the FIT Module." In this example, the module is not downloaded.
- 12. The subsequent new project wizards are for selection of additional CPU options, selection of global options, and selection of standard header files. If it is necessary to configure these settings, click the "Next" button [15]; otherwise, click the "Finish" button [16].





2.1.2 Download the FIT Module

Using the e^2 studio functionality, download the FIT module from the Web. Download of FIT module can also be downloaded from existing project. For details, see item 5 in "2.4 Troubleshooting".

1. In the new project wizard (Select Coding Assistant Tool), click "Download FIT modules" [1].

C Project e2 studio - Project Gene Select Coding Assistant Tool	eration	- • ×	
○ None ● Peripheral Code Gener □ Use Peripheral co ☑ Use FIT module ○ Smart Configurator	rator or Firmware Integration Technology (FIT) ode Generator Download FIT modules [1]		
	User Application and Middleware er Code FIT Modules Driver/Middleware Board Support Package MCU Hardware	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 (GUI). 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.	
(?)	< <u>B</u> ack	<u>N</u> ext > <u>Finish</u> Cancel	



- 2. e^2 studio will retrieve the FIT module information from the Web.
- 3. The retrieval results will be displayed in the FIT module download wizard. By default, the filter to display only the RX Driver Package^{*1} is selected, so RX Driver Package is displayed [2]. To display all peripheral functions, middleware, and the like, unselect this filter [3].
- Note 1. The RX Driver Package is a software platform (framework) that packages together all of the FIT modules. The use of this package is recommended.

	IT Module Download			- 🗆	\times
	Title [2] RX Family RX Driver Package Ver.1.11	Document No. R01AN3467EJ0111	Rev. Rev.1.11	lssue date 2016/10/13	
	ered: Show RX Driver Package only				
	Module Folder Path:				
	C:\Renesas\e2_studio\FITModules			Brow	se
	Select All	Deselect All			
				Download Ca	ncel
	FIT Module Download	Document No.	Rev.	- D	×
<u></u>	RX Family LPC Module Using Firmware Integration	R01AN2769EJ0140	Rev.1.40	2016/10/01	
	RX Family Clock Synchronous Control Module for RX Family LVD Module Using Firmware Integration	R01AN2325EJ0233 R01AN1726EU0150	Rev.2.33 Rev.1.50	2015/12/29 2015/07/09	
	RX Family LONGQ Module Using Firmware Integra	R01AN1889EJ0160	Rev.1.60	2016/01/29	
	RX Family BYTEQ Module Using Firmware Integrati		Rev.1.60	2016/01/29	
Ш.	RX Family Clock Synchronous Control Module for	R01AN2662EJ0233	Rev.2.33	2016/02/02	
jii)	RX Family SRC Module using Firmware Integration	R01AN2090EJ0111	Rev.1.11	2014/12/12	
	RX Family SRC Module using Firmware Integration Renesas USB MCU USB Basic Host and Peripheral	R01AN2090EJ0111 R01AN2025EJ0111	Rev.1.11 Rev.1.11	2014/12/12 2015/09/30	
jii)	RX Family SRC Module using Firmware Integration	R01AN2090EJ0111	Rev.1.11	2014/12/12	
	RX Family SRC Module using Firmware Integration Renesas USB MCU USB Basic Host and Peripheral RX Family SCI FIFO Module Using Firmware Integr RX Family SSI Module using Firmware Integration RX Family Open Source FAT File System [M3S-TFA	R01AN2090EJ0111 R01AN2025EJ0111 R01AN2222EU0110	Rev.1.11 Rev.1.11 Rev.1.10	2014/12/12 2015/09/30 2015/03/19	\$
	RX Family SRC Module using Firmware Integration Renesas USB MCU USB Basic Host and Peripheral RX Family SCI FIFO Module Using Firmware Integr RX Family SSI Module using Firmware Integration	R01AN2090EJ0111 R01AN2025EJ0111 R01AN2222EU0110 R01AN2150EJ0120 R20AN0038EJ0303	Rev.1.11 Rev.1.11 Rev.1.10 Rev.1.20	2014/12/12 2015/09/30 2015/03/19 2015/04/28 2016/10/01	>
	RX Family SRC Module using Firmware Integration Renesas USB MCU USB Basic Host and Peripheral RX Family SCI FIFO Module Using Firmware Integr RX Family SSI Module using Firmware Integration RX Family Open Source FAT File System [M3S-TFA ered: Show RX Driver Package only Module Folder Path:	R01AN2090EJ0111 R01AN2025EJ0111 R01AN2222EU0110 R01AN2150EJ0120 R20AN0038EJ0303	Rev.1.11 Rev.1.11 Rev.1.10 Rev.1.20	2014/12/12 2015/09/30 2015/03/19 2015/04/28 2016/10/01	
	RX Family SRC Module using Firmware Integration Renesas USB MCU USB Basic Host and Peripheral RX Family SCI FIFO Module Using Firmware Integr RX Family SSI Module using Firmware Integration RX Family Open Source FAT File System [M3S-TFA ered: Show RX Driver Package only Module Folder Path: C:\Renesas\e2_studio\FITModules	R01AN2090EJ0111 R01AN2025EJ0111 R01AN2222EU0110 R01AN2150EJ0120 R20AN0038EJ0303	Rev.1.11 Rev.1.11 Rev.1.10 Rev.1.20	2014/12/12 2015/09/30 2015/03/19 2015/04/28 2016/10/01	vse.
Filt	RX Family SRC Module using Firmware Integration Renesas USB MCU USB Basic Host and Peripheral RX Family SCI FIFO Module Using Firmware Integr RX Family SSI Module using Firmware Integration RX Family Open Source FAT File System [M3S-TFA ered: Show RX Driver Package only Module Folder Path:	R01AN2090EJ0111 R01AN2025EJ0111 R01AN2222EU0110 R01AN2150EJ0120 R20AN0038EJ0303	Rev.1.11 Rev.1.11 Rev.1.10 Rev.1.20	2014/12/12 2015/09/30 2015/03/19 2015/04/28 2016/10/01	



