

# GATTBrowser for iOS

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Rev.1.12

## Smartphone Application Instruction manual

Jan 09, 2018

### Introduction

This manual describes about Renesas Bluetooth® Low Energy (hereinafter call, "BLE") on how to use the Smartphone application known as "GATTBrowser". This application will be used for checking the BLE behavior during the development of BLE products with the Renesas microcontroller (RL78/G1D).

### Target Device

Apple iOS devices

### Related Documents

The related documents referred in this document might include preliminary versions. However, the preliminary versions are not marked as such.

Document Name	Document No.
Bluetooth® Low Energy Protocol Stack	-
User's Manual	R01UW0095E
BLE Virtual UART Application	R01AN3130E
Embedded Configuration Sample Application	R01AN3319E
RL78/G1D Beacon Stack	-
Connecting and Updating Beacon Data Sample Program	R01AN3313E

## Contents

1. Overview .....	3
2. Applicability .....	3
3. Restriction .....	3
4. Operational Environment.....	3
5. Installation .....	4
6. Method of operation .....	4
6.1 Application launch .....	4
6.2 BLE devices scan list .....	6
6.2.1 Start scan .....	6
6.2.2 Stop scan .....	7
6.2.3 Rescan .....	7
6.2.4 Menu button.....	8
6.2.5 BLE device information in short format .....	11
6.2.6 BLE device information with Advertising data information .....	12
6.2.7 BLE device connection .....	13
6.3 Service and Characteristic list.....	14
6.3.1 Connection Status .....	15
6.3.2 Display Service name & Characteristic name.....	15
6.3.3 Characteristic selection .....	16
6.4 Characteristic operation.....	17
6.4.1 Characteristic operation screen .....	17
6.4.2 Connection status.....	18
6.4.3 Read operation .....	18
6.4.4 Notification operation .....	18
6.4.5 Indication operation.....	19
6.4.6 History of received data .....	19
6.4.7 Write operation .....	20
6.4.8 Write without response operation.....	20
6.4.9 Select write mode operation .....	21
6.4.10 History of sending data .....	22
6.4.11 Copying historical data into the text field. ....	23
6.4.12 Update of descriptors .....	23
6.5 Display Renesas custom data .....	24
6.5.1 Renesas custom Service and Characteristic names display .....	24
6.5.2 Beacon data analysis dialog.....	26
7. Appendix.....	28

## 1. Overview

GATTBrowser is a general purpose application that can scan BLE devices, which are advertising in vicinity and can perform the GATT-based communication with the connected BLE device. For testing, using its functionalities will expedite the development of BLE microcontroller, RL78/G1D device.

GATTBrowser supports the following features.

- Scan surrounding BLE devices
- Display the Advertising data
- Display the Received Signal Strength Indication (hereafter call, "RSSI")
- Connect to Renesas RL78/G1D BLE microcontroller and other BLE devices
- Display the services and characteristics information
- Communicate with BLE device
- Support Renesas unique services and characteristics

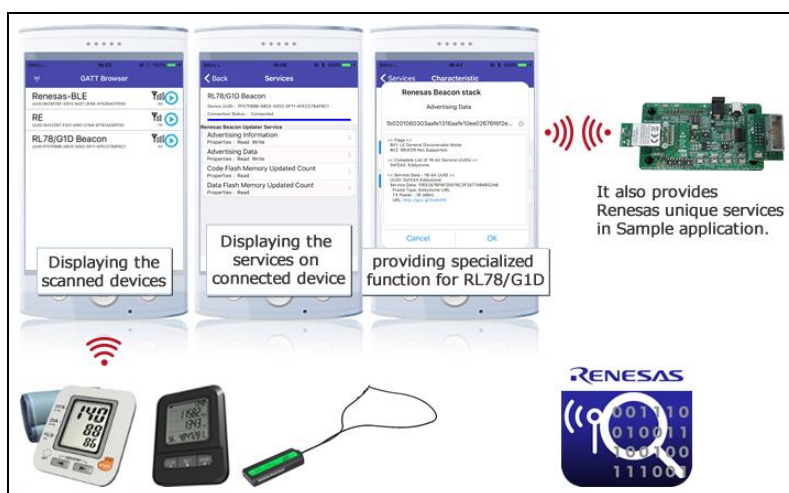


Figure 1-1 GATTBrowser Outline of operation

## 2. Applicability

This manual explains about iOS application, GATTBrowser Version 1.1.3 or later.

## 3. Restriction

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

## 4. Operational Environment

The GATTBrowser runs on the following operating environment.

- Apple Inc. iOS version 9 or later.
- Use Bluetooth function.

## 5. Installation

To install in iOS devices, open the Apple's App Store and search for "GATTBrowser". Then get the application.

It is also possible to install from the following URL.

➤ GATTBrowser

<https://itunes.apple.com/us/app/gattbrowser/id1163057977?mt=8>

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



Figure 5-1 GATTBrowser icon

## 6. Method of operation

This chapter will describe about how to use GATTBrowser. For explaining examples, the illustration are captured by using iPhone6 device.

### 6.1 Application launch

To start GATTBrowser, touch the GATTBrowser icon. After starting, it immediately scans the BLE devices that are advertising in the surrounding area. The Figure 6-1 shows the GATTBrowser launch screen.

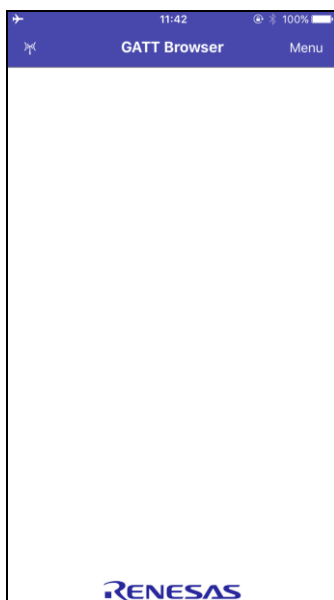
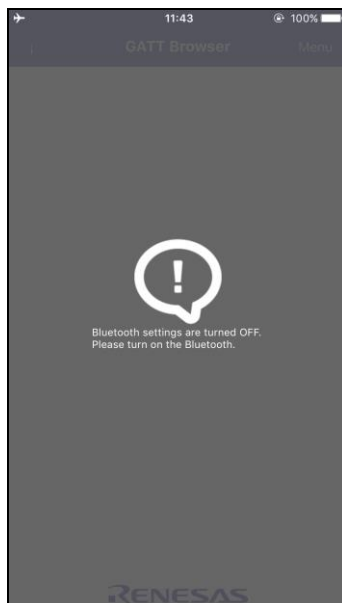


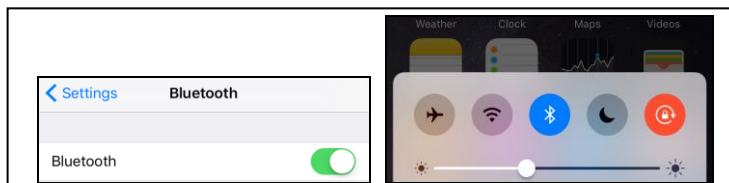
Figure 6-1 GATTBrowser launch

When Bluetooth Setting is switched to off in the iOS device while starting, the GATTBrowser application will notify the message, "Bluetooth setting are turned OFF. Please turn on the Bluetooth" as shown in Figure 6-2. In order to use this application, the iOS device must be turned on the Bluetooth function.



