GATTBrowser for Android

Smartphone Application Instruction manual

Introduction

This manual describes about Renesas *Bluetooth*® Low Energy (hereinafter call, "Bluetooth LE") on how to use the Smartphone application known as "GATTBrowser". This application will be used for checking the wireless communication behavior during the development of Bluetooth LE products with the Renesas Bluetooth LE microcontrollers.

Android Version Requirement

Android 10 or later

Target Device

- IC
  - RX23W Group
  - RA4W1 Group
  - RL78/G1D Group
- Module
  - RX23W Module
  - RY7011 (RL78/G1D mounted)

Related Documents

- RX23W Bluetooth LE Solution & Resource Quick Start Guide (R01QS0067)
- RA4W1 Bluetooth LE Solution & Resource Quick Start Guide (R01QS0066)
- RL78/G1D Bluetooth LE Solution & Resource Quick Start Guide (R01QS0068)
- Bluetooth Core Specification v5.0 (https://www.bluetooth.com/)
- Supplement to the Bluetooth Core Specification CSS (https://www.bluetooth.com/)

Contents

1. Overview

GATTBrowser is a general-purpose application that can scan Bluetooth LE devices, which are advertising in vicinity and can perform the GATT-based communication with the connected Bluetooth LE device. Using the functions of this application promotes software development using Renesas Bluetooth LE microcontrollers.

GATTBrowser supports the following features.

- Scan surrounding Bluetooth LE devices
- Display the Advertising data
- Display the Received Signal Strength Indication (hereafter call, "RSSI")
- Connect to Renesas Bluetooth LE microcontrollers and other Bluetooth LE devices
- Display the BD Address of the connected Bluetooth LE device
- Display the services and characteristics information
- Communicate with Bluetooth LE device
- Support Renesas custom services and characteristics

2. Applicability

This manual explains about Android application, GATTBrowser Version 1.0.4 or later.

3. Restriction

This GATTBrowser application is intended to evaluate the Bluetooth LE software. Accordingly, this GATTBrowser is not applicable to any purpose other than evaluation.

4. Operational Environment

The GATTBrowser runs on the following operating environment.

- Android 10 or later
- Use Bluetooth LE function.

5. Installation

To install in Android devices, open Google Play and search for "GATTBrowser". Then get the application.

It is also possible to install from the following URL.

- GATTBrowser
  https://play.google.com/store/apps/details?id=com.renesas.ble.gattbrowser

After successfully installed, the following icons will be appeared on the screen.

Figure 5-1 GATTBrowser icon.

6. Method of operation

This chapter describes how to operate GATTBrowser. Shows an example of operation when using a smartphone that supports Android 10 and 12 as an example.

6.1 Application launch

To start GATTBrowser, touch the GATTBrowser icon. After starting, the GATTBrowser starts scanning the Bluetooth LE devices performing advertising in the surrounding area. Figure 6-1 GATTBrowser launch. shows the GATTBrowser launch screen.

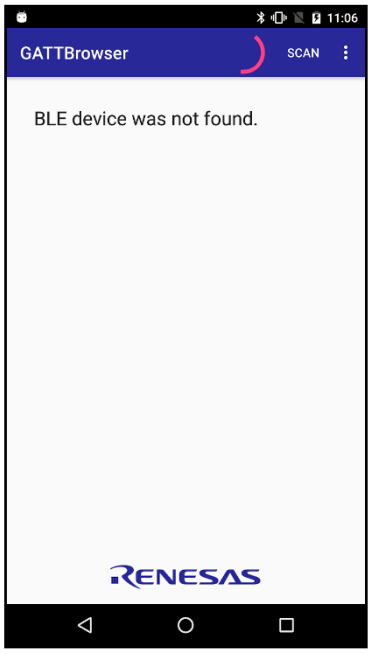
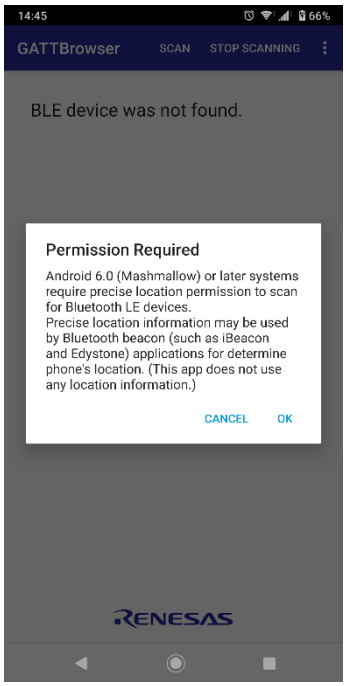
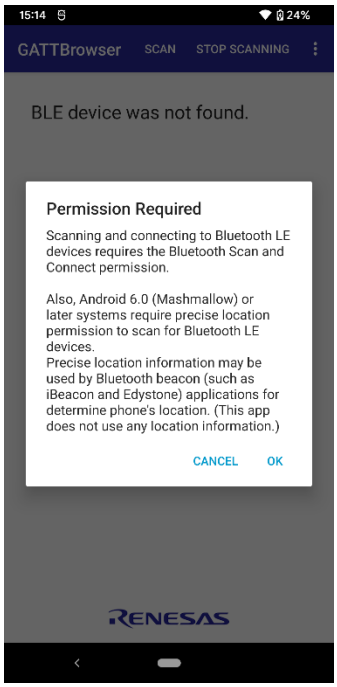
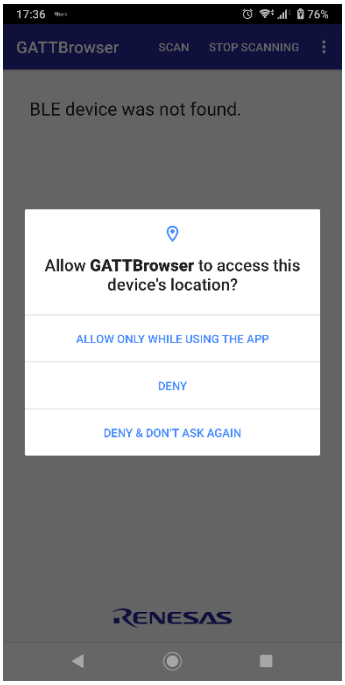
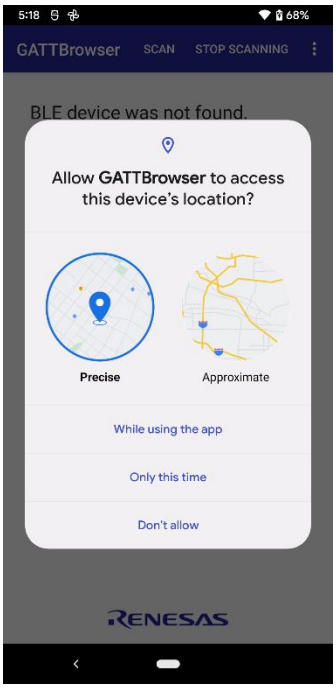


Figure 6-1 GATTBrowser launch.

If the app's permissions are insufficient, a dialog requesting permissions will be displayed, so please allow them.

