

RX Family

R20AN0293EJ0101

Rev.1.01

Oct 01, 2016

Sample program that uses Open Source FAT File System [M3S-TFAT-Tiny] Module Firmware Integration Technology

Introduction

This document explains the usage of the Open Source FAT File System M3S-TFAT-Tiny for the RX Family (hereafter referred to as "TFAT library") along with a sample program.

Target Device

RX610, RX62N, RX210, RX64M, RX71M, RX65N

Contents

1. Structure of application note	2
1.1 Development environment	2
2. Sample program	3
2.1 Outline	3
2.2 Sample software execution	3
2.2.1 The sample program that only an MMC driver used	3
2.2.2 Flow	4
2.2.3 Sample program using an MMC driver and the USB driver	5
2.2.4 Flow	6
2.2.5 The sample program that only an USB driver used	7
2.2.6 Flow	8
3. Software update information	9

1. Structure of application note

This application note includes files below.

Table 1.1 Structure of application note

name	Description
r20an0293ej0101_rx_tfat.pdf	This document
readme_r22e.txt	Sample program information
Workspace (workspace)	
Sample program (sample)	
TFAT_sample_RX210_with_MMC	Sample program for rx210 by e ² studio(*2)
TFAT_sample_RX610_with_MMC	Sample program for rx610 by e ² studio(*2)
TFAT_sample_RX62N_with_MMC	Sample program for rx62N by e ² studio(*2)
TFAT_sample_RX62N_with_USB_mmc	Sample program for rx62N(*1) by e ² studio(*2)
TFAT_sample_RX64M_with_USB	Sample program for rx64M by e ² studio(*2)
TFAT_sample_RX71M_with_USB	Sample program for rx71M by e ² studio(*2)
TFAT_sample_RX65N_with_USB	Sample program for rx65N by e ² studio(*2)

(*1)This can use Multidrive feature.

(*2)It is possible to convert e2 studio project to CS+ project.

1.1 Development environment

TFAT library can run with this development environment below.

[Software tools]

- Integrated Development Environment
- e2 studio V5.2
- Coding Tool
- Renesas RXC Toolchain V2.04.01(e² studio)

[Debug tools]

- Emulator debugger
- RX E1/E20 Emulator Debugger
- Emulator software
- RX E1/E20 Emulator software V.1.02.00

[Board]

- Renesas Starter Kit for RX610 (type: R0K556100S000BE)
- Renesas Starter Kit+ for RX62N (type: R0K5562N0S100BE)
- Renesas Starter Kit for RX210 (type: R0K505210S000BE)
- Renesas Starter Kit+ for RX64M (type:R0K50564MS100BE)
- Renesas Starter Kit+ for RX71M (type:R0K50571MS100BE)
- Renesas Starter Kit+ for RX65N (type:RTK5005651C01000BR)

2. Sample program

2.1 Outline

The sample program is High-performance Embedded Workshop project that works at the board (hereafter referred to as "CPU board") shown in 1.1 Development environment. The sample program prepares for two kinds of following projects

- Sample program only using an MMC driver
- Sample program using an MMC driver and the USB driver

Please refer to the following for more information about MMC driver.

http://www.renesas.com/products/mpumcu/rx/Application_Notes.jsp

— Document No. : R20AN0046

— Document Title. : RX Family SPI mode MultiMediaCard Driver: Introduction Guide

— Document No. : R01AN2025

— Document Title. : USB Basic Host and Peripheral Driver Firmware Integration Technology: Application note

— Document No. : R01AN2026

— Document Title. : USB Host Mass Storage Class Driver (HMSC) Firmware Integration Technology: Application note

2.2 Sample software execution

2.2.1 The sample program that only an MMC driver used

When the program is run, a FAT filesystem work area is registered. A file is created on the memory media and text data of 2 KB is written to the file. The file is then closed. For confirmation of the data that is written, the file is opened again in the read mode. The entire contents of the file are read and they are compared with the write buffer data in the program. Whether the contents of the data are matching or not is indicated on the LEDs on CPU board.

Table 2.1 Explanation of LED display

LED2	LED3	Explanation
OFF	ON	Program running
ON	OFF	Error occurred
ON	ON	Execution successful

The sample data for file read / write is stored in the `r_data_file.c`. The data is stored in an array of 2048 elements giving a total size of 2 KB (2048 Bytes). The data array consists of the text string "Renesas," written repeatedly. If required, the user can modify this array and the corresponding macro `FILESIZE`.