- 4. Select the check boxes of the FIT modules to download [4]. In this example, select the RX Driver Package.
- 5. Click the "Download" button [5]. If My Renesas authentication has not yet been performed even once, the My
- Renesas dialog will open. Enter the email address and password that have been registered on the Renesas website.

RX Family RX Driver Package Ver.1.11 R01AN3467EJ0111 Rev.1.11 2016/10/13 Filtered: Show RX Driver Package only Image: Show RX Driver Package only Image: Show RX Driver Package only FIT Module Folder Path: C:\Renesas\e2_studio\FITModules Image: Show RX_priver_Package only Image: Show RX_priver_Package only
Filtered: Show RX Driver Package only FIT Module Folder Path:
Show RX Driver Package only

6. To proceed from here, see step 12. in "2.1.1 Create a New Project."



2.2 Adding the FIT Module

2.2.1 Launch the FIT Configurator

Select "Renesas Views" > "e² solution toolkit" > "FIT Configurator" from the menu bar [1], and launch the FIT Configurator [2].

ile _gdit _source Ketactor Navigate Search Project	Renesas Views Run Window Help C/C++ > Image: Second	(□ × → → → → → → → → → → → → → → → →
A.2			
C/C++ - e2 studio Ie Edit Source Refactor Navigate Search Project → R → Project Explorer → Project Explorer → Project Explorer → Project Explorer → Project Explorer			★ ↓ C/C++ *3 □ 5 ▽
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le Edit Source Refactor Navigate Search Project S ▼ R R 20 S ▼ S ▼ S R R 20 C 1 E Project Explorer S R 20 S ▼ R 1 E	Image:	Quick Access	An outline is not available.



2.2.2 Initialize the FIT Configurator Settings

The behavior of the FIT Configurator can be customized.

- From the ∇ drop-down menu, select "Configurator Preferences" to open the FIT Configurator initialization dialog
 [1].
- 2. Configure the module generation settings in Generation options [2]. In this example, "Overwrite module" (the default) is selected. The following are descriptions of the setting values.
 - "Overwrite module"
 - All of the FIT modules are regenerated.
 - "Do nothing if module exists"

When the "Code Generation" button is clicked, all FIT modules in the user project that already exist will not be generated.

- 3. Select the "Move module to project 'trash' folder when overwriting/removing files" check box [3]. In this example, select this check box (the default).
- 4. Select a module dependency setting in Dependency options [4]. In this example, "Add dependent modules (non-recursive)" (the default) is selected. The following are descriptions of the setting values.
 - --- "Add dependent modules (non-recursive)"
 - The dependent modules that are directly related to the selected FIT module are automatically added.
 - "Do not add dependent modules"
 - Even if there are dependent modules that are directly related to the selected FIT module, they are not automatically added.
- 5. Select a dependency check setting in Dependency options [5]. In this example, "Strict check for dependent module" (the default) is selected. The following are descriptions of the setting values.