<table>
<tr><th>Below Android 12</th><th>Android 12 or later</th></tr>
<tr><td colspan="2">Confirm why the app needs permissions.</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td colspan="2">Allow access to device location.</td></tr>
<tr><td> 
</td><td> 

Allow access to "Precise" location information.</td></tr>
</table>

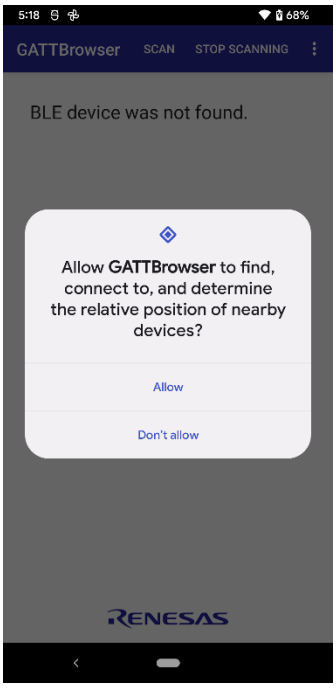
Allow find, connect to, and determine the relative position of nearby devices.	
When below Android 12, the dialog requesting allow of this permission will not be displayed.	

Figure 6-2 Allow app permissions.

When the Android device is turn off the Bluetooth while starting, the GATTBrowser application notifies the message, "Bluetooth setting are turned OFF. Please turn on the Bluetooth" as shown in Figure 6-3. To use this application, the Android device must be turned on the Bluetooth function.

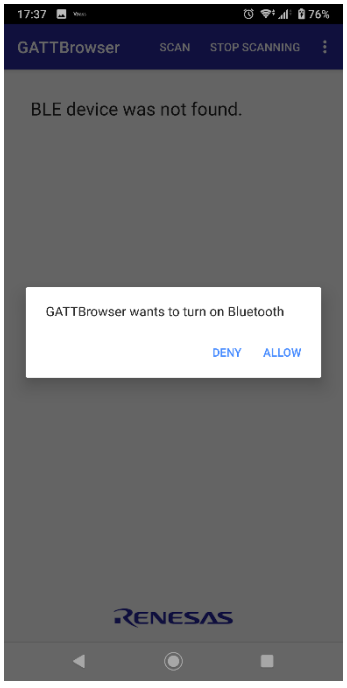


Figure 6-3 Allow Bluetooth ON.

6.2 Bluetooth LE devices scan list

6.2.1 Start scan

When starting up, the GATT Browser starts scanning Bluetooth LE devices performing advertising in the surrounding area. The discovered Bluetooth LE device will be displayed in the list.

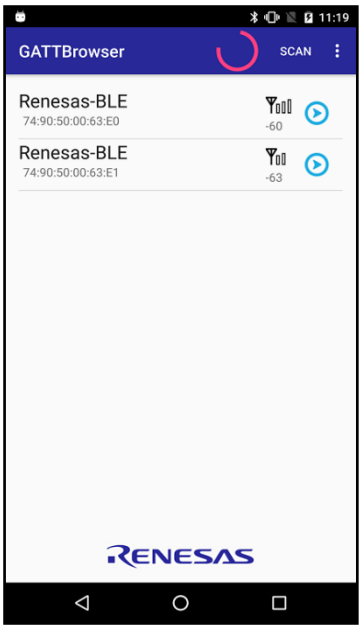


Figure 6-4 List of found Bluetooth LE devices.

A circular progress bar will be displayed on the upper right side of the screen during scanning. Scanning stops after 30 seconds have elapsed since the scan started.

6.2.2 Stop scan

Tap the Overflow Menu on the upper right side of the screen to display the function items. Tap "Stop Scanning" to stop scanning.

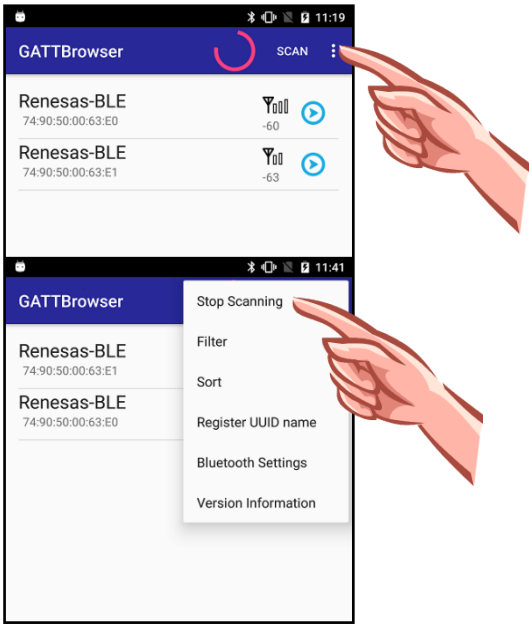


Figure 6-5 Tap on “Stop Scanning”.

If the size of the screen is large such as tablet, "STOP SCANNING" button will be displayed on the upper side of the screen.

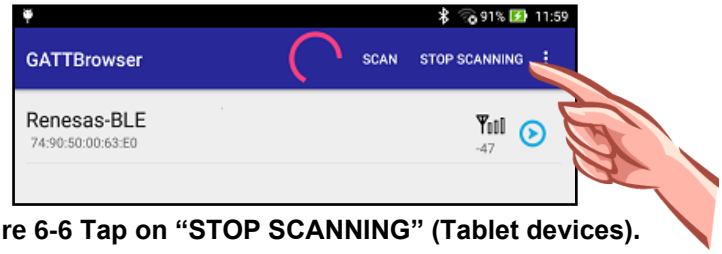


Figure 6-6 Tap on “STOP SCANNING” (Tablet devices).

Even if the Bluetooth LE device starts advertising newly while scanning is stopped, it will not be added to the list. It also stops updating the display of the RSSI and displays the RSSI last observed.

6.2.3 Rescan

Tap the "SCAN" button on the upper right side of the screen. After rescanning, the Bluetooth LE device information displayed in the list will be cleared once, and the discovered Bluetooth LE devices will be displayed in the list. Rescanning is also effective during scanning.

6.2.4 **Bluetooth LE device information in short format**

The information of the discovered Bluetooth LE device is displayed as follows.

Figure 6-7 Bluetooth LE device information in short format.

Table 6-1 Bluetooth LE device information

No.	Information	Description
①	Device Name	Displays the device name for Bluetooth LE devices found. Display the device name from the advertising data. If the advertising data does not contain the device name, it will display as "<No name>".
②	BD Address	Displays the BD Address of the discovered Bluetooth LE device.
③	RSSI	Displays the RSSI value of the discovered Bluetooth LE device. During scanning operation, the RSSI value is periodically updated. After the scanning operation is stopped, the RSSI value last observed is displayed.
④	Connection Button	Connects to the discovered Bluetooth LE devices.

6.2.5 Bluetooth LE device information with Advertising data information

When the cell of the discovered Bluetooth LE device is tapped, the display area of the cell is enlarged and the advertising data is displayed. Tap again to erase the advertising data and return to the original display.

For detail information about displayed parameters, refer to the Bluetooth SIG documents such as Bluetooth Core Specification v5.0 [Vol 3, Part-C] and Supplement to the Bluetooth Core Specification CSS [Part A].