2.2.2 Flow

Flow of a sample program is shown below.

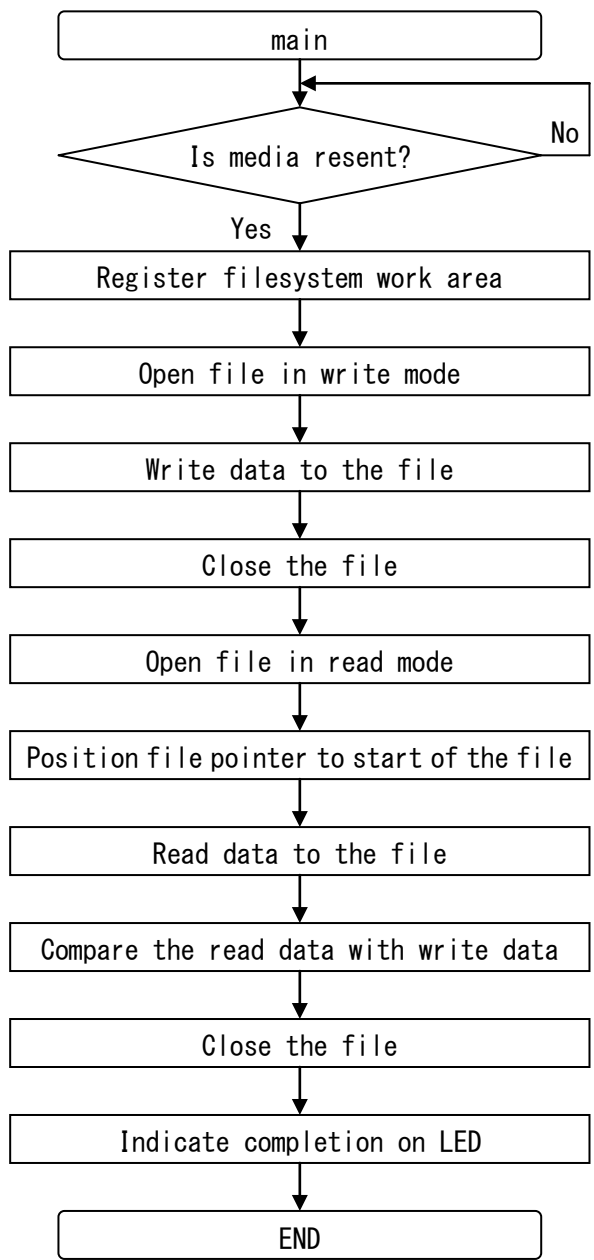


Figure 2-1 Flow of sample program

2.2.3 **Sample program using an MMC driver and the USB driver**

When a program is executed, I register FAT File System working area for USB and MMC.

I repeat the following movement when I push down SW2 on the CPU board.

- I make a file in both MMC and USB memory.
- I write in text data of 2KB at both files and close a file.
- I cut MMC and a file of the USB memory open with a reading mode again.
- I read the whole contents of the file and close a file.

I repeat a stop and the reopening of the movement every one of pressing of SW2.

In operation, LED0 - LED3 performs lighting / lights out sequentially.

The data of the file note are as follows.

- It is written in 512 characters at USB storage device 'a'.
- It is written in 512 characters at MMC 'b'.

2.2.4 Flow

Flow of a sample program is shown below.