**Figure 6-2 Bluetooth OFF the screen**

Figure 6-3 shows how to turn ON Bluetooth feature in the iOS device. There are two ways to turn on the Bluetooth function. They are Settings App Icon and Control center. From the Settings, Bluetooth can be turned on by switch as shown in left side of the below figure. Alternatively, swiping up from the bottom of the screen will open control center, and "set" ON and OFF for tapping "Bluetooth icon". Again, the Control center is shown in right side of the below figure. For more information about how to operate the iOS devices, refer to the respective user guide.



**Figure 6-3 Bluetooth ON settings screen**

## 6.2 BLE devices scan list

### 6.2.1 Start scan

When starting the GATTBrowser, the application continuously scans the BLE devices that have been advertising in surrounding area. The BLE devices found in vicinity are listed on the screen as shown in Figure 6-4. The list is growing until exhausted because of scanning continuously.

📶 icons are displayed at the right end of connectable devices. In the case of Non-Connectable devices, ❌ icon is displayed.

The BLE device once scanned continues to be displayed in the list, but for BLE devices that could not detect Advertising for 5 seconds, the antenna displayed at the right end of the BLE device name is hidden.

For details, refer to “6.2.5 BLE device information in short format”.

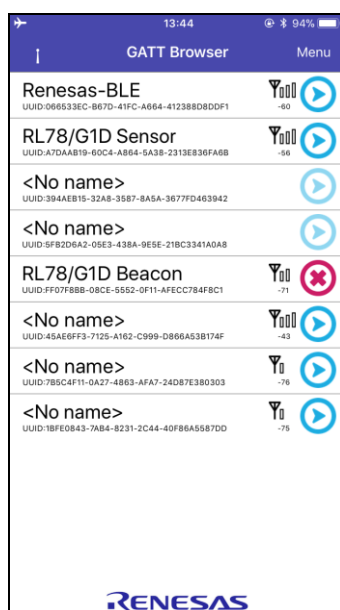


Figure 6-4 List of found BLE devices

The antenna icon at the upper left corner of the screen shown in Figure 6-4 indicates the scanning status. While scanning continuously, the animation appears from left to right endlessly illustrated in Figure 6-5. When stop scanning, show the right most icon with no animation.

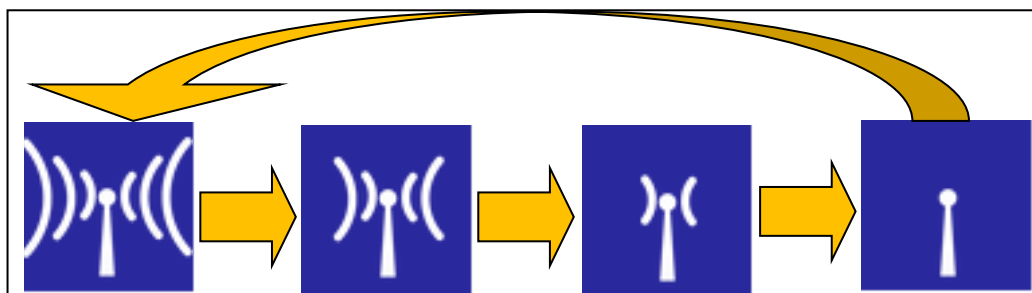


Figure 6-5 Antenna icon

### 6.2.2 Stop scan

Tapping icon will stop scanning while animating the antenna icon (scanning the advertising BLE devices).

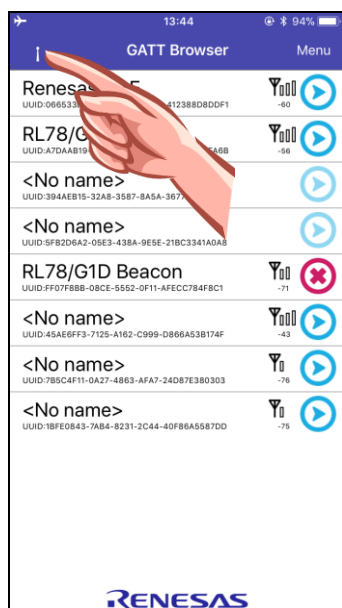


Figure 6-6 Tap on antenna icon

When stop scanning, the list of Advertising BLE device is maintained and stop adding newly discovered Advertising BLE devices in the list. It also stops updating the respective devices of RSSI. Thus, RSSI values shown on the screen are the last observed values at stop scanning state.

### 6.2.3 Rescan

There are three ways to restart the scanning by which swiping under the list that shown in Figure 6-7 or tapping antenna icon that shown in Figure 6-8 or change RSSI filter setting that shown in 6.2.4 Menu button. Both methods are clear the previously scanned list of BLE devices and rescan the Advertising BLE devices in surrounding area. While rescanning, the newly founded Advertising BLE devices will be listed on the screen again.

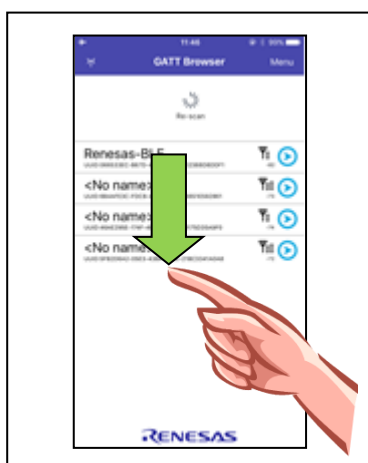



Figure 6-7 Swipe operation



Figure 6-8 Tap again on antenna icon

Note: The antenna icon in Figure 6-7 and Figure 6-8 must be like this .

### 6.2.4 Menu button

Figure 6-9 shows the Menu button that displays in the upper right corner of the screen. Holding down the Menu button will display the menu list: Filter, Sort, Bluetooth Settings, and Version Information.

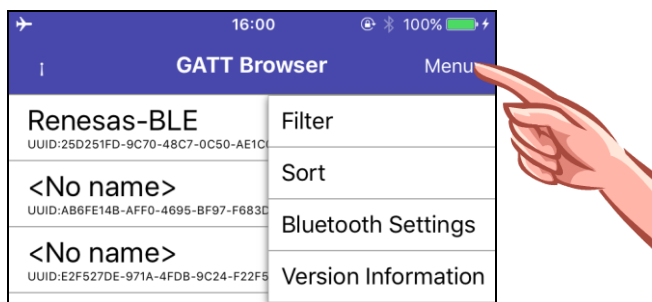


Figure 6-9 Menu button

#### ➤ Filter setting

This setting can filter BLE devices found with received RSSI strength.

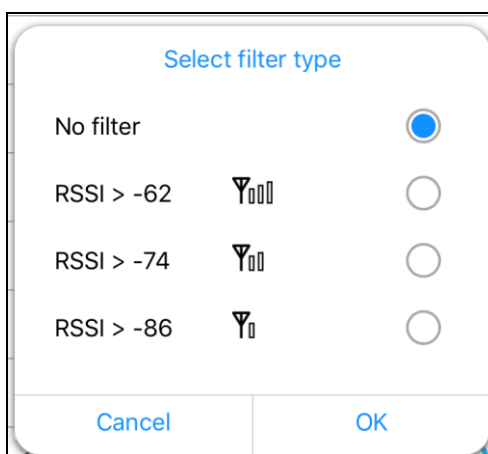


Figure 6-10 Filter setting menu

The configuration of received RSSI strength levels is listed in Table 6-1. By default, the application sets as "No filter". Tap one of the radio buttons to change received RSSI strength level. Pressing OK button changes to new setting or Cancel button does not change the previous setting. Then start scan again.

Table 6-1 RSSI filter levels setting

Setting level	Description
No filter	No setting
RSSI > -62	To receive "Excellent" signal strength
RSSI > -74	To receive "Good" signal strength
RSSI > -86	To receive "Fair" signal strength

After changing the RSSI filter level setting, discovered BLE devices are not removed from the list. Newly found BLE devices will be filtered with respect to the received RSSI strength level and only BLE devices met with the Setting level are added to the list.