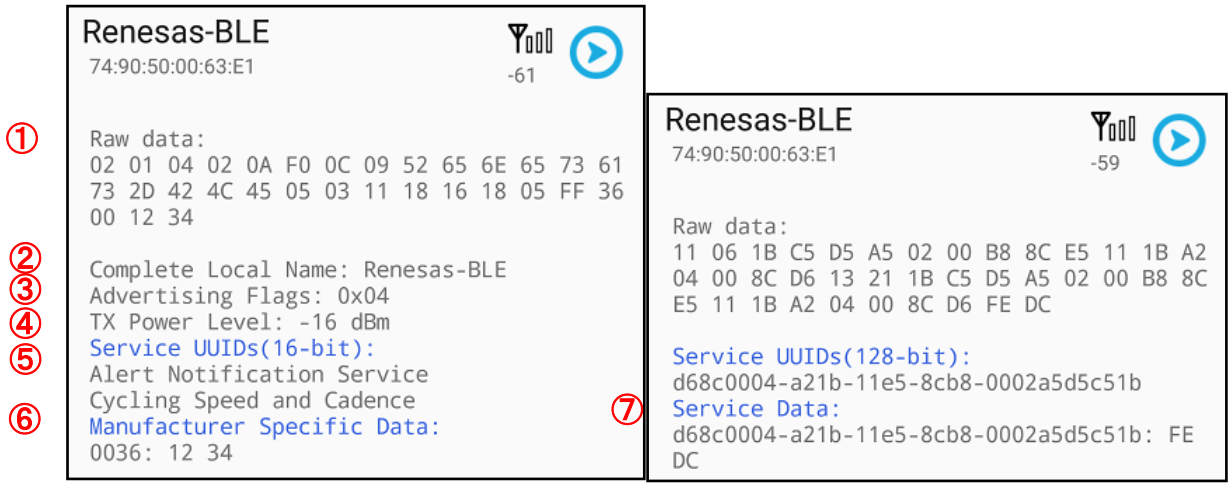


Figure 6-8 Advertising data information.

Table 6-2 Advertising data

No.	Information	Description
①	Raw Data	Raw data of the Advertising data and the Scan Response data.
②	Local Name	The local name of the Bluetooth LE device.
③	Flags	The flags such as discoverable mode and others.
④	TX Power Level	The transmit power of the Bluetooth LE device.
⑤	Service UUIDs(16-bit) Service UUIDs(32-bit) Service UUIDs(128-bit)	Services UUID of the Bluetooth LE device.
⑥	Manufacturer Specific Data	Data set independently by the manufacturer of the Bluetooth LE device.
⑦	Service Data	Service Data of the Bluetooth LE device.

When the received Advertising data is iBeacon, detailed information on iBeacon will be displayed.

For detail information about displayed parameters, refer to https://developer.apple.com/ibeacon

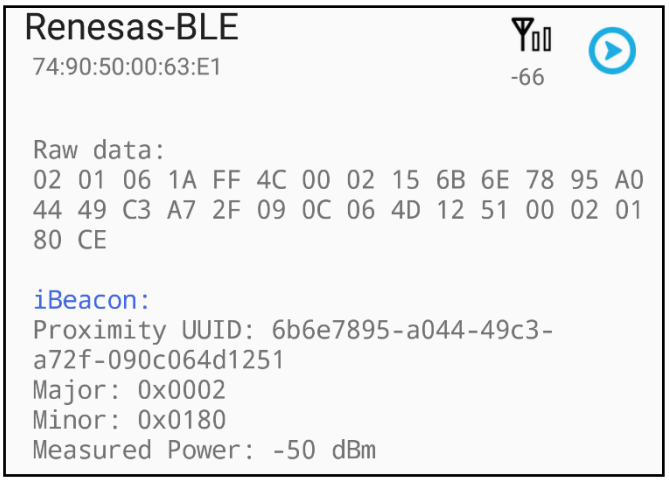


Figure 6-9 iBeacon information.

When the received Advertising data is Eddystone, detailed information on Eddystone will be displayed. Eddystone URL, Eddystone-TLM, and Eddystone-EID are supported. Tap the URL to open the URL in WebView in this application.

For detail information about displayed parameters, refer to https://github.com/google/eddystone

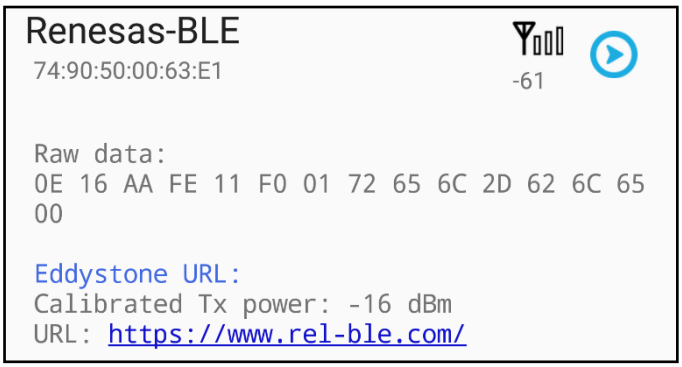


Figure 6-10 Eddystone information.

6.2.6 Bluetooth LE device connection

Tap the Connection Button at the right end of the Bluetooth LE device information to connect to the Bluetooth LE device and move to the screen described in 6.3 Service and Characteristic list

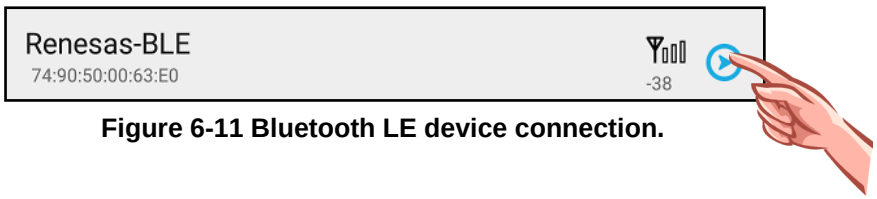


Figure 6-11 Bluetooth LE device connection.

6.2.7 Filter function

For the discovered Bluetooth LE devices, only Bluetooth LE devices corresponding to preset conditions are displayed.

Tap the Overflow Menu on the upper right side of the screen to display the function items. Tap "Filter" to display the filter selection dialog.

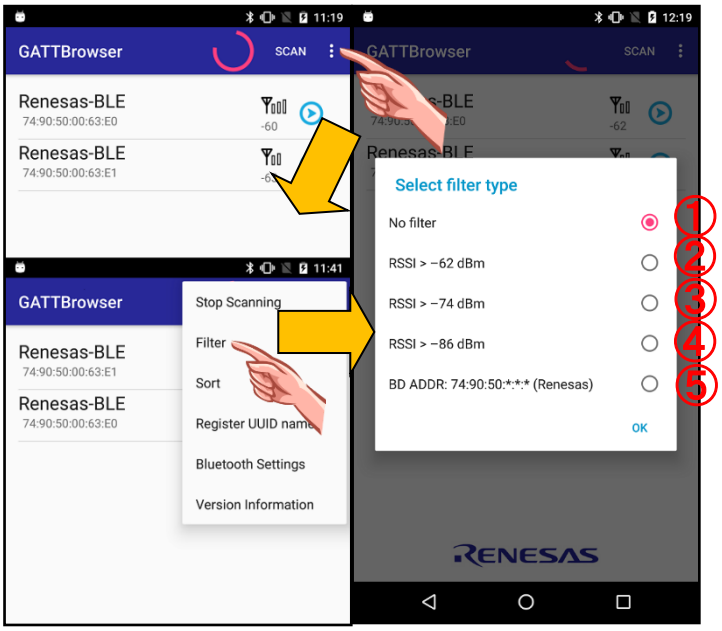


Figure 6-12 Filter function.