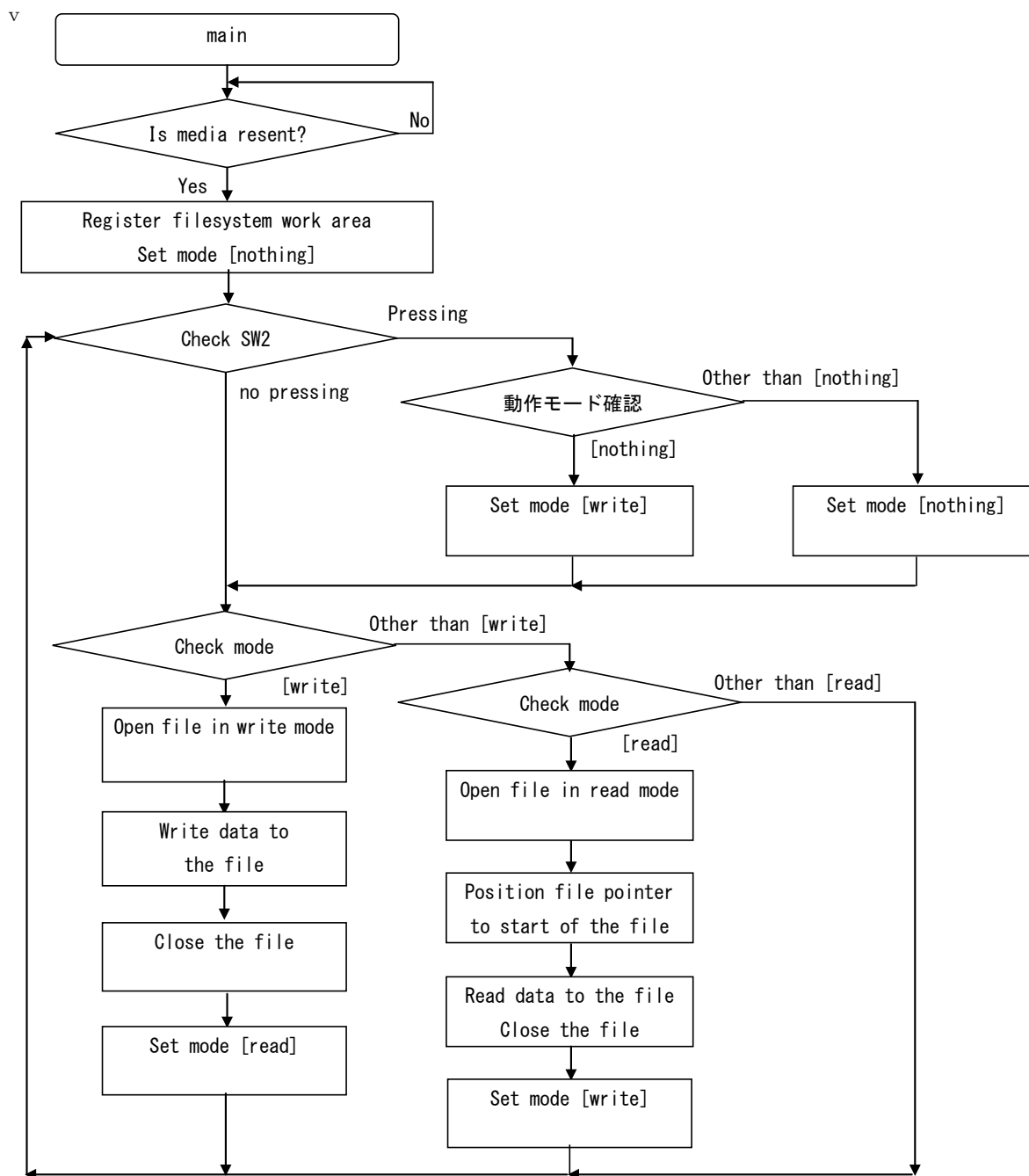


Figure 2-2 Flow of sample program

2.2.5 The sample program that only an USB driver used

When the program is run, a FAT filesystem work area is registered. A file is created on the memory media and text data of 2 KB is written to the file. The file is then closed. For confirmation of the data that is written, the file is opened again in the read mode. The entire contents of the file are read and they are compared with the write buffer data in the program. Whether the contents of the data are matching or not is indicated on the LEDs on CPU board.

Table 2.3 Explanation of LED display

LED2	LED3	Explanation
OFF	ON	Program running
ON	OFF	Error occurred
ON	ON	Execution successful

The sample data for file read / write is stored in the `r_data_file.c`. The data is stored in an array of 2048 elements giving a total size of 2 KB (2048 Bytes). The data array consists of the text string "Renesas," written repeatedly. If required, the user can modify this array and the corresponding macro `FILESIZE`.

2.2.6 Flow

Flow of a sample program is shown below.

