RX Family

RX Driver Package Ver.1.19

Introduction

This document is the RX Family RX Driver Package Application Note, version 1.19.

This application note 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, RX66T Group

RX71M Group, RX72T 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 e² studio Used for Operation Confirmation

Operation of the RX Driver Package has been confirmed on e2 studio V. 7.3.0.

The RX Driver Package can be obtained from within e2 studio. Instructions are provided in section 4, Usage.

Related Documents

- RX Family Board Support Package Module Using Firmware Integration Technology (R01AN1685)
- Firmware Integration Technology User’s Manual (R01AN1833)
- RX Family Adding Firmware Integration Technology Modules to Projects (R01AN1723)
- RX Family Adding Firmware Integration Technology Modules to CS+ Projects (R01AN1826)
- The User’s Manual provided with the RX Driver Package Application.

Contents

1. Overview

1.1 Applicability

This application note applies to the RX Family RX Driver Package, version 1.19. The System Build of this package is described below.

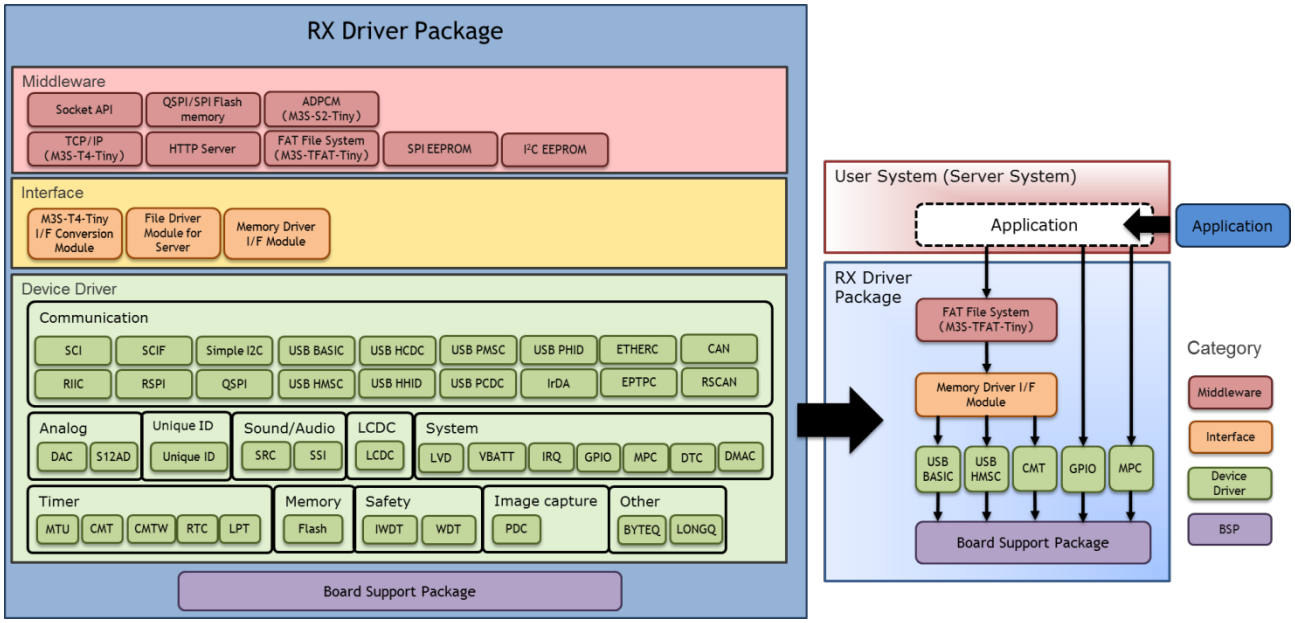

Figure 1-1 An Example of System Build

1.2 Operating Environment

This package runs under the operating environment described below.

Table 1-1 Operating Environment

Item	Contents
Integrated development environment	Renesas Electronics e^2 studio V7.3.0
C compiler	Renesas Electronics C/C++ compiler for RX Family V. 3.01.00
	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. 1.19
Board used	Renesas Starter Kit+ for RX64M (product No.: R0K50564Mxxxxxx) Renesas Starter Kit for RX231 (product No.: R0K505231xxxxxx) Renesas Starter Kit for RX130-512KB (product No.: RTK505130xxxxxxxxx) Renesas Starter Kit+ for RX65N-2MB (product No.: RTK50565N2Sxxxxxxx) Renesas Starter Kit for RX66T (product No.: RTK50566Txxxxxxxxx) Renesas Starter Kit for RX72T (product No.: RTK5572Txxxxxxxxxx)

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.

3. FIT Modules

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

After the release of RX Family RX Driver Package Ver. 1.18 (R01AN4659), many Firmware Integration Technology (FIT) modules have been updated. Differences from Family RX Driver Package Ver. 1.18 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.