Table 6-3 Filter types

No.	Information	Description
①	No filter	Displays all discovered Bluetooth LE devices. (Default)
②	RSSI > -62 dBm	Displays Bluetooth LE devices with RSSI greater than -62 dBm.
③	RSSI > -74 dBm	Displays Bluetooth LE devices with RSSI greater than -74 dBm.
④	RSSI > -86 dBm	Displays Bluetooth LE devices with RSSI greater than -86 dBm.
⑤	BD ADDR: 74:90:50:*:*:*	Displays Bluetooth LE devices that BD Address corresponds to vendor code of Renesas Electronics Corporation (OUI: 74 - 90 - 50)

When filtering by RSSI reception strength, if the RSSI reception strength of the displayed Bluetooth LE device falls below the RSSI reception strength set in the filter, it will be removed from the display list. If the RSSI reception strength exceeds the RSSI reception strength set in the filter again, it will be displayed in the display list.

6.2.8 Sort function

Sets the order of the discovered Bluetooth LE devices. Tap the Overflow Menu on the upper right side of the screen to display the function items. Tap "Sort" to display the sort selection dialog.

If scanning is in progress and sorting is enabled, the order of the Bluetooth LE devices is updated approximately once every second.

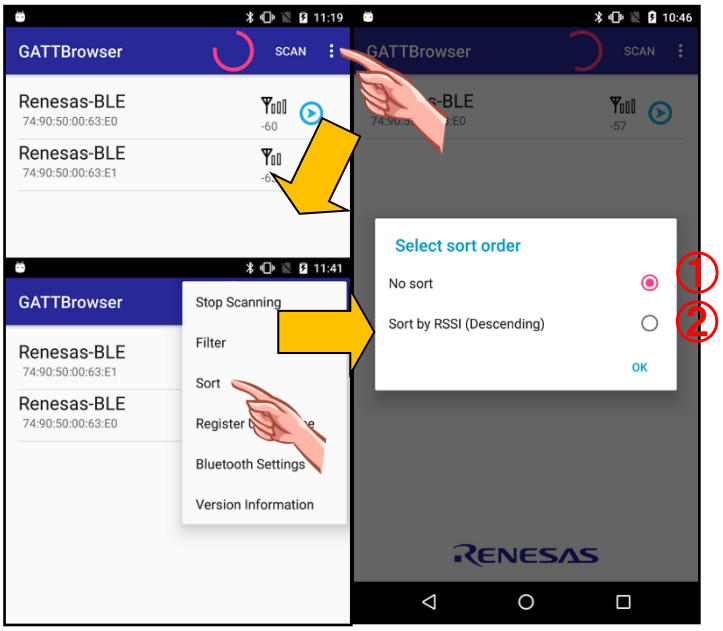


Figure 6-13 Sort function.

Table 6-4 Sort types

No.	Information	Description
①	No sort	Displays Bluetooth LE devices in the order of discovery. (Default)
②	Sort by RSSI(Descending)	Display Bluetooth LE devices in the order of RSSI descending.

6.2.9 Correspondence function of UUID and name

Register the name corresponding to 128 bit UUID. The name corresponding to the 128-bit UUID is displayed in the 128-bit UUID display part of "Service and Characteristic list" screen and "Characteristic operation" screen.

Tap the Overflow Menu on the upper right side of the screen to display the function items. Tap "Register UUID name" to display a dialog to register correspondence between UUID and name.

6.2.10 Launch the Bluetooth setting screen

Tap the Overflow Menu on the upper right side of the screen to display the function items. Tap "Bluetooth Settings" to launch the Android standard Bluetooth setting application.

6.2.11 Version information

Tap the Overflow Menu on the upper right side of the screen to display the function items. Tap "Version Information" to display the version information dialog of this application.

6.2.12 **Local Device information**

Tap the Overflow Menu on the upper right side of the screen to display the function items. Tap "Local Device Information" to display the information dialog about the local device running this application.

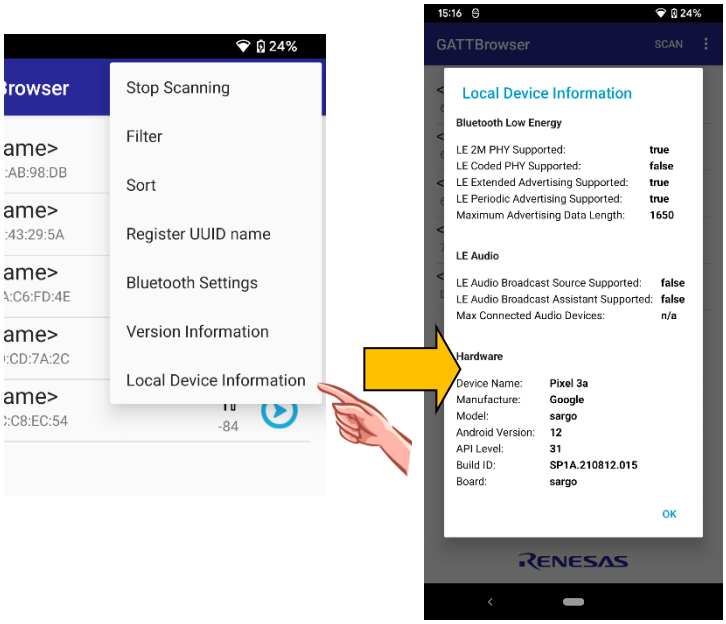


Figure 6-14 Local Device Information display function.

A dialog displays support information for the main features of "Bluetooth Low Energy" and "LE Audio" and information about "Hardware". ("LE Audio" information is valid for Android 13 or later)

6.3 Service and Characteristic list

When you connect to the Bluetooth LE device, it switches to "Service and Characteristic list" screen.

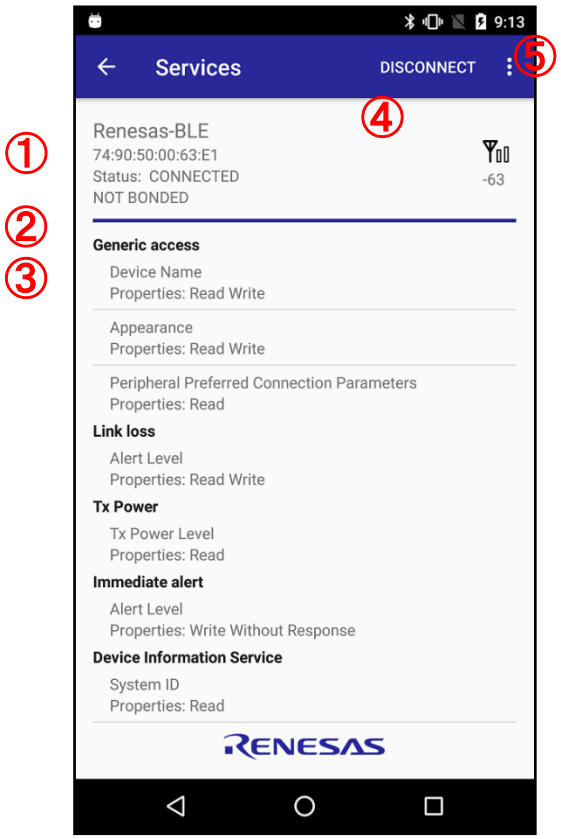


Figure 6-15 Service and Characteristic list.

Table 6-5 Bluetooth LE device information

No.	Information	Description
①	Connected device information	Displays the “local name”, “BD address”, “connection status”, “binding status”, and “RSSI” of the connected Bluetooth LE device.
②	Service name	Displays a list of all Service and Characteristic found by Service Discovery.
③	Characteristic name	Displays the “name” and “Properties” of the characteristic in the service.
④	DISCONNECT	Disconnects the connection.
⑤	Overflow Menu	Displays the functions items described in Table 6-6.