➤ Sort setting

The discovered BLE devices can be sorted in the list by means of received RSSI strength level or BLE device name.

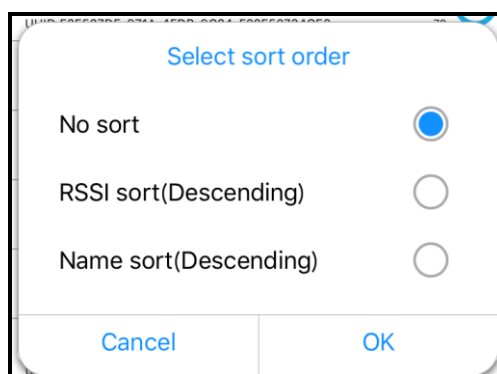


Figure 6-11 Sort setting menu

Table 6-2 shows the Sort setting. By default, there is "No sort" configuration. To sort the BLE device list, tap one of the radio buttons then press the OK button to change the setting. Pressing Cancel button will abort this setting.

Table 6-2 Sort setting

Sort order	Description
No sort	No sort
RSSI sort(Descending)	RSSI level sort (Descending)
Name sort(Descending)	Name sort (Descending)

After selecting RSSI sort, the application shows lower number of BLE devices in the list with respect to RSSI strength increasing or decreasing level. When tap the OK button with selection of RSSI sort, the list will be sorted on received strength value on each BLE devices.

After selecting Name sort, BLE device name are sorted at all times.

➤ Bluetooth Settings

This Setting allow you to call the iOS device's Bluetooth Settings directly. Using this menu selection, turn ON and OFF to the slide switch for removing the pairing information. To return back to the GATTBrowser, select the left arrow icon with GATTBrowser text " GATTBrowser " at the upper left corner of the status bar.

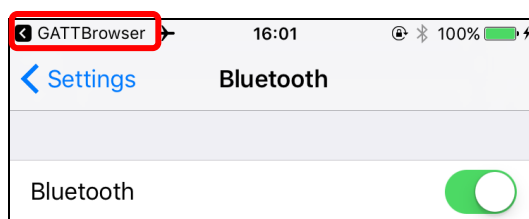
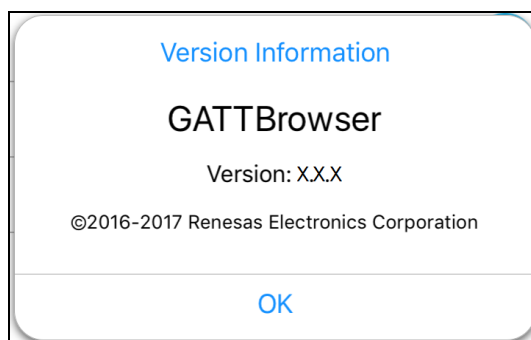


Figure 6-12 iOS device Bluetooth Settings menu

➤ Version Information

This menu uses to view the version information about the GATTBrowser. Pressing OK button will abort this menu.



**Figure 6-13 Version Information**

### 6.2.5 BLE device information in short format

Initially, the list of Advertising BLE devices found in surrounding area is shown as short format include only four parameters; (1) Device Name, (2) Device UUID, (3) RSSI and (4) connection button shown as Figure 6-14. In this format, the detail information of BLE device is listed in Table 6-3.

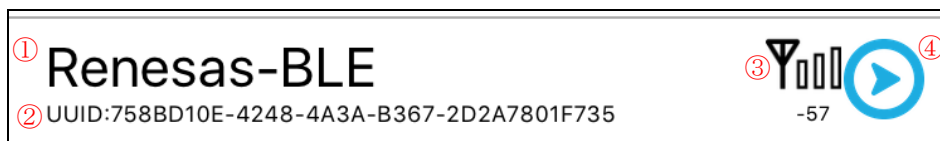



Figure 6-14 BLE device information in short format

Table 6-3 BLE device information

No.	information	description
①	Device Name	<p>Display the device name for BLE device found.</p> <ul style="list-style-type: none"> <li>➤ If the device is previously connected, it will display the value of the Characteristic GAP Device Name.</li> <li>➤ If the device is never connected, it will display the device name in the advertising data. When the advertising data does not contain the device name, the text "&lt;No name&gt;" will be displayed.</li> </ul>
②	Device UUID	<p>If peer device application does not expose BD address, allow finding BLE devices to use the unique ID of the device in iOS. To identify the Bluetooth device, use the device UUID instead of BD address.</p> <p>The iOS turns off the device's Bluetooth feature as long as the BLE device UUID that granted the same UUID.</p>
③	RSSI	<p>RSSI value can be shown in real time for BLE device. At scanning, iOS device always gets and displays the RSSI antenna strength, and it keeps updating the parameter value.</p> <p>If the BLE device's Advertising stops and 5 seconds have elapsed since the last RSSI acquisition, the antenna display and the RSSI value will be hidden. If Advertising is detected again, it will be redisplayed.</p> <p>When pause the scan operation, the last observed RSSI value will be displayed continuously.</p>
④	Connection Button	<p>This is the button to connect BLE devices in the list. Tap this button for connecting to the one of BLE devices.</p> <p>If "Is connectable" included in the advertisement information is No,  icon is displayed, and even if you tap it you cannot connect.</p>

### 6.2.6 BLE device information with Advertising data information

When tapping one of the cell to the Advertising BLE devices, expand that cell and display the Advertising data at the bottom of the BLE device as shown in Figure 6-15. For detail information about displayed parameters, refer to the online documentation for the Apple Developer Documentation of the Core Bluetooth Framework "[Advertisement Data Retrieval Keys](#)".

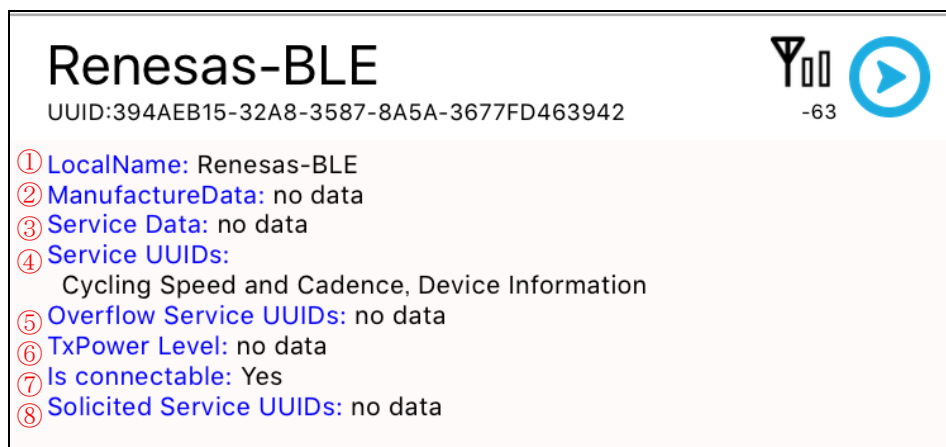



Figure 6-15 Advertising data information

Table 6-4 shows the list of Advertising data information and explain in the description column.

Table 6-4 Advertising data

No.	Information	Description
①	LocalName	The local name for BLE device
②	ManufactureData	BLE device-specific data
③	Service Data	Services data for BLE device
④	Service UUID	Services UUID of BLE device
⑤	Overflow Service UUID	If stored as the long in BLE device, here shows Service UUID.
⑥	TxPower Level	BLE device transmit power
⑦	Is connectable	The Flag indicates whether BLE device is connectable or not. When this flag is No, the "④ Connection button" in "Table 6-3 BLE device information" becomes  icon.
⑧	Solicited Service UUIDs	Invitation of whether BLE device can operate as a UUID of GATT Client Service to the Server or not.

