

QE for BLE[RA,RE,RX] V1.7.0

Release Note

Thank you very much for your using the QE for BLE[RA,RE,RX] V1.7.0.

This release documentation, we have indicated this product installation, restrictions and so on.

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1. About QE for BLE[RA,RE,RX]

1.1 Summary

QE for BLE[RA,RE,RX] is a dedicated tool for developing Bluetooth® low energy-based embedded systems. This solution tool kit runs in the e² studio integrated development environment. The combination of e² studio and QE for BLE[RA,RE,RX] makes it easy to test the communications features of RA4W1 group of RA family, RE01B group of RE family, RX23W group of RX family that supports BLE5, thus reducing the time required in developing a product prior to its release on the market.

In addition, QE for BLE[RA,RE,RX] supports DA14531 and RYZ012 Bluetooth Low Energy Module.

1.2 Functions

Adding Bluetooth functions to a product requires the addition and customization of complex Bluetooth profiles. The QE for BLE[RA,RE,RX] supports Bluetooth development for RA family devices with the following functions.

1. Designation of a profile provided by Bluetooth SIG

Using R_BLE Custom Profile RA,RE,RX (QE) View, you can generate code by designating a Bluetooth profile provided by Bluetooth SIG Inc. (<https://www.bluetooth.com/>).

2. Definition of a proprietary profile

If you want to perform unique data communication (not through profiles provided by Bluetooth SIG), you must define a profile. Using R_BLE Custom Profile RA,RE,RX (QE) View, you can modify a profile easily and generate code.

3. Configuration of advertising and scanning

Supports the configuration of advertising and scanning, a feature of the BLE. Using R_BLE Custom Profile RA,RE,RX (QE) View, you can easily configure the timing and frequency of advertising and scanning communication with the GUI.

4. Communication check by using a profile

The QE for BLE[RA,RE,RX] allows you to check profile-based communication by creating and executing a script using the API for the Bluetooth protocol stack

Note: Systems that use DA14531 or RYZ012 do not support this function.

1.3 New Functions

1. Support DA14531 Pmod module

The combination of the RA, RX, and RL78 families and the DA14531 Pmod module supports profile creation and code generation. There are some notes, see Section 3.1.3, Notes of DA14531 module.

Reference:

- RL78 Family US159-DA14531EVZ BLE Control Module Using Software Integration System

Application Note:

<https://www.renesas.com/document/apn/rl78-family-us159-da14531evz-ble-control-module-using-software-integration-system>

Sample Code:

<https://www.renesas.com/document/scd/rl78-family-us159-da14531evz-ble-control-module-using-software-integration-system-sample-code>

- US159-DA14531EVZ BLE Control Module

Fit Module: Refer to List of FIT Modules (xlsx)

<https://www.renesas.com/software-tool/fit>

- GTL BLE Abstraction

FSP Module:

https://renesas.github.io/fsp/group_ble_abs_gtl.html

1.4 Supported Environment

Microsoft Windows 10, Windows 11

Renesas e² studio 2024-01 (or later)

1.5 Supported Microcontroller and Bluetooth Module

- RA4W1
- RE01B
- RX23W
- RYZ012
- DA14531

1.6 Supported FSP Version

- RA4W1
FSP V2.0.0 (or later)
- RE01B
RE01B Group Bluetooth Low Energy Sample code (using CMSIS Driver Package) (R01AN5606)
- RX23W
BLE Driver: r_ble_rx23w V2.30 (or later)
- RYZ012
RA: FSP V3.4.0 (or later)
RX: r_ryz012_rx V1.00 (or later)
- DA14531
RA: FSP V5.2.0 (or later)
RX: r_ble_da14531_rx V1.20 (or later)
RL78: r_ble_da14531 V1.20 (or later)

2. Installation and Uninstallation

2.1 Installing This Product

Use either of the following procedure to install this product.