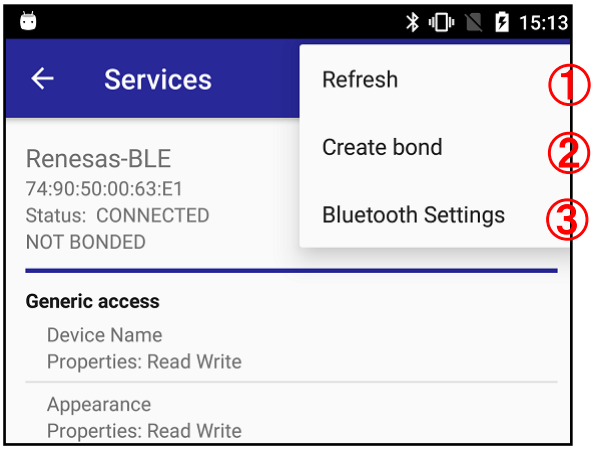


Figure 6-16 Overflow Menu.

Table 6-6 Overflow Menu items

No.	Information	Description
①	Refresh	Removes the Service and Characteristic information that Android keeps in the cache, and get information from the connected Bluetooth LE device.
②	Create bond	Bonds to the connected Bluetooth LE device.
③	Bluetooth Settings	Launches the Android standard Bluetooth setting application.

6.3.1 Connection Status

Displays the “device name”, “BD Address”, “Connection status”, “Bonding status”, and “RSSI value” of the connected Bluetooth LE device. The “RSSI value” is updated at regular intervals. The color of the divider line changes (CONNECTED: Blue, DISCONNETED: Red) depending on the connection state.

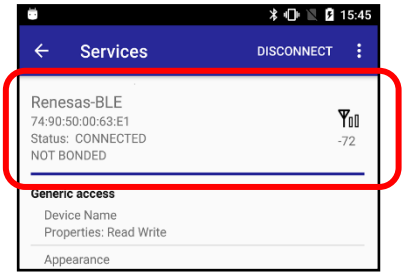


Figure 6-17 Connected.

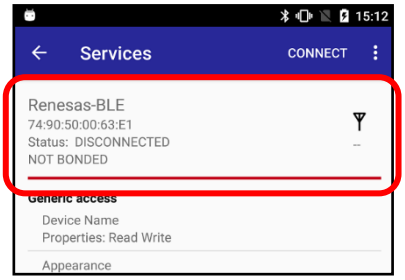


Figure 6-18 Disconnected.

6.3.2 Display Service name & Characteristic name

When UUID specified by Bluetooth SIG, Inc. is detected during Service Discovery, the service name corresponding to the UUID is displayed. For other custom UUID, the UUID is displayed as it is.

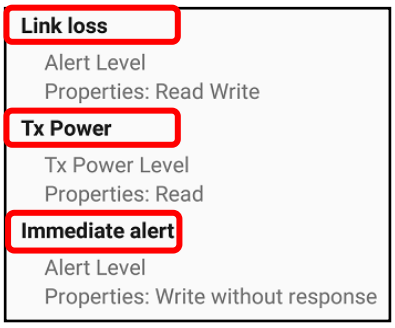


Figure 6-19 Display Service name determined by the Bluetooth SIG, Inc.

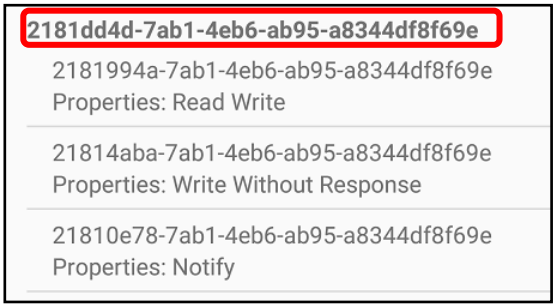


Figure 6-20 Service names of custom UUID is detected.

Likewise, when UUID specified by Bluetooth SIG, Inc. is detected during Characteristic Discovery, the characteristic name corresponding to the UUID is displayed. For other custom UUID, the UUID is displayed as it is.

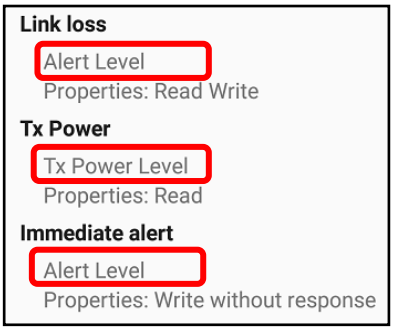


Figure 6-21 Display Characteristic name determined by the Bluetooth SIG, Inc.

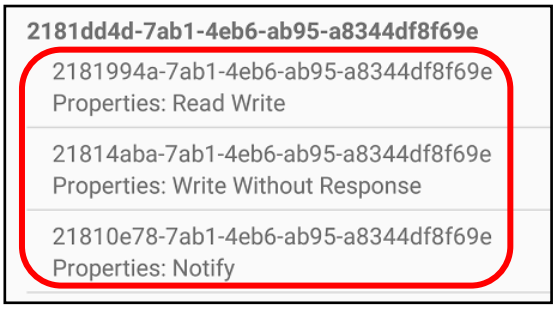


Figure 6-22 Characteristic names of custom UUID is detected.

If a custom UUID to be used in the sample application for Bluetooth LE microcontrollers is detected, the custom service name and characteristic name will be displayed instead of the UUID. For details, see "6.5 Displaying Renesas Custom data".

6.3.3 **Characteristic selection**

When the characteristic you want to operate is tapped, it will move to "Characteristic operation" screen. Only one characteristic can be selected and operated at a time

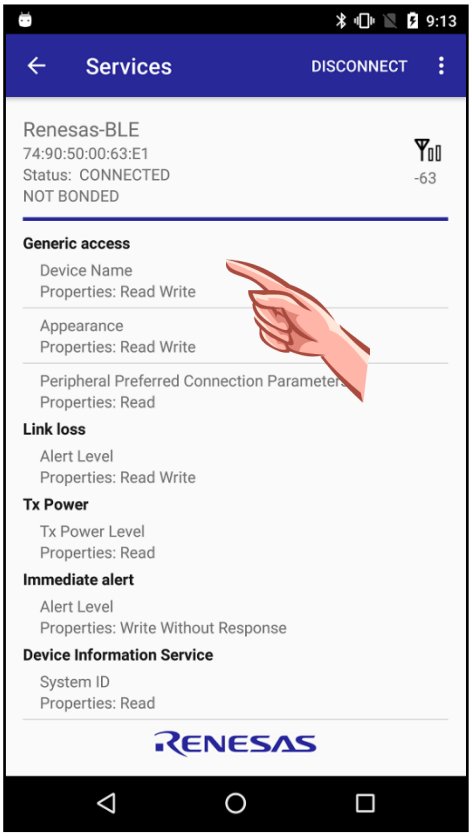


Figure 6-23 Characteristic selection.

6.4 Characteristic operation

6.4.1 Characteristic operation screen

By tapping the characteristic that you want to operate on "Service and Characteristic list" screen, the screen will move to "Characteristic operation" screen. The displayed buttons and items will change depending on the Characteristic Properties attributes of the characteristic to be operated.