To display in short format again, tapping to the BLE device cell will restore the Advertising information cell then display back to short format. To close all cells that displaying Advertising information, pinch in the opened Advertising information cells as shown in Figure 6-16.



Figure 6-16 Advertising information cell continuous close

## 6.2.7 BLE device connection

When tap the arrow inside circle mark at the right side of the BLE device information display, which shown in

Figure 6-17, the iOS device will connect to that selected peripheral device. After the connection, transit to next screen that will be explained in section "6.3 Service and Characteristic list".

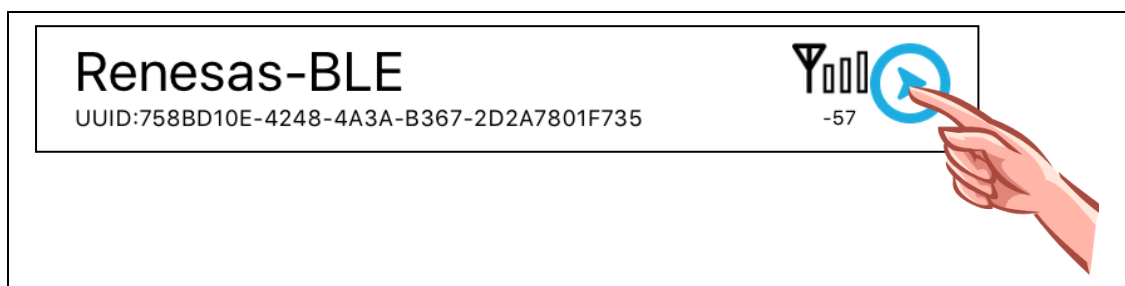




Figure 6-17 BLE device connection

By checking the number ⑦ from "Table 6-4 Advertising data", the device can be identified whether it is connectable or not. If the device is connectable, the flag displays "Yes" in Connection Status and connection button is  icon. If the device is not connectable, the flag displays "No" in Connection Status and connection button is  icon. Tap does not perform connection processing.

### 6.3 Service and Characteristic list

After connecting to the BLE device, show the list of Service and Characteristic on screen.

The numbered items shown in Figure 6-18 are information and user interaction to connected device. The detail are explained in Table 6-5.

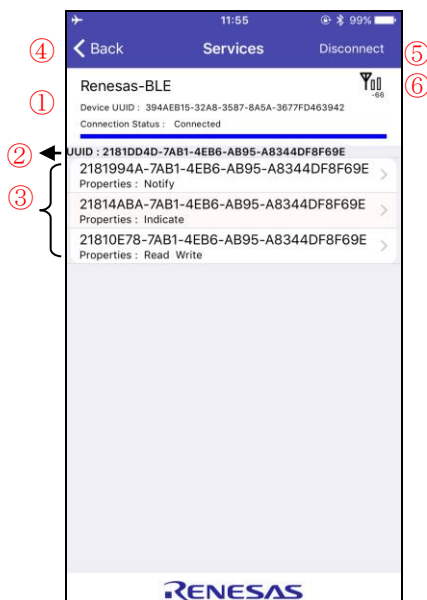


Figure 6-18 Service and Characteristic list

Table 6-5 Service and Characteristic information

No.	Information	Description
①	Device connection information	Display the information of connected BLE device. Display the device name and device UUID as well as indication of connection status.
②	Service name	Display the Service name in the Service Discovery and all included Characteristics.
③	Characteristic name	Display the Characteristic name in the Characteristic Discovery. Display each Characteristic found separately for every Service. Display all properties and characteristics, along with Characteristic.
④	Back	Return button to disconnect and back to "BLE device scan list".
⑤	Disconnect / Connect Button	Disconnect the BLE device. When disconnected, "Connect" is switched, and when you tap it you can reconnect to the same BLE device.
⑥	RSSI	Display the RSSI received strength and BLE devices.

### 6.3.1 Connection Status

While maintaining the connection with the BLE device, display as "Connected" in the connection status, which indicates the "Connection Status". When lost communicating with the BLE device, the "Connection Status" displays in red text as "Disconnected". Figure 6-19 and Figure 6-20 are shown in connection and disconnection state respectively.

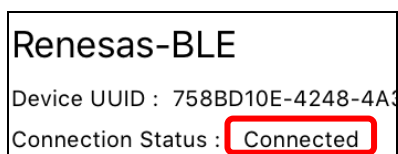


Figure 6-19 Connected

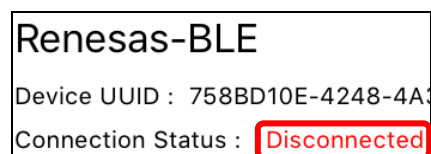


Figure 6-20 Disconnected

### 6.3.2 Display Service name & Characteristic name

When detect the UUID of Bluetooth SIG, display the Service name (such as Link Loss, Tx Power and Immediate Alert, and etc.) that corresponds to the Service Discovery. As an example, Figure 6-21 shows Service names with respect to Service Discovery. If there are custom UUIDs, the complete UUIDs are also displayed as shown in Figure 6-22.

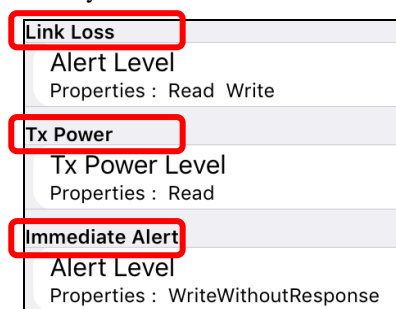


Figure 6-21 Display Service name determined by the Bluetooth SIG, Inc.

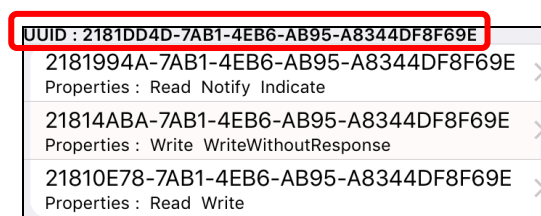


Figure 6-22 Service names of custom UUID is detected

To display the Characteristic (such as Alert Level, Tx Power Level, and etc.), it is determined by the Bluetooth SIG or custom UUID as well as the service name, based on the UUID finding in Characteristic Discovery.

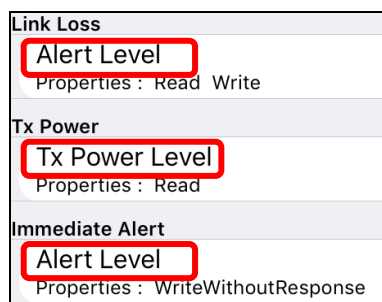


Figure 6-23 Display Characteristic name determined by the Bluetooth SIG, Inc.

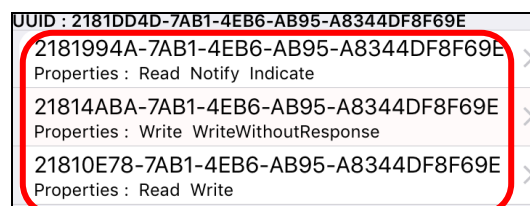


Figure 6-24 Characteristic names of custom UUID is detected

Figure 6-23 and Figure 6-24 show Characteristic names and custom Service respectively. If the detected custom UUID is used in the Renesas sample application of RL78/G1D device, display the received custom service as its feature name rather than the UUID. For more information, refer to the section "6.5 Display Renesas custom data" later in this document.