 - Strictly checks that the versions of the FIT module and the dependent modules are approved combinations.
 - "Do not check for dependent modules"
 Dependency errors and warnings will not be displayed.
 - "Ignore if dependent module version is newer"

If a dependent module that is more recent than the required version is selected, a dependency error or warning will not be displayed. If a selected dependent module is older than the required version, a warning will be displayed.

6. Click the "OK" button [6].

Console 💯 FIT	Configurato		[1]
ame of the proje	ct to add FIT	modules: rskrx64m_fitcfg_demo	Configurator Preferences X E Configurator Preferences Download more modules
arget Board RS	KRX64M	✓ Advanced Filters	Module generation control Overwrite module [2]
vailable Module	s		Move module to project 'trash' folder when overwriting/removing files [3]
Modules	Version	Description	
r_bsp	3.40	Board Support Packages.	Dependency options
r_byteq	1.60	Byte-based circular buffer library.	Module dependency control Add dependent modules (non-recursive)
r_can_rx	2.10	CAN API for the RX71M, RX64M, F	Dependency check Strict check for dependent module [5]
r_cmtw_rx	1.20	CMTW Driver	
r_cmt_rx	3.00	Simple CMT driver for creating tin	FIT module folder path
r_dac_rx	2.91	Digital-to-Analog Converter drive	C:\Renesas\e2 studio\FITModules Browse Restore Defaults
r_dmaca_rx	1.04	DMAC driver	
e dta ni	2.05	DTC driver	[6]
Add Module >>			OK Cancel
Details		L	
Jetans			



2.2.3 Select Modules Using Detailed Filtering

The FIT modules to display in the usable modules list can be controlled. When "Advanced Filters..." is selected [1], the detailed filter settings dialog is displayed. The filter options (Family, Series, Group, etc.) will be for the device that has been specified in the current project. In this example, "R5F564MLCxFC" has been selected for the device, so the "RX" Family, the "RX600" Series, and the "RX64M" Group are automatically selected.

Name of the projec	🛙 🔤	modules: rskrxt	^{54m_fitcf} [1	1 /	/		~		Generate Code 🛛 🗖 🗖
Target Board RSK	RX64M		ced Filters					Option	Value
Available Modules			e ² Advanced	Filters					
Modules	Version	Description		of available	e FIT modu	les			
r_bsp	3.40	Board Support F		these option	s from their d	efault values will show non-	compatible FIT i	modules	
r_byteq	1.60	Byte-based circ	-	,					
r_can_rx	2.10	CAN API for the							
r_cmtw_rx	1.20	CMTW Driver	Family	RX ~	Series	RX600 ~	Group	RX64M ~	
r_cmt_rx	3.00	Simple CMT dri	-		-				
r_dac_rx	2.91	Digital-to-Analo	Tool chain	Renesas 🗸	Function	Any \lor	Application	Any	
r_dmaca_rx	1.04	DMAC driver							Restore Defaults
e dte ev	2.05	DTC driver							Restore Delauits
Add Module >>									
Details			?						OK Cancel

2.2.4 Select Versions

By default, the most recent version of each of the installed FIT modules is displayed in the available modules list. However, if the use of a previous version is desired, click the "Version" column of each module, and select the desired version from the displayed drop-down list.

						Option	Value
Target Board RS	KRX64M	✓ <u>Advanced Filters</u>					
Available Module	es			Selected Modu	les		
Modules	Version	Description	^	Modules	Version		
r_bsp	3.40	Board Support Packages.					
r_byteq	1.60	Byte-based circular buffer library.					
r_can_rx	2.10	CAN API for the RX71M and RX64M.					
r_cmtw_rx	1.20	✓ NTW Driver					
r_cmt_rx	1.10	hple CMT driver for creating timer tick.					
r_dac_rx	1.20	gital-to-Analog Converter driver					
r_dmaca_rx	1.04	DMAC driver					
e dec er	2.05	DTC Module	Ŷ				
Add Module >>				<< Remove M	lodule		
Details							
Dependency: r	hsn version(s	a) 2.80, 2.90, 3.00, 3.01, 3.10, 3.20, 3.30, 3.40			<u>^</u>		
		fied, abstracted interface for setting up the CMTW perip	beral generating	timer ticks. The	sofware		