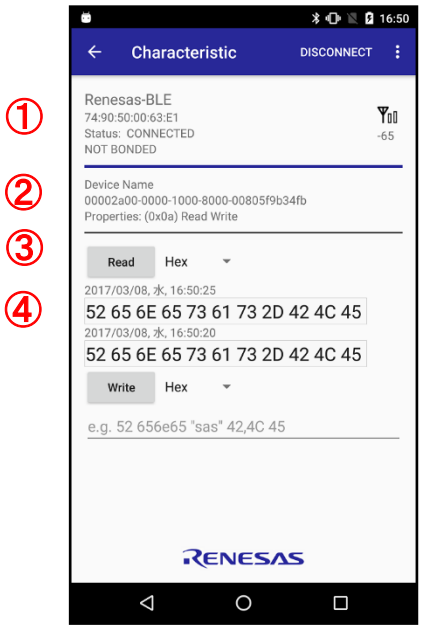


Figure 6-24 Characteristic operation 1.

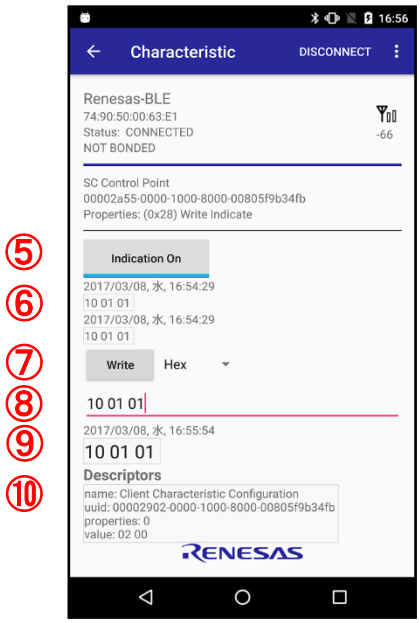


Figure 6-25 Characteristic operation 2.

Table 6-7 Characteristic operation information

No.	Information	Description
①	Connected device information	Displays "Local name", "BD address", "Connection status", "Bonding status", and "RSSI" of the connected Bluetooth LE device. The displayed information is the same as the "Service and Characteristic list" screen.
②	Characteristic information	Displays "Characteristic name", "Characteristic UUID" and "Characteristic Properties」 of the connected Bluetooth LE device.
③	Read button & Display mode selection spinner	The "Read" button is to receive the value of the characteristic. "Display mode selection Spinner" selects the display method of received data. "Read" button and "Display mode selection" spinner is displayed based on the characteristic properties and are not displayed when there is no Read attribute in the characteristic properties.
④	History of received data	Displays the characteristic value received by operating the "Read" button. Up to three cells are displayed, and the latest data is displayed at the top.
⑤	Indication / Notification button	The Indication / Notification button is for instructing Indication / Notification. Each button is displayed based on the characteristic properties and are not displayed when there is no Indication / Notification attribute in the characteristic properties.

⑥	History of Indication / Notification received data	Displays the contents of the data notified of the change. Up to three cells are displayed, and the latest data is displayed at the top. Data is displayed in hexadecimal for every 8 bits.
⑦	Write button & Write mode selection spinner	The “Write” button is to write a value to the characteristic. The “Write” button is displayed based on the characteristic properties and it is not displayed when there is no Write attribute in the characteristic properties. “Write mode selection” spinner specifies the format of data to be written.
⑧	Text field of write data	The text field is to enter a value to be written to the characteristic. After entering the data here, tap the “Write” button and write the data to the target characteristic.
⑨	History of sent data	Displays the value successfully sent by the “Write” button. Up to three cells are displayed, and the latest data is displayed at the top. If sending operation fails, it will not be displayed in the history.
⑩	Descriptor information	Displays the descriptor information of the characteristic.

6.4.2 **Connection status**

The connection status is the same as "6.3.1 Connection Status".

6.4.3 **Read operation**

If the characteristic has the read attribute in the Characteristic Properties, the "Read" button and “display mode selection” spinner will be displayed. Tap the "Read" button to read the characteristic value.

The read data is displayed in the received data history field.

Figure 6-26 The “Read” button.

Figure 6-27 After tapping the "Read" button.

6.4.4 Display mode selection

In the “display mode selection” spinner, next to the "Read" button, select the display method of the received data. “Hex” mode and “String” mode can be selected. When “Hex” mode is selected, data is displayed in hexadecimal for every 8 bits. If “String” mode is selected, data is displayed as UTF-8 string.

Figure 6-28 Display mode selection spinner.

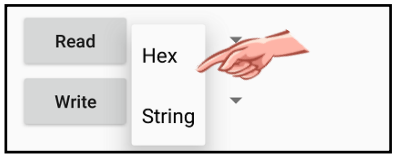


Figure 6-29 Select display mode.

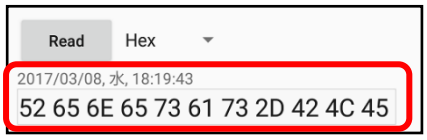


Figure 6-30 Hex mode.

Figure 6-31 String mode.

6.4.5 History of received data

The data received with the “Read” button is displayed in the received data history field. Up to three of this history are displayed, and the latest data is displayed at the top. When receiving the characteristic data when there are three histories, the oldest history at the bottom is removed and the latest data is added to the top.

6.4.6 Notification operation

If the characteristic has the Notification attribute in the Characteristic Properties, the Notification On / Off toggle button will be displayed. When this toggle button is pressed, the display changes from "Notification Off" to "Notification On", and you can receive the Notification. If the reception request for Notification fails, the button display will not be switched. In the “display mode selection” spinner, next to the Notification On/Off toggle button, select the display method of the received data. “Hex” mode and “String” mode can be selected.

The received notification data is displayed in the received notification data history field.

Figure 6-32 Notification On/Off toggle button.

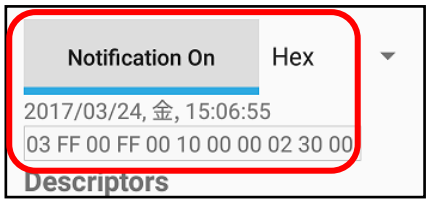


Figure 6-33 Received notification data.

6.4.7 Indication operation

If the characteristic has the Indication attribute in the Characteristic Properties, the Indication On / Off toggle button will be displayed. When this toggle button is pressed, the display changes from "Indication Off" to "Indication On", and you can receive the Indication. If the reception request for Indication fails, the button display will not be switched.

The received indication data is displayed in the received indication data history field.

6.4.8 Write operation

If the characteristic has the write attribute in the Characteristic Properties, the "Write" button, the “write mode selection” spinner, and the text field for setting write data are displayed. Tap the "Write" button to write the characteristic value.

The data that was successfully written is displayed in the sent data history field.

Enter the write data.

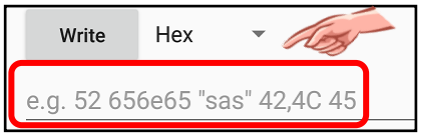


Figure 6-34 Sending text field.

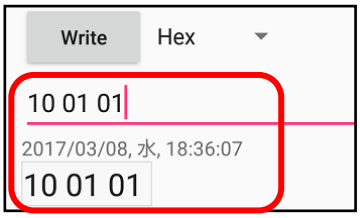


Figure 6-35 After tapping the "Write" button.

6.4.9 Write without response operation

If the characteristic has the write without response attribute in the Characteristic Properties, the "Write" button and the text field for setting write data are displayed. On the screen display, there is no difference between Write operation and Write without response operation.

6.4.10 Write mode selection

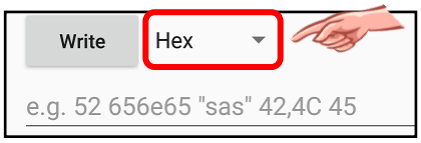


Figure 6-36 Write mode selection spinner.