### 6.3.3 Characteristic selection

To open the Characteristic operation screen, tap the Characteristic that you want to perform its operation then can operate one Characteristic at a time for each selection. As an Example, Figure 6-25 shows the selecting of the Characteristic.

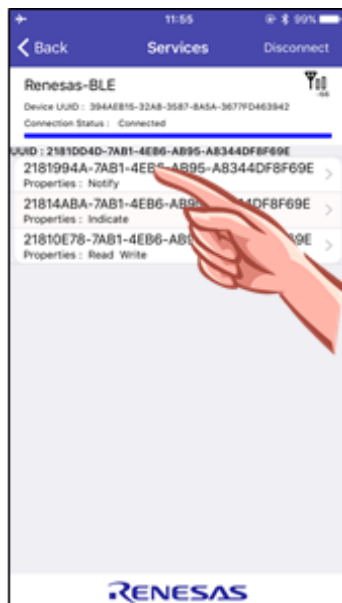


Figure 6-25 Characteristic selection



## 6.4 Characteristic operation

### 6.4.1 Characteristic operation screen

After selecting a particular characteristic, Figure 6-26 shows the Characteristics screen with respect to its attributes like read, write, indication and notification. Detail are explained in Table 6-6.

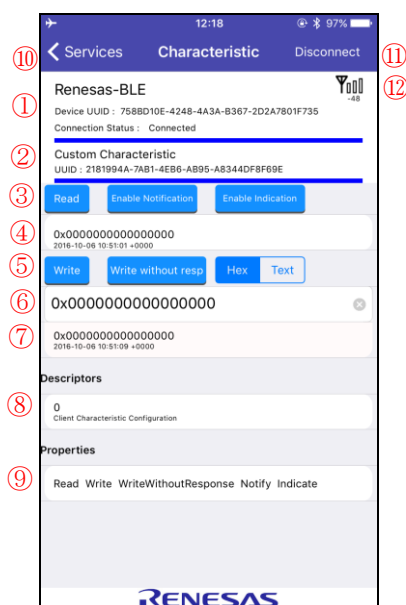


Figure 6-26 Characteristic operation screen

Table 6-6 Characteristic operation information

No.	Information	Description
①	Device connection information	Display the information of connected BLE device. Display the device name and device UUID, and connection status indication. This information is the same as "Service and Characteristic list".
②	Characteristic name	Display information about the Characteristic of operation. Display the Characteristic name and UUID.
③	Read/Notification/Indication button	Button to receive the characteristic value. Each button is displayed based on the setting of the Characteristic Properties. The Properties settings will not be hid.
④	History of receive data	Display the received value of the Characteristic Read/Notification/Indication by pressing the buttons. If appear five values in the cell, the displayed top value is the latest data. In one cell, there are three lines: top line: ASCII, middle line: base-16 number display, and bottom line: received time stamp information.
⑤	Write/WriteWithoutResponse button and select button of write data format.	Writing a value to the characteristic button. Each button is displayed based on the setting of the Characteristic Properties. The Properties settings will not be hid. If selecting the write mode selection buttons, treat data as either Hex/Text or other.
⑥	Text field of write data	A text field to enter the value, which to be written to the characteristic. After writing data to Write or WriteWithoutResponse in text field, press

		button to write the entered data to the target Characteristic.
⑦	History of send data	If operation of Write/WriteWithoutResponse button successfully send, the values will be shown in this cell. If five values appear in one cell, display the top value as the latest data. Fail to send the data also added to the history.  Display two lines in single cell: send data at the top line and timestamp information at the bottom line after sending.
⑧	Descriptor information	Display the characteristic Descriptor information.
⑨	Properties information	Displays the Properties for the characteristic.
⑩	Back	Return button to Service and Characteristic list
⑪	Disconnect / Connect Button	Disconnect the BLE device.  When disconnected, "Connect" is switched, and when you tap it you can reconnect to the same BLE device.
⑫	RSSI	Display the received RSSI strength and BLE device.

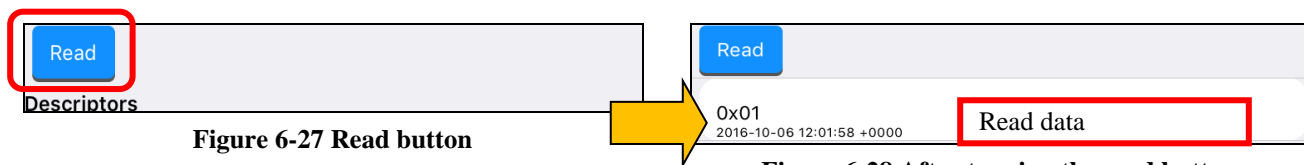
#### 6.4.2 Connection status

Connection Status: the connection status is similar to section "6.3.1 Connection Status".

#### 6.4.3 Read operation

When Characteristic Properties have Read attributes, Read button is displayed as shown in Figure 6-27. By pressing this Read button, you can read relevant Characteristic value from peer device.

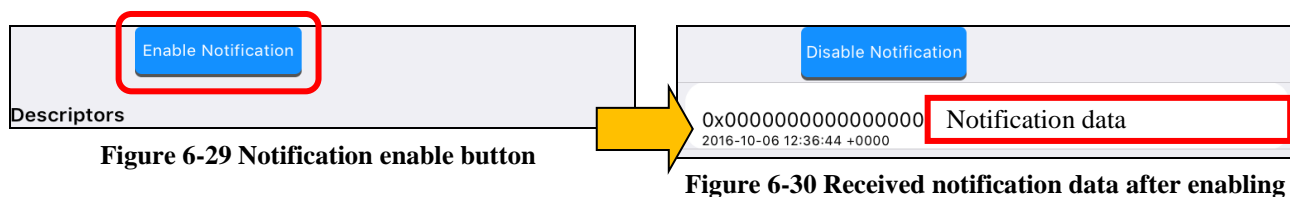
Read data is displayed in received data history as shown in Figure 6-28.



#### 6.4.4 Notification operation

In the characteristic Properties, Notification attributes are valid when the "Enable Notification" button is displayed in as Figure 6-29 for Client Characteristic Configuration Descriptor (CCCD). You can toggle between "Disable Notification" and "Enable Notification" by pressing this button. To receive a Notification of the relevant Characteristic, pressing the button showing with "Enable Notification" will change to "Disable Notification". After showing with "Disable Notification", it will start receiving notification data. If not switch to this button showing with "Enable Notification", it is disable to notification permission and stop receiving Notification data.

Received Notification data is displayed in the Figure 6-30 as incoming data history after enabling the notification permission.



When Notification data is received on other than the Characteristic operation screen, the Characteristic UUID of the received data and the received Notification data are displayed at the bottom of the screen.

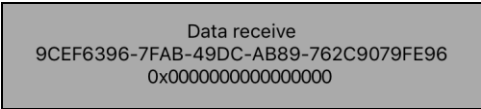


Figure 6-31 Notification data received indication other than Characteristic operation display

6.4.5 Indication operation

Similarly, Indication attributes are valid in the Properties of the characteristic when the "Enable Indication" button is displayed as in Figure 6-32 for Client Characteristic Configuration Descriptor (CCCD). Toggling this button will change between "" and "Enable Indication". To receive an Indication of the Characteristic, press this button while showing with "Enable Indication ". Then, it changes to "Disable Indication" and receives indication data. Not switching to this button showing with "Enable Indication" will disable to indication permission.

Received Indication data is displayed in Figure 6-33 as received data history after enabling the indication permission.