2.1.1 Install from the "Renesas Software Installer" menu of e² studio

1. Start e² studio.
2. Select the [Renesas Views] – [Renesas Software Installer] menu of e² studio to open the [Renesas Software Installer] dialog box.
3. Select the [Renesas QE] and click the [Next>] button
4. Select the [QE for BLE[RA,RE,RX] (V1.7.0)] check box, and click the [Finish] button.
5. Check that the [Renesas QE for BLE[RA,RE,RX]] check box and the [Renesas QE for BLE[RA,RE,RX] Utility] check box are selected in the [Install] dialog box, and click the [Next>] button.
6. Check that the [Renesas QE for BLE[RA,RE,RX]] check box and the [Renesas QE for BLE[RA,RE,RX] Utility] check box are selected as the target of installation, and click the [Next>] button.
7. After confirming the license agreements, if you agree to the license, select the [I accept the terms of the license agreements] radio button, and click the [Finish] button.
8. If the dialog of the trust certificate is displayed, check that certificate, and click the [OK] button to continue installation.
9. When prompted to restart e² studio, restart it.
10. Start this product from the [Renesas Views] - [Renesas QE] menu of e² studio. For details about how to use this product, see the [Help] menu of e² studio.

2.1.2 Install using QE (zip file) downloaded from the Renesas website

1. Start e² studio.
2. From the [Help] menu, select [Install New Software...] to open the [Install] dialog box.
3. Click the [Add...] button to open the [Add Repository] dialog box.
4. Click the [Archive...] button, select the installation file (zip file) in the opened file selection dialog box, and then click the [Open] button.
5. Click the [OK] button in the [Add Repository] dialog box.
6. Expand the [Renesas QE] item shown in the [Install] dialog box, select the [Renesas QE for BLE[RA,RE,RX]] check box and the [Renesas QE for BLE[RA,RE,RX] Utility] check box, and then click the [Next>] button.
* If you check off the [Contact all update sites during install to find required software] checkbox, you can shorten the installation time.
7. Check that the [Renesas QE for BLE[RA,RE,RX]] and the [Renesas QE for BLE[RA,RE,RX] Utility] are selected as the target of installation, and click the [Next>] button.
8. After confirming the license agreements, if you agree to the license, select the [I accept the terms of the license agreements] radio button, and click the [Finish] button.
9. If the dialog of the trust certificate is displayed, check that certificate, and click the [OK] button to continue installation.
10. When prompted to restart e² studio, restart it.
11. Start this product from the [Renesas Views] - [Renesas QE] menu of e² studio. For details about how to use this product, see the [Help] menu of e² studio.

2.2 Updating This Product

If you have already installed this product, you can update it in the same way as the procedure for installation.

2.3 Uninstalling This Product

Use the following procedure to uninstall this product.

1. Start e² studio.
2. Select [Help -> About e² studio] to open the [About e² studio] dialog box.
3. Click the [Installation Details] button to open the [e² studio Installation Details] dialog box.
4. Select [Renesas QE for BLE[RA,RE,RX]] and [Renesas QE for BLE[RA,RE,RX] Utility] displayed on the [Installed Software] tabbed page and click the [Uninstall...] button to open the [Uninstall] dialog box.
5. Check the displayed information and click the [Finish] button.
6. When prompted to restart e² studio, restart it.

2.4 Updating QE for BLE[RA,RE,RX] Utility

Use the following procedure to update QE for BLE[RA,RE,RX] Utility included in this product.

1. Start e² studio.
2. Click [Renesas Views], and then click the [Renesas QE], and then click [R_BLE Custom Profile RA,RE,RX (QE)] menu of e² studio to open the [R_BLE Custom Profile RA,RE,RX (QE)] view.
* By opening the view, the QE for BLE[RA,RE,RX] Utility's update site is registered in e² studio.
3. Click [Help], and then click the [Install New Software...] menu to open the [Install] dialog box.
4. Select following item from the [Work With:] drop-down list.
[Renesas QE BLE[RA,RE,RX] Utility – http://tool-support.renesas.com/e2studio/qe/blera_util]
5. Select the [Renesas QE for BLE[RA,RE,RX] Utility] check box, and then click [Next>] button.
6. Confirm that the installation target is correct, and then click the [Next>] button.
7. After checking the license, select the [I accept the terms of the license agreements] radio button, and then click the [Finish] button.
8. When a dialog box for selecting a trusted certificate appears, check the displayed certificate, and then click the [OK] button to continue installation.
9. When prompted to restart e² studio, restart it.

3. Notes / Restrictions

3.1 Usage Considerations

Please pay attention to the following items.

3.1.1 Notes of [Working with views]

1. Floating an R_BLE Main RA,RE,RX (QE) view may not display the contents of the floating view.

Workaround:

Do not float the R_BLE Main RA,RE,RX (QE) view.