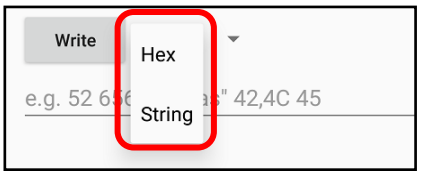


Figure 6-37 Select write mode.

In the “write mode selection” spinner, next to the "Write" button, select the specifies whether data set in the text field is handled as Hex data or String data.

In the “Hex” mode, write data is handled as a hexadecimal number. Two hexadecimal digits (8-bit data) are the minimum input unit, and the delimiter allows a space and a comma. For example, to write hexadecimal "0x000102ABCD", enter as follows.

000102ABCD

00 01 02 AB CD

000102ABCD

00,01,02,AB,CD

In addition, character strings delimited by single quotation mark or double quotation mark are decoded and written by UTF-8. For example, if you enter"00 "Renesas" FE FF","0x0052656e65736173FEFF" will be written.

In the “String” mode, write data is decoded and written with UTF-8. For example, to write "Renesas", "0x52656e65736173" will be written.

6.4.11 History of sending data

As with the received data history, the data sent with the “Write” button is displayed in the sent data history field. Up to three of this history are displayed, and the latest data is displayed at the top. When sending the characteristic data when there are three histories, the oldest history at the bottom is removed and the latest data is added to the top.

Sent data history is displayed in hexadecimal format regardless of the type of the write mode selection.

6.4.12 Historical data copying into the text field

When the text field of the write data is displayed and there is a received data history, long tap on the cell of the received data history will copy the data to the text field of the write data.

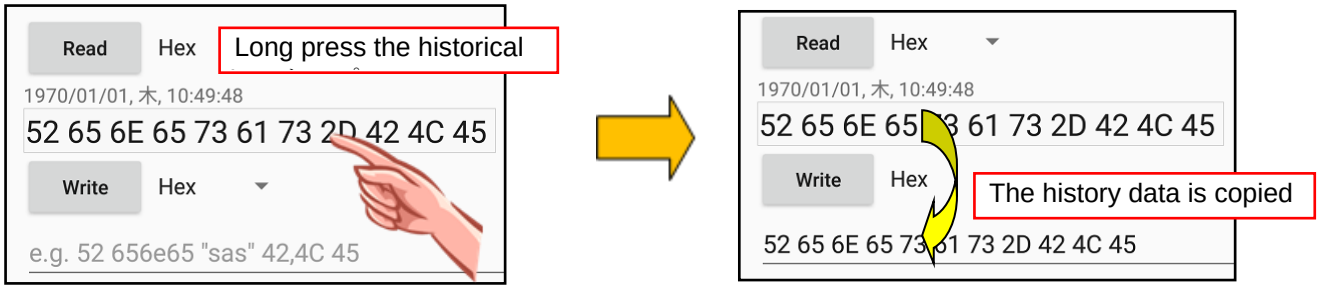


Figure 6-38 Copy historical data into the text field.

6.4.13 Update of descriptors

The descriptor information is automatically updated when requesting reception of Notification or Indication, but by tapping the cell of display information, it intentionally reads the descriptor information of the characteristic.

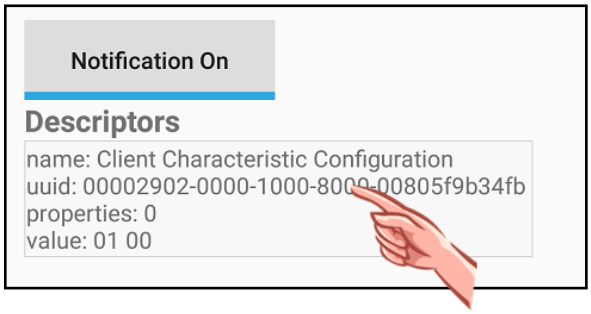


Figure 6-39 Update of descriptor.

6.4.14 Limitations

Operations on Broadcast attribute (0x01) and Extended Properties attribute (0x80) of Characteristic Properties are not supported.

6.5 Display Renesas custom data

If a custom UUID used in the sample application for Bluetooth LE microcomputers is detected, the custom Service name and Characteristic name will be displayed instead of the UUID. In addition, a dedicated information analysis dialog is displayed for a specific Characteristic.

6.5.1 Renesas custom Service and Characteristic names display

The Service name used in the sample applications for Bluetooth LE microcomputers as below are detected and displayed the following Service/Characteristic UUID and Characteristic names.

- BLE Virtual UART application (R01AN3130)

Table 6-8 UUIDs of BLE Virtual UART application

UUID	Service and Characteristic Name
D68C0001-A21B-11E5-8CB8-0002A5D5C51B	Renesas Virtual UART Service
D68C0002-A21B-11E5-8CB8-0002A5D5C51B	Indication Characteristic
D68C0003-A21B-11E5-8CB8-0002A5D5C51B	Write Characteristic

- Embedded Configuration Sample Program (R01AN3319)

Table 6-9 UUIDs of Embedded Configuration Sample Program

UUID	Service and Characteristic Name
5BC1B9F7-A1F1-40AF-9043-C43692C18D7A	Renesas Sample Custom Service
5BC18D80-A1F1-40AF-9043-C43692C18D7A	Switch State Characteristic
5BC143EE-A1F1-40AF-9043-C43692C18D7A	LED Control Characteristic

- RL78/G1D Beacon Stack Connecting and Updating Beacon Data Sample Program (R01AN3313)

Table 6-10 UUIDs of RL78/G1D Beacon Stack Connecting and Updating Beacon Data Sample Program

UUID	Service and Characteristic Name
A7660001-4B1E-4D6E-91C4-997BA9B6FC07	Renesas Beacon Updater Service
A7660002-4B1E-4D6E-91C4-997BA9B6FC07	Advertising Information
A7660003-4B1E-4D6E-91C4-997BA9B6FC07	Advertising Data
A7660004-4B1E-4D6E-91C4-997BA9B6FC07	Code Flash Memory Updated Count
A7660005-4B1E-4D6E-91C4-997BA9B6FC07	Data Flash Memory Updated Count
A7660006-4B1E-4D6E-91C4-997BA9B6FC07	Scan Response Data