2.2.5 Select FIT Modules

- 1. From the available modules list, select the FIT modules to use [1]. In this example, select the BSP and CMTW FIT modules.
- Click the "Selected Modules >>" button [2]. The selected FIT modules will be displayed in the selected FIT modules list [3].
- 3. To delete FIT modules from the selected modules list, select the modules in question, and click the "<< Remove Module" button [4].

rget Board RSKRX64M	✓ Advanced Filters			
/ailable Modules				
	[4]	Selected Modules	[2]	
Modules Version Desc	cription [1]	^ Modules	v [3]	
r_bsp 3.40 Boar	rd Support Packages.	r_bsp	3.40	
r_byteq 1.60 Byte	-based circular buffer library.	r_cmtw_rx	1.20	
r_can_rx 2.10 CAN	API for the RX71M and RX64M.			
r_cmtw_rx 1.20 CM1	TW Driver			
r_cmt_rx 3.00 Simp	ple CMT driver for creating timer tick.			
r_dac_rx 2.91 Digit	tal-to-Analog Converter driver			
r_dmaca_rx 1.04 DMA	AC driver			
dtc. pr 2.05 DTC	Madula	×		
Add Module >> [2]		<< Remove Mod	ule [4]	
		0	- 1.1	
letails				
Dependency: r henversion(s) 2.80	2.90, 3.00, 3.01, 3.10, 3.20, 3.30, 3.40		~	

2.2.6 Pin Settings

When using FIT modules for which pin settings must be specified, the pin functions to use and the pins to which to assign them can be selected.

- 1. From the selected modules list, select the FIT module for which to specify pin settings [1]. In this example, select "r cmtw rx".
- 2. From the pin settings list, select the check boxes for the channels in question [2]. In this example, select the CMTW0 check box.
- 3. Select the pin port to use. If "Unused" is selected, a drop-down list is displayed, so select the port to use [3]. In this example, the TOC0 pin is set to "PC7", and the TOC1 pin is set to "PE7".

MTW M S CMTW0 F TIC0 Pin	[2
	Unused
∓ TIC1 Pin	Unused
	PC7 [3
TIC2 Pin	Unused
TIC3 Pin	Unused
TOC2 Pin	Unused
TOC3 Pin	Unused
	TIC3 Pin TOC2 Pin



2.2.7 Generate Code

- 1. Click the "Generate Code" button on the FIT Configurator toolbar [1].
- 2. The FIT code generation dialog will be displayed. If there are no problems with the information displayed, click the "OK" button [2].