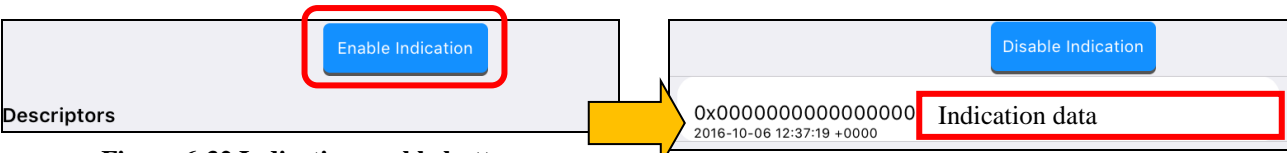


Figure 6-32 Indication enable button

Figure 6-33 Received indication data after enabling

When the Indication data is received on other than Characteristic operation screen, it will be displayed at the bottom of the screen, as shown in "Figure 6-31 Notification data received indication other than Characteristic operation display".

6.4.6 History of received data

Data, which received by the Read/Notification/Indication and time stamp, is displayed in the incoming data history. This history shows maximum five data values and lists the most recent data at the top position and discard the oldest history from the bottom when exceed the maximum limit shown in Figure 6-34. As first in first out action, the history has maintained maximum five Characteristic data for the most recent received data as shown in Figure 6-35.



Figure 6-34 Maximum of history data

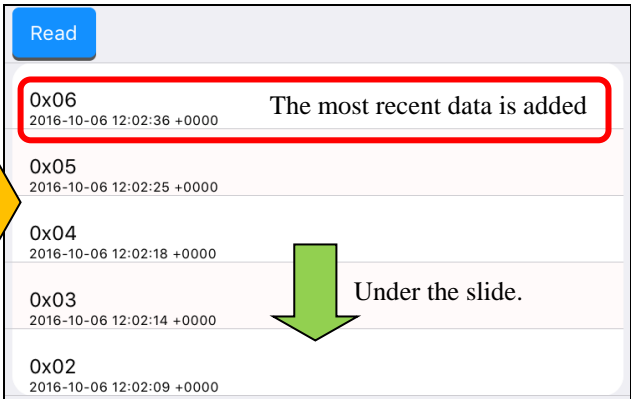


Figure 6-35 Overflow the history data

### 6.4.7 Write operation

Write attributes are valid to set with Write button when Write data in the characteristic Properties, and the text field is displayed. Set the data in the text field and then press the Write button. After pressing the Write button, it is able to write the Characteristic value. In addition to display a button to transmit data, there is write mode switch at the right side of the Write button. Refer to the section "6.4.9 Select write mode operation" for detail.

Succeeded for writing data is displayed in the send data history as shown in Figure 6-37.

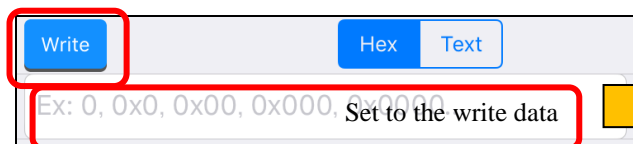


Figure 6-36 Write button, text field, and select button

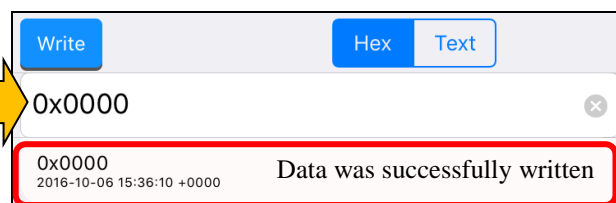


Figure 6-37 Write the Characteristic

### 6.4.8 Write without response operation

If the text field is displayed, write data "write without response" attributes are valid in the characteristic Properties to set with "Write without resp" button. Writing the data in a text field and pressing the "Write without resp" button will send to "write without response" of the Characteristic. Similarly display a button to transmit data write mode at the right side of "Write without resp" button. Refer to section "6.4.9 Select write mode operation" for detail.

Regardless of the success or failure of the writing, writing data with write without response will be displayed as sending data in history field as shown in Figure 6-39.



Figure 6-38 "Write without resp" button and select button

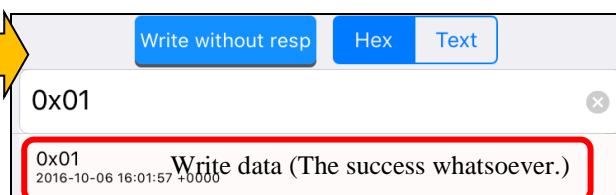


Figure 6-39 Write without response the Characteristic

### 6.4.9 Select write mode operation

For either "Write" or "Write without resp" button, write mode switching button is displayed. Switching to this button, set data text field as either hexadecimal data or text data. During communication with the Peer Device, switch buttons and connect Characteristic screen hold each switch setting.

For Write data or Write without response in hexadecimal mode, write data is treated as base-16 number. In the following example, handling as hexadecimal data "1" will write to the Characteristic data value "0x1" as shown in Figure 6-40.

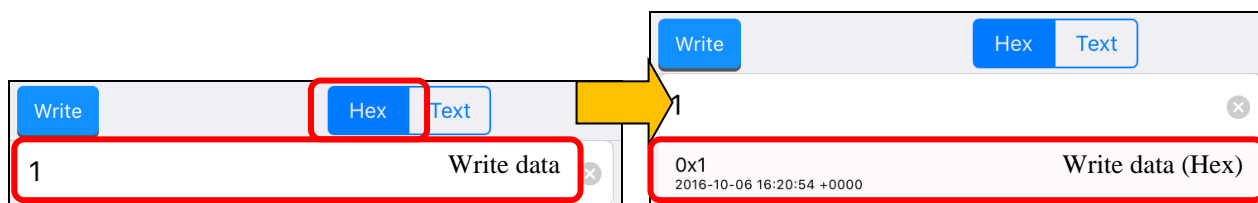


Figure 6-40 Write of Hex format

For Write data or Write without response in text mode, write data is replaced by UTF-8 character code and will be treated as text data. In the following example, handling data "1" will write hexadecimal value "0x31" data to a Characteristic.

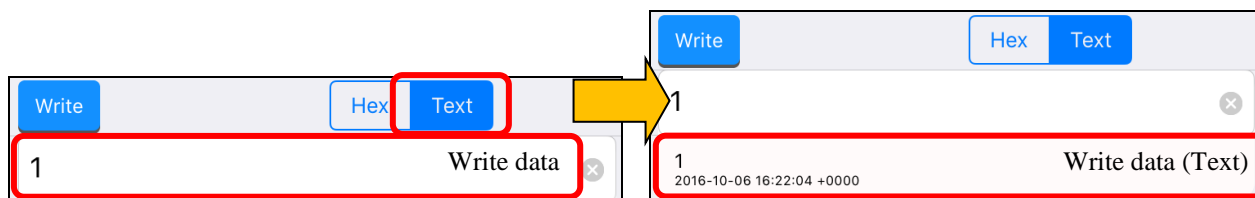


Figure 6-41 Write of Text format

6.4.10 History of sending data

Not only filled with Write/Write without response of incoming data but also the time stamp of the historical data will be displayed in the history of the transmitted data. In this historical list, show maximum five data with the most recent data at the top of the list. When adding the most recent Characteristic data, the oldest data of the list will be discarded from the bottom to maintain five historical data for the most recently submitted data as shown in Figure 6-43.



Figure 6-42 Full historical data



Figure 6-43 History data update

In order to send the hexadecimal data, set the text field to write data as "1". This means that "0x" is prefixed automatically and stored in the history as shown in Figure 6-44. On the other hand, writing text data will be preserved in the history as is. Figure 6-45 shows the writing text data.