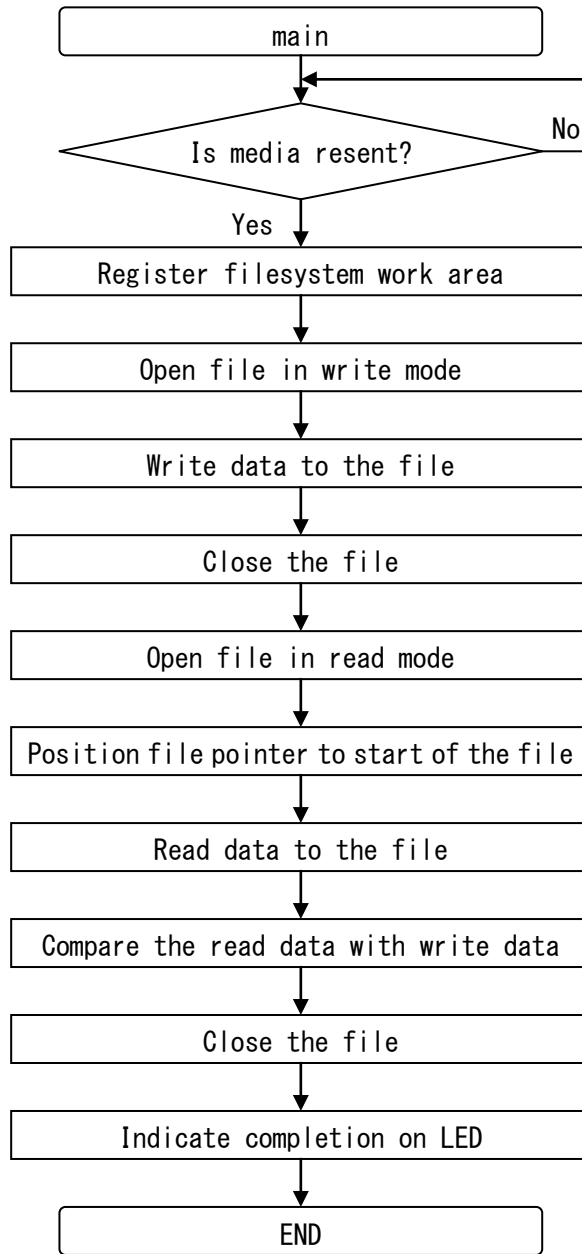


Figure 2-3 Flow of sample program

3. Software update information

This document version	TFAT library version	Change
1.01	3.03	<ul style="list-style-type: none">- Updated TFAT library- Added sample program's for RX64M, RX71M and RX65N
1.00	3.00	<ul style="list-style-type: none">- Applied FIT spec.
---	3.00	<ul style="list-style-type: none">- Added Multidrive sample program for RX62N- Fixed, do not call R_tfat_disk_initialize() in each sample program.

Website and Support

Renesas Electronics Website

<http://www.renesas.com/>

Inquiries

<http://www.renesas.com/contact/>

All trademarks and registered trademarks are the property of their respective owners.

Revision History

Rev.	Date	Description	
		Page	Summary
1.01	Oct 01, 2016	—	Updated sample program's
1.00	Jul 01, 2014	—	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.

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.

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
3. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics product.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.
"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots etc.
"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; and safety equipment etc.
Renesas Electronics products are neither intended nor authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems, surgical implantations etc.), or may cause serious property damages (nuclear reactor control systems, military equipment etc.). You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application for which it is not intended. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for which the product is not intended by Renesas Electronics.
6. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You should not use Renesas Electronics products or technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. When exporting the Renesas Electronics products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, who distributes, disposes of, or otherwise places the product with a third party, to notify such third party in advance of the contents and conditions set forth in this document, Renesas Electronics assumes no responsibility for any losses incurred by you or third parties as a result of unauthorized use of Renesas Electronics products.
11. This document may not be reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.



SALES OFFICES

Renesas Electronics Corporation

<http://www.renesas.com>

Refer to "<http://www.renesas.com/>" for the latest and detailed information.

Renesas Electronics America Inc.

2801 Scott Boulevard Santa Clara, CA 95050-2549, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited

9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe Limited

Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH

Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.

Room 1709, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100191, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.

Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, P. R. China 200333
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited

Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.

13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.

80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.

Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics India Pvt. Ltd.

No.777C, 100 Feet Road, HALII Stage, Indiranagar, Bangalore, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.

12F., 234 Teheran-ro, Gangnam-Gu, Seoul, 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141