Name of the project to add FIT modules: rsknodd Target Board SSKRX64M Advanced Available Modules Advanced Modules Version Description r_bsp 3.40 Board Support Pa r_byteq 1.60 Byte-based circula r_cmt_rx 2.10 CAN XPI for the R r_cmt_rx 3.00 Simple CMT driver r_dad_rx 2.11 Digital-to-Analog r_dMd Module >> NTC Madula Add Module >> Click OK to continue, Cancel to go back	📓 FIT Configurate	ar 🖂			🐻 Generate Code	~ - 6
Target Board RSKRX64M Advanced Advalable Modules Advalable Modules Index (V1.20) Following include paths will be added to project setting:	Name of the pro	ject to add FIT	modules: rskrx64r	FIT Generation - Summary ×	▼ Pin Setting	
Modules Version Description r_bsp 3.40 Board Support Pat r_byteq 1.60 Byte-based circula r_can_rx 2.10 CAN API for the R r_can_rx 2.10 CAN API for the R r_cdac_rx 2.91 Digital-to-Analog r_ddd Module >> MCC Miver c.ddd Module >> DMC Module			~ Advanced	r_bsp (v3.40)	🗸 💑 CMTW	
Modules Version Description r_bsp 3.40 Board Support Par r_byteq 1.60 Byte-based circula r_can_rx 2.10 CAN API for the R r_cmtw_rx 1.20 CMTW Driver r_dac_rx 2.90 Simple CMT driver r_date_rx 2.05 NTC Module Add Module >> Cick OK to continue, Cancel to go back	Available Modu	les		r_cmtw_rx (v1.20)		
r_bsp 3.40 Board Support Pa r_byteq 1.60 Byte-based circula r_can_rx 2.10 CAN API for the R r_cmtw_rx 1.20 CMTW Driver r_cac_rx 2.91 Digital-to-Analog r_ddd Module >> 7/S (ProjName)/r_cmtw_rx/src Add Module >> 7/S (DrojName)/r_cmtw_cancel to go back	Modules	Version	Description	Following include paths will be added to project setting:		
r_byteq 1.60 Byte-based circula /S(ProjName)/r_contig r_can_rx 2.10 CAN API for the R /S(ProjName)/r_cmtw_rx r_cmtw_rx 1.20 CMTW Driver /S(ProjName)/r_cmtw_rx/src r_cmt_rx 3.00 Simple CMT driver /S(ProjName)/r_pincfg r_dac_rx 2.91 Digital-to-Analog r_dac_rx 1.04 DMAC driver - ddd Module >> 2.05 NTC Madula Click OK to continue, Cancel to go back Click OK to continue, Cancel to go back	r_bsp	3.40	Board Support Pag	/\${ProjName}/r_bsp		
r_can_rx 2.10 CAN API for the R r_cmtw_rx 1.20 CMTW Driver r_cmt_rx 3.00 Simple CMT drive r_dac_rx 2.91 Digital-to-Analog r_dmaca_rx 1.04 DMAC driver c.dbt Area 3.05 DTC Module Click OK to continue, Cancel to go back Cick OK to continue, Cancel to go back	r_byteq	1.60	Byte-based circula			
r_cmtw_rx 1.20 CMTW Driver r_cmt_rx 3.00 Simple CMT driver r_dac_rx 2.91 Digital-to-Analog r_dmaca_rx 3.05 DTC Module Add Module >> Click OK to continue, Cancel to go back	r can rx	2.10				
r_cmt_rx 3.00 Simple CMT drive r_dac_rx 2.91 Digital-to-Analog r_dmaca_rx 1.04 DMAC driver e-dbc ev 2.05 DTC Module Click OK to continue, Cancel to go back Click OK to continue, Cancel to go back		1.20	CMTW Driver			
r_ddac_rx 2.91 Digital-to-Analog r_dmaca_rx 1.04 DMAC driver e_dte_ex 2.05 DTC Module Click OK to continue, Cancel to go back Click OK to continue, Cancel to go back		3.00	Simple CMT drive			
r_dmaca_nx 1.04 DMAC driver Add Module >> Otto Module Click OK to continue, Cancel to go back		2.91			TOC2 Pin	Unused
Add Module >> 2.05 DTC Module Click OK to continue, Cancel to go back		1.04			TOC3 Pin	Unused
Click OK to continue, Cancel to go back	e dte or	2.05	DTC Madula	× .		
Details	Add Module >	>		Click OK to continue, Cancel to go back		
	Details					
Dependency: r_bsp version(s) 2.80, 2.90, 3.00, 3.0 This software provides a unified, abstracted inter ticks. The software also allows output compare a	This software	provides a uni	fied, abstracted inter	[2]		

3. Code for the selected FIT modules will be generated. The generated code is added to the project in question in the Project Explorer [3]. In this example, the folders "r_bsp", "r_cmtw_rx", "r_pincfg", and "r_config" are added. The "r_pincfg" folder is generated by specifying pin-specified functions, and contains a file in which there are functions that enable the pin functions. The "r_config" folder is always generated when FIT modules are used, and contains configuration files for the respective FIT modules.



2.3 Building a Project

Create a user program, and build a project.



2.4 Troubleshooting

- 1. Q: How do you delete FIT modules that were code generated by the FIT Configurator?
 - A: To remove FIT modules, follow the procedure below. In this example, remove "r_cmtw_rx".
 - In the selected modules list in the FIT Configurator, select the FIT module to delete [1].
 - When the "<< Remove Module" button is clicked [2], the selected FIT modules are removed from the selected modules list [3].</p>