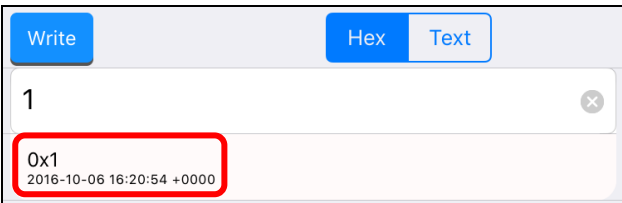


Figure 6-44 Display of historical data (Hex)

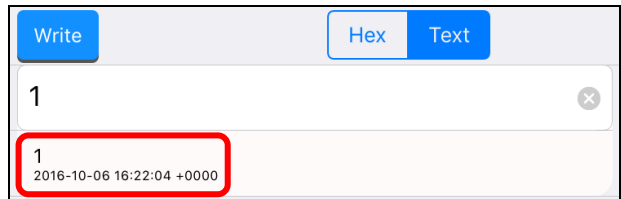


Figure 6-45 Display of historical data (Text)

#### 6.4.11 Copying historical data into the text field.

If the text field of the write data is displayed, tap onto the written historical data or received data history listed in history data field. After tapping, that data has been copied into the text field for sending.

Below Figure 6-46 shows as an example of copying the historical data when tap to the cell of receiving data in historical section.

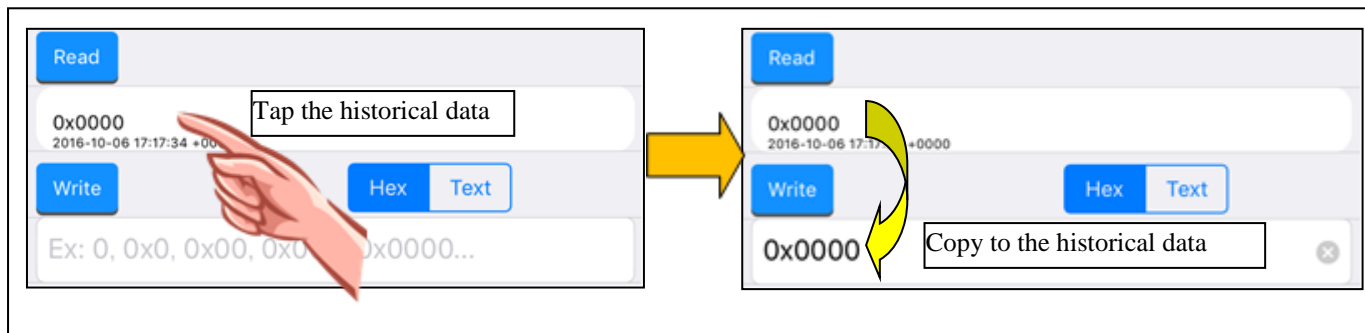


Figure 6-46 Copy historical data into the text field

#### 6.4.12 Update of descriptors

By tapping the permission of Notification or Indication cell in display information, it is possible to re-read the relevant Characteristic Descriptor information intentionally. That descriptor information is updated automatically as shown in Figure 6-47.



Figure 6-47 Update of descriptors

## 6.5 Display Renesas custom data

If RL78/G1D custom UUID that has been detected is used in the sample application, you will see the name of the custom services and characteristics instead of the UUID. In addition, a dialog will be displayed for information analysis, but it is a specific characteristic.

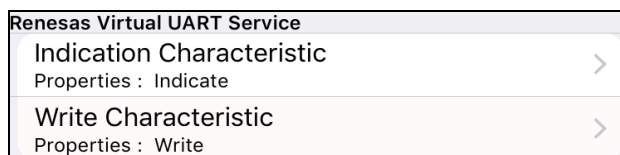
### 6.5.1 Renesas custom Service and Characteristic names display

The Service name used in the below RL78/G1D sample applications are detected and displayed the following Service/Characteristic UUID and Characteristic names.

- BLE Virtual UART application (Document No. R01AN3130E)

**Table 6-7 UUID of BLE Virtual UART application**

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

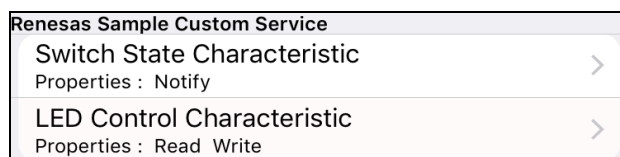


**Figure 6-48 Display of BLE Virtual UART application**

- Embedded Configuration Sample application (Document No. R01AN3319E)

**Table 6-8 UUID of Embedded Configuration Sample application**

UUID	Renesas custom Service and Characteristic
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



**Figure 6-49 Display of Embedded Configuration Sample application**



- RL78/G1D Beacon Stack Connecting and Updating Beacon Data Sample Program (Document No. R01AN3313E)

**Table 6-9 UUID of RL78/G1D Beacon Stack Connecting and  
Updating Beacon Data Sample Program**

UUID	Renesas custom Service and Characteristic
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

Renesas Beacon Updater Service	
Advertising Information	>
Properties : Read Write	
Advertising Data	>
Properties : Read Write	
Scan Response Data	>
Properties : Read Write	
Code Flash Memory Updated Count	>
Properties : Read	
Data Flash Memory Updated Count	>
Properties : Read	

**Figure 6-50 Display of RL78/G1D Beacon Stack Connecting and  
Updating Beacon Data Sample Program**

### 6.5.2 Beacon data analysis dialog

The RL78/G1D beacon stack, which can connect for beacon data update, can establish a connection. Then read Characteristic data of Advertising Information and Advertising Data / Scan Response Data included in the sample program. Tapping the historical read data will appear in Analysis dialog. When tapping the historical write data, dedicated Analysis dialog will appear as well.

➤ Advertising information

To Read or Write data on the advertising Information, tap the Read history data to appear Advertising Information Analysis dialog as shown in Figure 6-51.