3.1 Board Support Package (BSP)

Table 3-1 Board Support Package (BSP)

Module	FIT Module Name	Rev	Update Information
Board Support Package (BSP)	r_bsp	4.01	Updated

3.2 Device Driver

Table 3-2 Device Driver

Module	FIT Module Name	Rev	Update Information
Voltage Detection Circuit (LVD)	r_lvd_rx	2.50	Updated
Low Power Consumption (LPC)	r_lpc_rx	1.40	Same
Battery Backup (VBATT)	r_vbatt_rx	1.02	Updated
Interrupt Controller (IRQ)	r_irq_rx	2.40	Updated
Data Transfer Controller (DTC)	r_dtc_rx	2.20	Updated
DMA Controller (DMAC)	r_dmaca_rx	1.20	Updated
I/O Ports (GPIO)	r_gpio_rx	2.50	Updated
Multi-Function Pin Controller (MPC)	r_mpc_rx	2.50	Updated
Compare Match Timer (CMT)	r_cmt_rx	3.40	Updated
Compare Match Timer W (CMTW)	r_cmtw_rx	1.40	Updated
Real-Time Clock (RTC)	r_rtc_rx	2.74	Updated
Low Power Timer (LPT)	r_lpt_rx	1.22	Same
Independent Watchdog Timer (IWDT)	r_iwdt_rx	2.00	Updated
Watchdog Timer (WDT)	r_wdt_rx	1.40	Updated
Serial Communications Interface (SCI: Asynchronous/Clock Synchronous)	r_sci_rx	2.20	Updated
Serial Communications Interface with FIFO (SCI: Asynchronous/Clock Synchronous)	r_scif_rx	1.21	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^2C Bus)	r_sci_iic_rx	2.40	Updated

I²C Bus Interface (RIIC)	r_riic_rx	2.40	Updated
Serial Peripheral Interface	r_rspi_rx	2.00	Updated
Quad Serial Peripheral Interface (QSPI: Device Driver for Serial Memory Control)	r_qspi_smstr_rx	1.11	Updated
USB Basic Firmware	r_usb_basic	1.25	Updated
USB Host Mass Storage Class	r_usb_hmsc	1.25	Updated
USB Host Communication Device Class	r_usb_hcdc	1.25	Updated
USB Host Human Interface Device Class	r_usb_hhid	1.25	Updated
USB Peripheral Mass Storage Class	r_usb_pmsc	1.25	Updated
USB Peripheral Communications Device Class	r_usb_pcdc	1.25	Updated
USB Peripheral Human Interface Device Class	r_usb_phid	1.25	Updated
USB Basic Firmware mini	r_usb_basic_mini	1.10	Same
USB Host Mass Storage Class mini	r_usb_hmsc_mini	1.10	Same
USB Host Communication Device Class mini	r_usb_hcdc_mini	1.10	Same
USB Host Human Interface Device Class mini	r_usb_hhid_mini	1.10	Same
USB Peripheral Mass Storage Class mini	r_usb_pmsc_mini	1.10	Same
USB Peripheral Communications Device Class mini	r_usb_pcdc_mini	1.10	Same
USB Peripheral Human Interface Device Class mini	r_usb_phid_mini	1.10	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	1.15	Same
CAN Module (CAN)	r_can_rx	2.15	Updated
CAN Module (RSCAN)	r_rscan_rx	1.21	Updated
IrDA Interface (IrDA)	r_irda_sci_rx	1.01	Same
Parallel Data Capture Unit (PDC)	r_pdc_rx	2.02	Updated
SD Host Interface (SDHI)	r_sdhi_rx	2.03	Updated
SD Slave Interface (SDSI)	r_sdsi_rx	2.01	Updated
MMC Mode MMCIF Driver (MMCIF)	r_mmcif_rx	1.04	Added
12-Bit A/D Converter (S12AD)	r_s12ad_rx	3.10	Updated
D/A Converter (DAC)	r_dac_rx	3.30	Updated
Flash Memory (On-chip flash memory Programing)	r_flash_rx	3.50	Updated
Sampling Rate Converter (SRC)	r_src_api_rx	1.12	Updated
Serial Sound Interface (SSI)	r_ssi_api_rx	1.22	Updated
LCD Controller/Driver (LCDC)	r_lcdc_rx	1.00	Same
Graphic LCD Controller (GLCDC)	r_glcdc_rx	1.01	Updated
Unique ID Read	r_uid_rx	1.10	Same
Byte Queue Buffer (Data Management)	r_byteq	1.71	Same
Long Queue Buffer (Data Management)	r_longq	1.71	Same
Event Link Controller (ELC)	r_elc_rx	1.20	Same
QE CTSU Module(CTSU)	r_ctsu_qe	1.00	Same

3.3 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	2.08	Same
Interface conversion module for Ethernet Driver and Embedded system M3S-T4-Tiny	r_t4_driver_rx	1.07	Same
System Timer Module	r_sys_time_rx	1.00	Same
SD Mode SD Memory Card Driver	r_sdc_sdmem_rx	2.03	Same
SPI Serial EEPROM Module	r_eeprom_spi	3.00	Updated
SPI Serial Flash memory Module	r_flash_spi	3.00	Updated
I^2C Bus Interface (RIIC) Module for EEPROM Access	r_eeprom_riic_rx	1.41	Updated
Simple I^2C Module for EEPROM Access	r_eeprom_sci_iic_rx	1.31	Updated
Memory Access Driver Interface Module	r_memdrv_rx	1.00	Added
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	3.04	Same
M3S-TFAT-Tiny Memory Driver Interface Module	r_tfat_driver_rx	1.05	Same
QE Touch Module	r_touch_qe	1.00	Same

4. Usage

You can easily construct application programs incorporating the RX Driver Package by using the Smart Configurator or FIT Configurator function of e2 studio.