	o add Fil	modules: rskrx64m_fitcfg_demo		~		
Target Board RSKRX Available Modules	(64M	✓ Advanced Filters	Selected Mod	ules	Option VIII CMTW VIII CMTW0	Value
Modules	Manaiana	Description	^ Modules	'	👡 TICO Pin	Unused
	Version	beschption	modules	[1]	🛰 TIC1 Pin	Unused
r_bsp	3.40	Board Support Packages.	r_bsp		🛰 TOCO Pin	PC7
r_byteq	1.60	Byte-based circular buffer library.	r_cmtw_rx	1.20	🔨 TOC1 Pin	PE7
r_can_rx	2.10	CAN API for the RX71M and RX64M.			V 🛄 CMTW1	
r_cmtw_rx	1.20	CMTW Driver			🔨 TIC2 Pin	Unused
r_cmt_rx	3.00	Simple CMT driver for creating timer tick.			TIC3 Pin	Unused
r_dac_rx	2.91	Digital-to-Analog Converter driver			TOC2 Pin	Unused
r_dmaca_rx	1.04	DMAC driver			TOC3 Pin	Unused
r_dtc_rx	2.05	DTC Module		[2]		
r_eeprom_spi	2.33	Clock Synchronous Control Module for EEPRO	¥	[4]		
Add Module >>			<< Remove I	Module		
Details						
				×		
-		modules: rskrx64m_fitcfg_demo		v	€ Generate Code	V - E
FIT Configurator & Name of the project t Target Board RSKRX	to add FIT	modules: rskrx64m_fitcfg_demo				Value
Name of the project t	to add FIT		Selected Mo		▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules	to add FIT K64M	✓ Advanced Filters		25	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules	to add FIT (64M Version	Advanced Filters Description	^ Modules		▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp	to add FIT (64M Version 3.40	Advanced Filters Description Board Support Packages.		25	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp r_byteq	K64M Version 3.40 1.60	Advanced Filters Description Board Support Packages. Byte-based circular buffer library.	^ Modules	25	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp r_byteq r_can_rx	Version 3.40 2.10	Advanced Filters Description Board Support Packages. Byte-based circular buffer library. CAN API for the RX71M and RX64M.	^ Modules	25	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules r_bsp r_byteq r_can_rx r_cmtw_rx	Version 3,40 1,60 2,10 1,20	Advanced Filters Description Board Support Packages. Byte-based circular buffer library. CAN API for the RX71M and RX64M. CMTW Driver	^ Modules	25	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp r_byteq r_can_rx r_cmtw_rx r_cmt_rx	version 3,40 1.60 2.10 1.20 3,00	Advanced Filters Description Board Support Packages. Byte-based circular buffer library. CAN API for the RX71M and RX64M. CMTW Driver Simple CMT driver for creating timer tick.	^ Modules	25	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp r_byteq r_can_rx r_cmt_wrx r_cmt_rx r_dac_rx	ko add FIT (64M Version 3.40 1.60 2.10 1.20 3.00 2.91	Advanced Filters Description Board Support Packages. Byte-based circular buffer library. CAN API for the RX71M and RX64M. CMTW Driver Simple CMT driver for creating timer tick. Digital-to-Analog Converter driver	^ Modules	25	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp r_byteq r_can_rx r_cmt_rx r_cmt_rx r_dac_rx r_dmaca_rx	 ko add FIT K64M Version 3.40 1.60 2.10 1.20 3.00 2.91 1.04 	Advanced Filters Description Board Support Packages. Byte-based circular buffer library. CAN API for the RX71M and RX64M. CMTW Driver Simple CMT driver for creating timer tick. Digital-to-Analog Converter driver DMAC driver	^ Modules	25	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp r_byteq r_can_rx r_cmtw_rx r_cmt_rx r_cdmac_rx r_dmac_rx r_dt_rx	ko add FIT (64M Version 3.40 1.60 2.10 1.20 3.00 2.91	Advanced Filters Description Board Support Packages. Byte-based circular buffer library. CAN API for the RX71M and RX64M. CMTW Driver Simple CMT driver for creating timer tick. Digital-to-Analog Converter driver DMAC driver DTC Module Clash Sequence Created Madula for SEDDO	Modules r_bsp	25	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp r_byteq r_can_rx r_cmt_rx r_cmt_rx r_dac_rx r_dac_rx r_drc_nx r_eeprom_spi	ke add FIT (64M Version 3.40 1.60 2.10 1.20 3.00 2.91 1.04 2.05	Advanced Filters Description Board Support Packages. Byte-based circular buffer library. CAN API for the RX71M and RX64M. CMTW Driver Simple CMT driver for creating timer tick. Digital-to-Analog Converter driver DMAC driver DTC Module Clash Sequence Created Madula for SEDDO	Modules r_bsp	5	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp r_byteq r_can_rx r_cmtw_rx r_cmt_rx r_cdmac_rx r_dmac_rx r_dt_rx	ke add FIT (64M Version 3.40 1.60 2.10 1.20 3.00 2.91 1.04 2.05	Advanced Filters Description Board Support Packages. Byte-based circular buffer library. CAN API for the RX71M and RX64M. CMTW Driver Simple CMT driver for creating timer tick. Digital-to-Analog Converter driver DMAC driver DTC Module Clash Sequence Created Madula for SEDDO	Modules r_bsp	5	▼ Pin Setting	
Name of the project t Target Board RSKRX Available Modules Modules r_bsp r_byteq r_can_rx r_cmt_rx r_cmt_rx r_dac_rx r_dac_rx r_drc_nx r_eeprom_spi	ke add FIT (64M Version 3.40 1.60 2.10 1.20 3.00 2.91 1.04 2.05	Advanced Filters Description Board Support Packages. Byte-based circular buffer library. CAN API for the RX71M and RX64M. CMTW Driver Simple CMT driver for creating timer tick. Digital-to-Analog Converter driver DMAC driver DTC Module Clash Sequence Created Madula for SEDDO	Modules r_bsp	5	▼ Pin Setting	