3.1.2 Notes of RYZ012 module

1. Some code-generated setting with the custom profile generation feature do not work in combination with FSP or FIT for the RYZ012 module. Also, be sure to perform sufficient test on the generated code.

Workaround:

Please refer to FSP or FIT documents about details of functional restriction.

3.1.3 Notes of DA14531 module

1. Some code-generated setting with the custom profile generation feature do not work in combination with FSP, FIT or SIS for the DA14531 module. Also, be sure to perform sufficient test on the generated code.

Workaround:

Please refer to FSP, FIT or SIS documents about details of functional restriction.

2. Notes on arguments for R_BLE_GATTS_GetAttr functions

In the case of DA14531 modules, add code to allocate memory for the members of the structure to be passed to the third argument at the call of the R_BLE_GATTS_GetAttr function in the code generated by QE for BLE.

Also, please note that if you use QE for BLE to generate code again, the changes will be removed.

Example before change:

```
st_ble_gatt_value_t gatt_value;
ret = R_BLE_GATTS_GetAttr(conn_hdl, p_attr->attr_hdl, &gatt_value);
```

Example after change:

```
st_ble_gatt_value_t gatt_value;
gatt_value.value_len = p_attr->db_size;
gatt_value.p_value = malloc(p_attr->db_size);
ret = R_BLE_GATTS_GetAttr(conn_hdl, p_attr->attr_hdl, &gatt_value);
...
free(gatt_value.p_value);
```

3. Notes on Notification and Client Characteristic Configuration Descriptor

In the case of DA14531 modules, the value of the Client Characteristic Configuration Descriptor cannot be obtained from the R_BLE_SERVS_GetDesc function.

As a result, calling R_BLE_<Service>_Notify<Characteristic> function generated by QE for BLE does not issue a Notify.

To issue a Notify, comment out the part where getting the value of the Client Characteristic Configuration Descriptor and set the value of cccd appropriately.

Also, please note that if you use QE for BLE to generate code again, the changes will be removed.

Example before change: qe_gen/ble/profile_cmn/r_ble_servs_if.c

```
...
ble_status_t R_BLE_SERVS_SendHdlVal(const st_ble_servs_char_info_t *p_attr, uint16_t
conn_hdl, const void *p_app_value, bool is_notify)
{
...
/* Check CCCD */
uint16_t cccd = 0;
R_BLE_SERVS_GetDesc(p_attr->pp_descs[0], conn_hdl, &cccd);
...
```

Example after change: qe_gen/ble/profile_cmn/r_ble_servs_if.c

```
...
ble_status_t R_BLE_SERVS_SendHdlVal(const st_ble_servs_char_info_t *p_attr, uint16_t
conn_hdl, const void *p_app_value, bool is_notify)
{
...
/* Check CCCD */
uint16_t cccd = <Value of Client Characteristic Configuration Descriptor>;
// R_BLE_SERVS_GetDesc(p_attr->pp_descs[0], conn_hdl, &cccd); // Comment out
...
```

3.1.4 Notes of Installation

1. When installing QE for BLE[RA,RE,RX] V1.7.0, the “Trust Artifacts” dialog box displays the QE for BLE[RA,RE,RX] plug-in as unsigned.

Workaround:

Check “Unsigned” and click the “Trust Selected” button to continue the installation.

3.2 Functional Restrictions

QE for BLE[RA,RE,RX] V1.7.0 has the following functional restrictions.

3.2.1 Restrictions for creating a custom profile

1. In the setting of Advertising Interval in the following three items of the [Peripheral] and [Central] tabs of the R_BLE Custom Profile RA,RE,RX (QE) View, the error icon does not appear even if the value that exceeds the input limit is entered.
 - [Peripheral] tab → Advertising Data → Advertising Interval
 - [Peripheral] tab → Scan Response Data → Advertising Interval
 - [Central] tab → Scan Filter Data → Advertising Interval

Workaround:

When setting the Advertising Interval, make sure it is entered correctly in the range of 20 to 10240ms.

3.2.2 Restrictions for working with views

1. In the Windows 11, the drop-down button for the project selection combo box in the R_BLE Main RA,RE,RX (QE) view and the R_BLE Custom Profile RA,RE,RX (QE) view is not displayed.

Workaround:

When you click the combo box, a drop-down is displayed, so there is no problem with the operation.

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Apr.09.24	-	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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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

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