User's Manual

32

RA4W1 Group

Bluetooth LE Profile API Document
User's Manual

RA Family / RA4 Series

Renesas Electronics
www.renesas.com

Rev.1.00 Jul 2020

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 or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving 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, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. 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 shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: “Standard” and “High Quality”. The intended 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; industrial robots; etc.
   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.
   Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or 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 damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user’s manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user’s manuals, application notes, “General Notes for Handling and Using Semiconductor Devices” in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, 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 and impractical, you are responsible for evaluating 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. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall 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 shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, 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.

(Note1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan

www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/.

How to Use This Manual

1. Purpose and Target Readers

This manual is for users to understand how to use the Bluetooth LE Profile API document. It is intended for users who design application systems using QE for BLE. To use this manual, you must have a basic knowledge of the programming language and microcomputer.

> Particular attention should be paid to the precautionary notes when using the manual. These notes occur within the body of the text, at the end of each section, and in the Usage Notes section.

> The revision history summarizes the locations of revisions and additions. It does not list all revisions. Refer to the text of the manual for details.

The following documents apply to the RA4W1 Group for Bluetooth® Low Energy (LE) application development. Make sure to refer to the latest versions of these documents. The newest versions of the documents listed may be obtained from the Renesas Electronics Web site.

Document Title	Document No.	Description
Renesas RA4W1 Group User's Manual: Hardware	R01UH0883EU0100	Hardware specifications (pin assignments, memory maps, peripheral function specifications, electrical characteristics, timing charts) and operation description
Renesas Flexible Software Package (FSP) v1.2.0 User's Manual	R11UM0146EU0120	Software library specifications for RA family
Bluetooth Low Energy Profile Developer's Guide for RA	R01AN5428EJ0100	Guide for using QE for BLE

Table of Contents

1. Overview

User can add service APIs to their project using QE for BLE, a tool to assist in the development of Bluetooth LE application development. There are two types of services used in QE for BLE: standard services defined by standardization organization and custom services defined by user. Bluetooth LE Profile API document describes the APIs for standard services. For Custom Services, refer to “Bluetooth Low Energy Profile Developer's Guide for RA”.

Bluetooth LE Profile Document is released in in single file with many html files compressed in it. Therefore, this document describes how to properly reference the Bluetooth LE Profile API document.

1.1 Environment

The operating environment in this document is shown below.

- Windows 8.1 (32/64 bit OS)
- Windows 10 (32/64 bit OS)

2. Usage

This chapter describes how to use the Bluetooth LE Profile API document.

2.1 Extract compressed files

This section describes how to extract “RA_API_document.zip”, a compressed file of Bluetooth LE Profile API document. We will show two ways to extract: use 7-zip and use Windows Utility.

Using 7-zip to extract:

1. Select “7-zip” > “Extract” in menu shown by right clicking “RA_API_document.zip”
2. Click “OK” in the window that appears
3. Extracted folder is redirected as “RA_API_document”

Using Windows Utility to extract:

1. Select “Extract all” in menu shown by right clicking “RA_API_document.zip”
2. Click “Extract” in the window that appears
3. Extracted folder is redirected as “RA_API_document”

2.2 View document

This section describes how to browse Bluetooth LE Profile API document extracted in the previous section.

In folder “RA_API_document”, there is shortcut “index.html”. You can open Bluetooth LE Profile API document with your browser by opening this shortcut. The HTML files can be found by double-clicking “RA_API_document” > “doxygen”. Figure 2.1 shows the window which opened “index.html” with Internet Explorer.

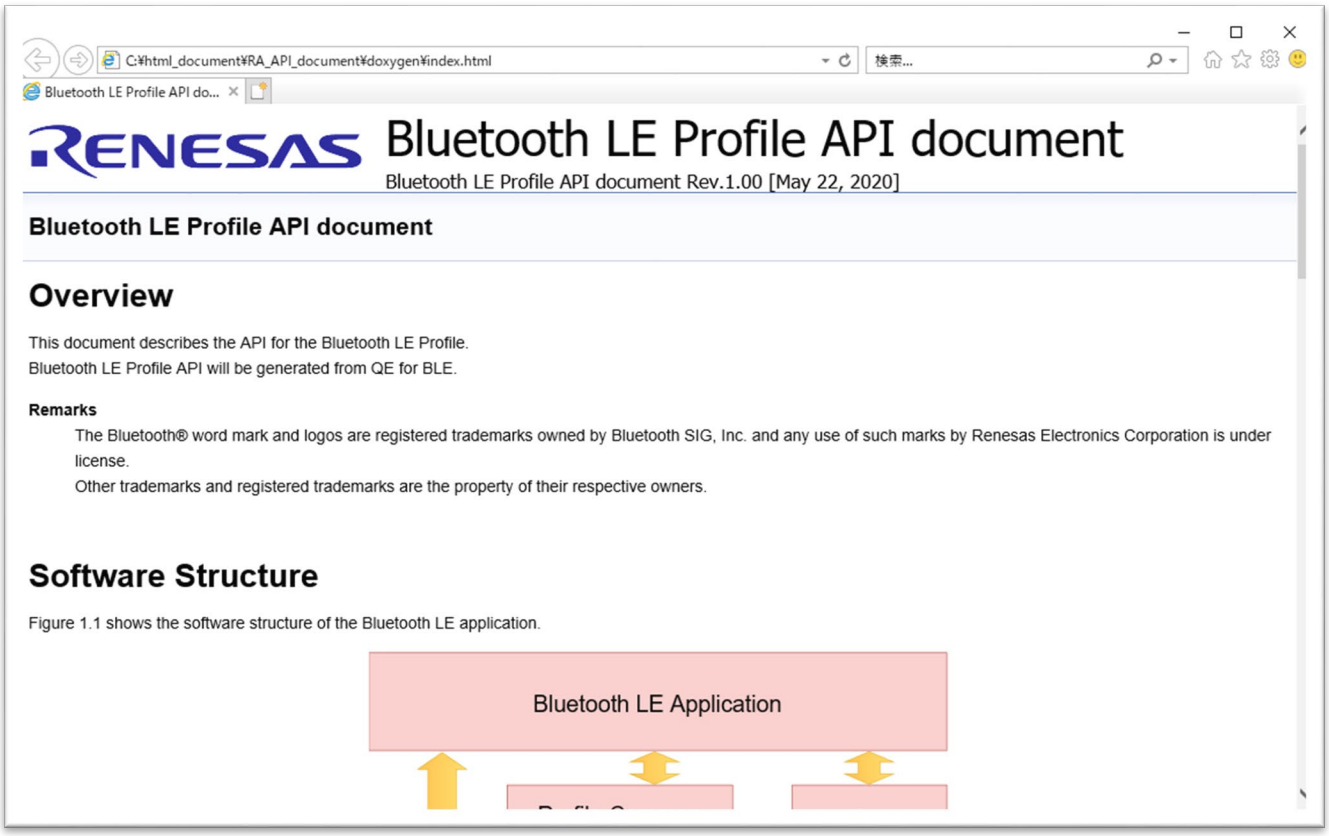

Figure 2.1 Viewing Bluetooth LE API document using Internet Explorer

Revision History	RA4W1 Group Bluetooth LE Profile document User's Manual

Rev.	Date	Description	
		Page	Summary
1.00	Jul.10.20	—	First Edition issued

RA4W1 Group Bluetooth LE Profile document User's Manual

Publication Date: Rev.1.00 Jul.10.20

Published by: Renesas Electronics Corporation

RA4W1 Group

Renesas Electronics Corporation

R11UM0154EJ0100