- Click the "Generate Code" button on the FIT Configurator toolbar [4].
- A FIT uninstall dialog is displayed. If there are no problems with the information displayed, click the "OK" button [5].

				-		
Target Board RSk	(RX64M	~ Advance	Following modules will be uninstalled:	^	Option	Value
Available Module	s		r_cmtw_rx (v1.20) Following include paths will be removed from project setting			
Modules	Version	Description	/\${ProjName}/r_cmtw_rx			
r_bsp	3.40	Board Support P	/\${ProjName}/r_cmtw_rx/src			
r_byteq	1.60	Byte-based circu	/\${ProjName}/r_pincfg			
r_can_rx	2.10	CAN API for the				
r_cmtw_rx	1.20	CMTW Driver				
r_cmt_rx	3.00	Simple CMT driv				
r_dac_rx	2.91	Digital-to-Analo				
r_dmaca_rx	1.04	DMAC driver		~ I I		
r_dtc_rx	2.05	DTC Module	< >			
r_eeprom_spi	2.33	Clock Synchrone	Click OK to proceed uninstallation, Cancel to skip	- 1		
Add Module >>]					
Details			[5]			
MCU informatio	ge provides on for differe	a foundation for contract and the second s	OK Cance 2 / tolders that make up the r_bsp package. The mcu Tolder . These files provide functionality such as easy register access.			

— The code for the selected FIT modules will be removed [6]. In this example, "r_cmtw_rx" and "r_pincfg" are removed from the Project Explorer. (The fact that "r_pincfg" was removed is due to its dependency relationship with "r_cmtw_rx".)

Image: Second system Image: Second system <t< th=""><th>"r_cmtw_rx" and "r_pincfg" are removed</th><th>Project Explorer ⊠ ⊆ ⊆ □ ✓ Cskrx64m_fitcfg_demo [HardwareDebug] > > □ [6] > ≥ r_bsp [6] > ≥ r_config > ≥ trash m custom.bat = rskrx64m_fitcfg_demo Debug.launch = rskrx64m_fitcfg_demo HardwareDebug.launch</th></t<>	"r_cmtw_rx" and "r_pincfg" are removed	Project Explorer ⊠ ⊆ ⊆ □ ✓ Cskrx64m_fitcfg_demo [HardwareDebug] > > □ [6] > ≥ r_bsp [6] > ≥ r_config > ≥ trash m custom.bat = rskrx64m_fitcfg_demo Debug.launch = rskrx64m_fitcfg_demo HardwareDebug.launch
Before code removal		After code removal



- 2. Q: Icons are displayed in the selected modules list. What should I do?
 - A: If inconsistencies are found between the selected modules, error and warning icons are displayed. A chart of these icons is shown below. Refer to the resolution methods described in the chart.