- Other Renesas custom UUIDs

Table 6-11 Other Renesas custom UUIDs list

UUID	Service and Characteristic Name
64800001-FAC7-4B08-AFA8-7D89FC4BBB41	Renesas Data Exchange Sample Program Service(Tag)
64800002-FAC7-4B08-AFA8-7D89FC4BBB41	Renesas Data Exchange Sample Program Service(Reader)
D68C0004-A21B-11E5-8CB8-0002A5D5C51B	Simple Connection Notification Characteristic
D68C0005-A21B-11E5-8CB8-0002A5D5C51B	Simple Connection Write Without Response Characteristic
FEACBB7A-DB63-4CA1-8AE2-F611C8269F65	Renesas OTA Reset Service
7753002F-34E9-4A65-904E-5636FBFCEC23	Virtual Reset Button Characteristic
1B7EEA33-19BF-44E0-BA37-3FA621BBB0D7	Project Information Characteristic
AAA509C9-7A50-458C-99DD-DC33E2C2D90C	Version Information Characteristic
9D5998F8-105B-4691-92BE-4B1B4D3EE8BB	Renesas OTA Service
629C8EF7-AA42-4F1E-8330-FE832961B926	Data Control Characteristic
13561280-ECB3-4691-9AB0-33649C7E03DB	Data Transfer Characteristic
9CEF3D10-7FAB-49DC-AB89-762C9079FE96	Renesas Throughput Service
9CEF3D11-7FAB-49DC-AB89-762C9079FE96	Throughput Data 1 Characteristic
9CEF3D12-7FAB-49DC-AB89-762C9079FE96	Throughput Data 2 Characteristic
7DBE3201-F5AB-498A-A012-676FEF22F735	Renesas Data I/O Service
7DBE3202-F5AB-498A-A012-676FEF22F735	Data In Characteristic
7DBE3203-F5AB-498A-A012-676FEF22F735	Data Out Characteristic
58831926-5F05-4267-AB01-B4968E8EFCE0	Renesas LED Switch Service
58837F57-5F05-4267-AB01-B4968E8EFCE0	Switch State Characteristic
5883C32F-5F05-4267-AB01-B4968E8EFCE0	LED Blink Rate Characteristic
908DCB17-7F42-44AC-AB9D-C36F63DCEBD8	Renesas LED Switch Bridge Service
4CC8C6EC-3954-41D1-8CFF-3F2FE5EC0180	Bridged Switch State Characteristic
458B6862-6D2C-4356-8B2E-B88BCE7F0C84	Bridged LED Blink Rate Characteristic

6.5.2 Beacon data analysis dialog

When connecting to the sample program included in “RL78/G1D Beacon Stack Connecting and Updating Beacon Data Sample Program (R01AN3313)", if you read the characteristic value of the Advertising Information characteristic, the Advertising Data characteristic, or the Scan Response Data characteristic and tap the received data, a dedicated analysis dialog will appear. When tapping the wrote data, the dedicated analysis dialog will appear as well.

- Advertising Information

  If you read an Advertising Information and tap history data, the Advertising Information analysis dialog will be displayed. Likewise, if you write an Advertising Information and tap the history data, the Advertising Information analysis dialog will be displayed.

  Here is an example when tapping the history data of Read.

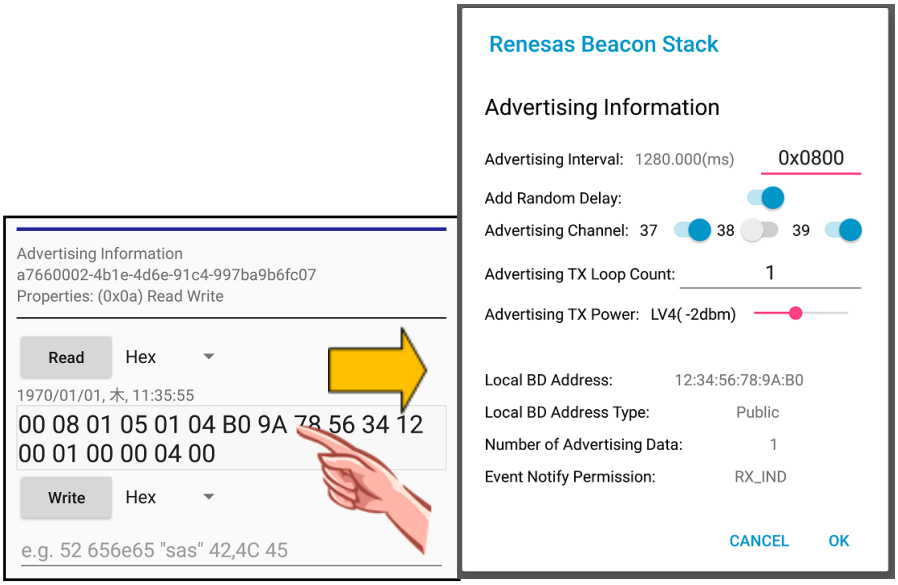


Figure 6-40 Advertising Data analysis dialog.

Parameters from “Advertising Interval” to “Advertising TX Power” can be edited in this dialog. After editing and tapping the "OK" button in the dialog, the changed parameter is set in the send text field.

If you set the write mode to Hex and tap the "Write" button, you can write the changed data to the characteristic. If you tap the "Cancel" button in the analysis dialog, the data will not be reflected in the send text field.

For details of each parameter, refer to "RL78/G1D Beacon Stack Connecting and Updating Beacon Data Sample Program (R01AN3313)" application note.

- Advertising Data / Scan Response Data

Just like Advertising Information, if you read an Advertising Data or a Scan Response Data and tap history data, Advertising Data analysis dialog will be displayed. Likewise, if you write an Advertising Data and tap the history data, the Advertising Data analysis dialog will be displayed.

Here is an example when tapping the history data of Read.

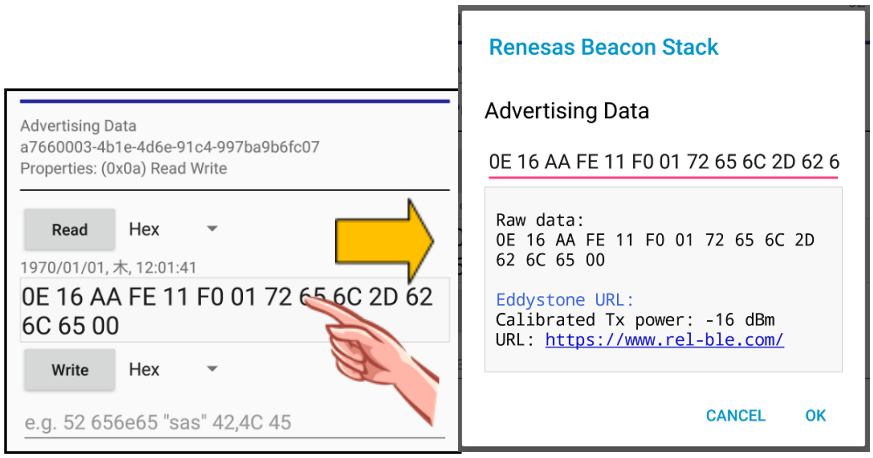


Figure 6-41 Advertising Information analysis dialog.

The tapped history data is copied to the text field at the top of the dialog and the analysis content is displayed in the analysis data field at the bottom. When editing the text field, the analysis result is reflected in the analysis data field. If the analysis data is Eddystone URL, the URL is displayed in blue and hyperlinked. Tap to open the URL in WebView in the application.

If you tap the "OK" button on the dialog after editing, the changed parameter is set in the send text field. If you set the write mode to Hex and tap the "Write" button, you can write the changed data to the characteristic. If you tap the "Cancel" button on the analysis dialog, the data will not be reflected in the send text field.

Refer to "RL78/G1D Beacon Stack Connecting and Updating Beacon Data Sample Program (R01AN3313)" application notes for details of each parameter.

7. Appendix

GATTBrowser uses the Bluetooth capabilities of the Android device. This feature cannot work when OFF. Turned up the GATTBrowser on the set. If you do not expect if you turned OFF the Bluetooth function during the operation.

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Apr 11, 2017	-	First edition issued.
1.01	Jul 7, 2017	25 - 28	A7660006-4B1E-4D6E-91C4-997BA9B6FC07 (Scan Response Data) was added in Table 6-10. Also, added the description in the text.
1.02	Dec 20, 2022	1	・Android requirements change. ・Add target device information. ・Replace related documents. ・Added a footnote regarding the attribution of the Bluetooth trademark.
		4	・Android version requirement change.
		6	・Added about app permission settings.
		15	・Addition of description of local device information display function.
		26	・Added a list of other Renesas custom UUIDs.

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

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