For instructions on using the RX Driver Package with e2 studio Smart Configurator and FIT Configurator, CS+, refer to documents under below, which is included in the RX Driver Package.

Table 4-1 related documents for instructions

Item	Related Documents
e^2 studio Smart Configurator	Renesas e^2 studio Smart Configurator User Guide (R20AN0451)
e^2 studio FIT Configurator	RX Family Adding Firmware Integration Technology Modules to Projects (R01AN1723)
CS+	RX Family Adding Firmware Integration Technology Modules to CS+ Projects (R01AN1826)

5. Supplement

5.1 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*1. FIT module unit package has “FITDemos” folder an includes sample program or sample project.

Or use supporting download and import sample project of FIT module with Smart Configurator. FIT module Guide function can easily import the sample program into e2studio Workspace. Please see for Renesas e2studio Smart Configurator V.2.0.0 Release Note (R20UT4475) for details.

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

5.2 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.

5.3 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 Usage” (Related Documents)(generally, C:\Renesas\e2_studio\ FITModules).

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

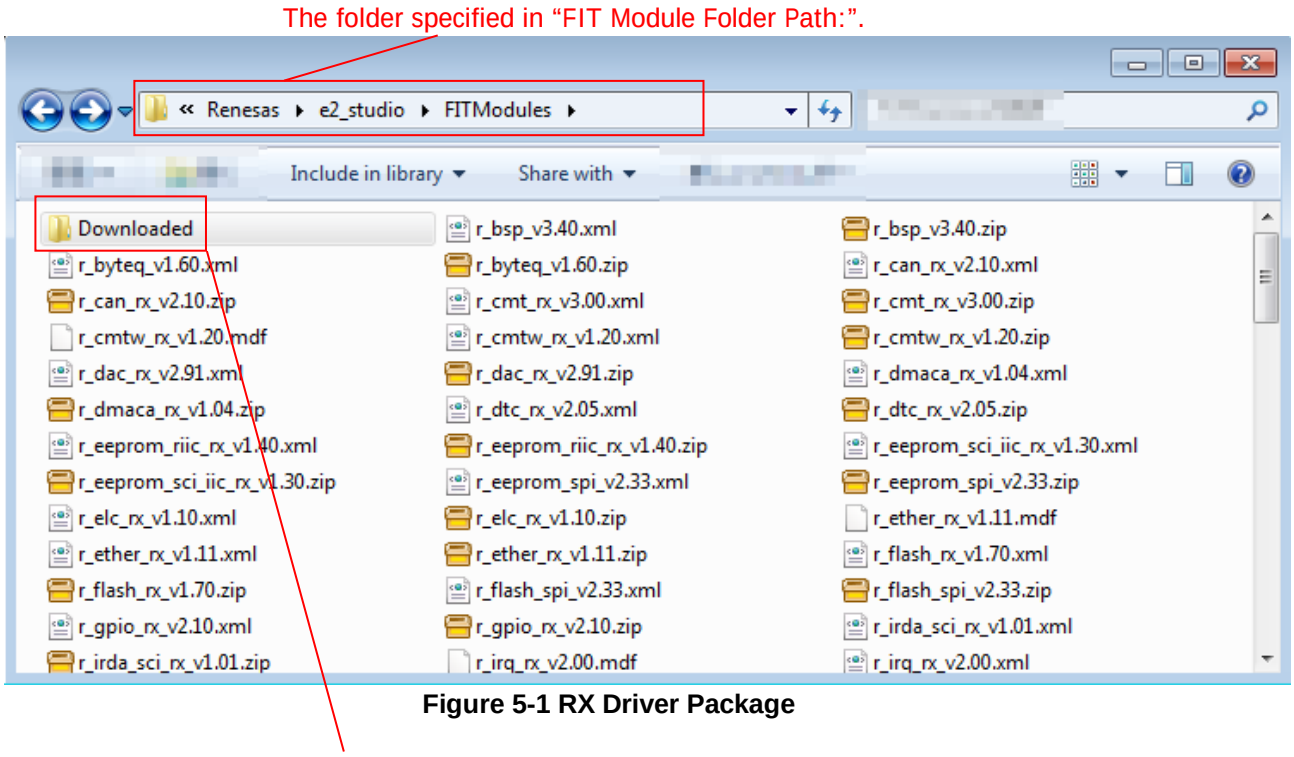

Figure 5-1 RX Driver Package

Revision History

Rev.	Date	Description	
		Page	Summary
1.19	May 13, 2019	-	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. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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