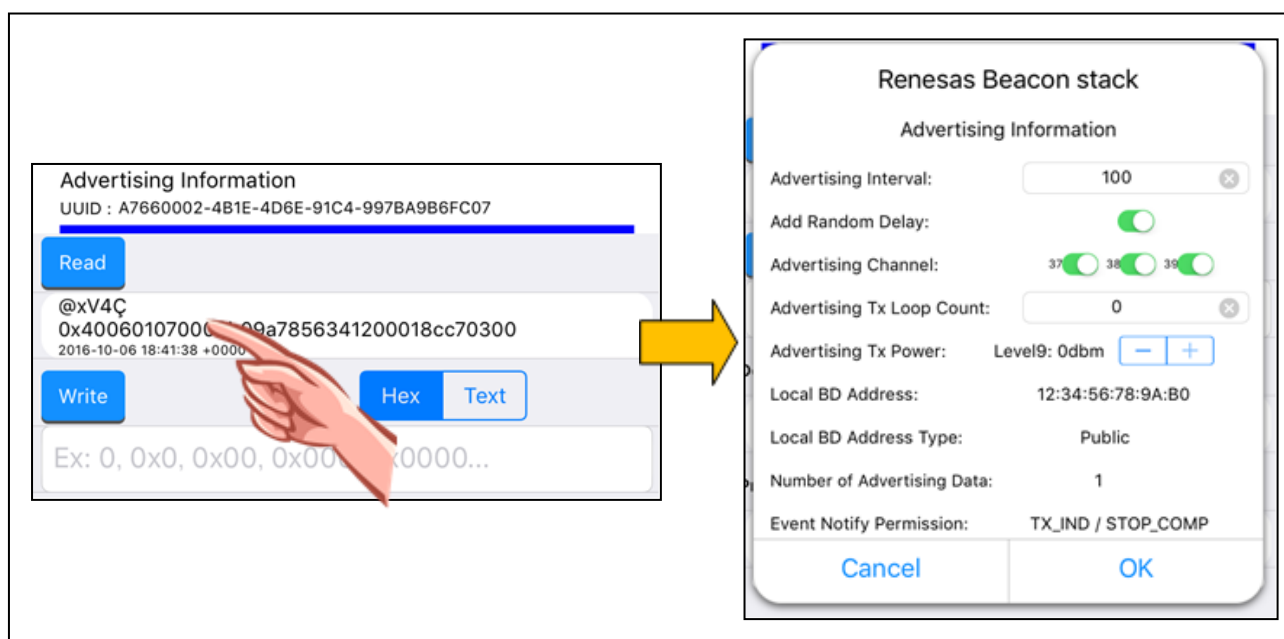


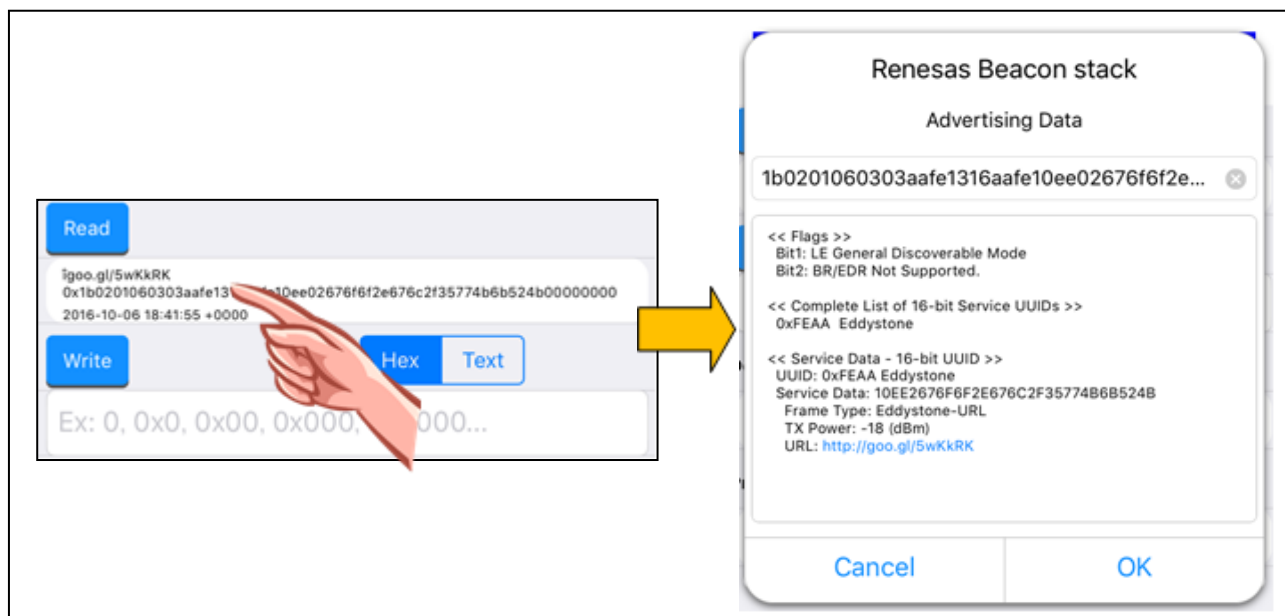
Figure 6-51 Advertising Information Data analysis dialog

In this dialog box, "Advertising Interval" and "Advertising Tx Power" parameter are allowed for editing. Set the Write data in the text field, and then pressing the OK button in the dialog will change the parameter setting. Press the Write button to write the hexadecimal data in Characteristic data writing mode. Whenever pressing the Cancel button on the Analysis dialog will abort the changes from the text field of the Write data.

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

➤ Advertising Data / Scan Response Data

When tapping the historical data to either Read or Write on the Advertising Data / Scan Response Data, the "Advertising Data" will appear the Advertising Data Analysis dialog as shown in Figure 6-52.



**Figure 6-52 Advertising Data analysis dialog**

Tapping the text field at the top of the dialog will copy the historical data into the text field, and the analysis data is displayed in the lower text area. Editing the top text field affects the analytical results, which is the bottom text area of analysis data. Then Analysis result will generate a hyperlink with blue letter in Eddystone-URL. Tapping that link on iOS device will open browser (standard Safari Browser) running the Webpage with the URL.

Then set the Write data in the text field, and then press OK button on the dialog to change parameter setting. After that press the Write button at Hex to write Characteristic data write mode. Whenever pressing the Cancel button on the Analysis dialog will abort the changes from the text field of the Write data.

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

## 7. Appendix

GATTBrowser uses the Bluetooth capabilities of the iOS device. This feature cannot work when Bluetooth is OFF. It shows up the GATTBrowser setting. Do not expect working if you turned OFF the Bluetooth function during the operation.

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## Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Oct 25, 2016	-	First edition issued
1.10	Mar 16, 2017	-	Rev.1.10 issued
			"Table 6-1 RSSI filter levels setting" after screen replacement
		P.8	Add "6.2.4 Menu button"
		P.12	"Figure 6-15 Advertising data information" screen replacement (Advertising data show format update)
		P.14	Add description of "⑤ Disconnect" & "⑥ RSSI" to "Figure 6-18 Service and Characteristic list" and "Table 6-5 Service and Characteristic information".
		P.17	Add description of "⑪ Disconnect" & "⑫ RSSI" to "Figure 6-26 Characteristic operation screen" and "Table 6-6 Characteristic operation information".
		P.20	"6.4.9 Select write mode operation"
			Add to that the settings will be saved.
1.11	Jul 07, 2017	-	Rev.1.11 issued.
		P.3	"2.Applicability" Update applicability version.
		P.10	"Figure 6-13 Version Information" screen replacement. (Replace version display with "X" from number.)
		P.25	"Table 6-9 UUID of RL78/G1D Beacon Stack Connecting and Updating Beacon Data Sample Program"
			Add description of "Scan Response Data".
			"Figure 6-50 Display of RL78/G1D Beacon Stack Connecting and Updating Beacon Data Sample Program" screen replacement.
			(Add information of "Scan Response Data".)
		P.27	"6.5.2 Beacon data analysis dialog"
			Add description of "Scan Response Data".
1.12	Jan 09, 2018	-	Rev.1.12 issued.
		P.3	"2. Applicability" Update applicability version.
		P.6	"Figure 6-4 List of found BLE devices" screen replacement.
		P.7	"Figure 6-6 Tap on antenna icon" screen replacement.
		P.11	Added explanation of "③ RSSI" and "④ Connection Button" in "Table 6-3 BLE device information".
		P.12	Added explanation of "⑦ Is connectable" in "Table 6-4 Advertising data".
		P.13	Changed description of device capable of connection described in "6.2.7 BLE device connection" below Figure 6-17.
		P.14	Change ⑤ in "Table 6-5 Service and Characteristic information" to "Disconnect / Connect Button".
		P.18	Change ⑪ in "Table 6-6 Characteristic operation information" to "Disconnect / Connect Button".
		P.19	"6.4.4 Notification operation" added "Figure 6-31 Notification data received indication other than Characteristic operation display".
			In the same way as in Figure. 6-31 in "6.4.5 Indication operation", a description is added when data is received on other than Characteristic operation screen.

## 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.

- ¾ 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.

- ¾ 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.  
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### 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.

- ¾ 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.

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