lcon	Error/Warning Type	Description and Resolution Method
۵	Dependency error	A dependency error occurs if required modules used by the item shown has not been added.
		Resolution method:
		To resolve this error, find the required FIT dependent modules, and add them to the selected modules list.
۵	Dependency warning	A dependency warning occurs if there was a mismatch between the version numbers of the item shown and the selected dependencies.
		Resolution method:
		To resolve this warning, make the version number of the selected dependencies match the version number of the item shown.
		If it is not possible to provide the exact same version, use a version that is more recent than the version required.
÷	Contention warning	A contention warning occurs if pins used by a FIT module are already being used by other FIT modules or functions configured via code generation.
		Resolution method:
		To resolve this warning, assign pin functions for which contention is occurring to other pins.
₽ 4	Dependency and contention warning	This icon appears if both a dependency problem and a contention problem occur in a selected FIT module. To resolve this warning, both of these problems must be addressed.

- 3. Q: I would like to add FIT modules that can be used in the FIT Configurator. How can I do that?
 - A: Select "Download modules from the network" from the ∇ drop-down menu in the FIT Configurator. The FIT module download dialog will be displayed, and FIT module information will be retrieved from the Web. Select the required FIT modules to download them. For details, see steps 3. to 5. in "2.1.2 Download the FIT Module."
- 4. Q: I performed code generation using pin-specified functions, but waveforms were not output from the pins.
 - A: The folder "r_pincfg", which is generated using the pin-specified functions, contains the file "r_pinset.c". In this file, there are functions (R_<peripheral function channel or FIT module identifier>_PinSet_<peripheral function channel>) that enable the pin functions. Call these functions from the user programs being used. For information regarding the timing with which to enable the pin functions used by FIT modules, see the manuals for the respective FIT modules.



- 5. Q: I did not download the FIT module when I created the e2studio project. I would like to download the FIT modules. How can I do that?
 - A: To download FIT modules, follow the procedure below. A project that can use the FIT module is a project that enabled the FIT module at the time of project creation. For details, see step 9 to 12 in "2.1.1 Create a New Project."
 - Launch the FIT configurator. For detail, see "2.2.1 Launch the FIT configurator."
 - Select "Download modules from the network" from the ∇ drop-down menu in the FIT Configurator. The FIT module download dialog will be displayed, and FIT module information will be retrieved from the Web. Select the required FIT modules to download them. For details, see steps 3 to 5 in "2.1.2 Download the FIT Module."

ame of the proje		modules: rskrx64m_fitcfg_demo Advanced Filters			~	Pin Setting Option	Download more modules
vailable Module	15			Selected Modu	les		
Modules	Version	Description	^	Modules	Version		
r_bsp	3.40	Board Support Packages.					
r_byteq	1.60	Byte-based circular buffer library.					
r_can_rx	2.10	CAN API for the RX71M and RX64M.					
r_cmtw_rx	1.20	CMTW Driver					
r_cmt_rx	3.00	Simple CMT driver for creating timer tick.					
r_dac_rx	2.91	Digital-to-Analog Converter driver					
r_dmaca_rx	1.04	DMAC driver					
r_dtc_rx	2.05	DTC Module					
	2.22	CI 1 C 1 C 1 IV 11 C 550000	· · · ·				
Add Module >>				<< Remove M	lodule		
Details							
					^		



3. Reference Documents

Technical Update/Technical News The latest information can be downloaded from the Renesas Electronics website.

User's Manual: Development Tools

CC-RX Compiler User's Manual (R20UT3248)

The latest version can be downloaded from the Renesas Electronics website.

Integrated Development Environment User's Manual: Getting Started Guide (R20UT2771) The latest version can be downloaded from the Renesas Electronics website.



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Revision History

		Descript	ion
Rev.	Date	Page	Summary
1.00	Jul. 17, 2013		First edition issued
1.10	Nov. 15, 2013	3	Updated to reflect changes to e ² studio plug-in
1.11	Oct. 15, 2014	3	Added description to 2.1 "Install the FIT modules so that the plug-in can find them"
		4, 5	Added description to 2.2 "Add the FIT Module with the FIT Plug-In"
		6	Added description to 2.3 "FIT Plug-In Messages"
1.20	Apr. 7, 2017		Complete revision based on added FIT Configurator features
1.21	June. 30, 2017	11	Added description to 2.1.2 "Download the FIT Module"
		22	Added item 5 in 2.4 "Troubleshooting"
		23	3. "Reference document" modified

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.
- 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 part number, confirm that the change will not lead to problems.

— The characteristics of Microprocessing unit or Microcontroller unit products 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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