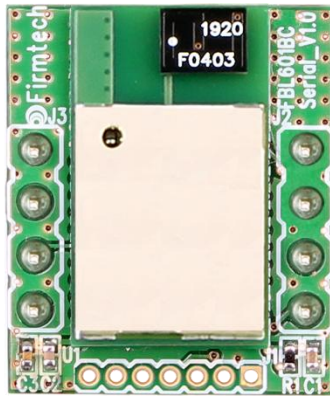


# Bluetooth Low Energy Embedded Module

## FBL601BC\_serial User Guide



Version 1.0



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## Revision History

<b>Revision</b>	<b>Date</b>	<b>Change Descriptions</b>
Ver 1.0	2022-09-15	- Write a draft

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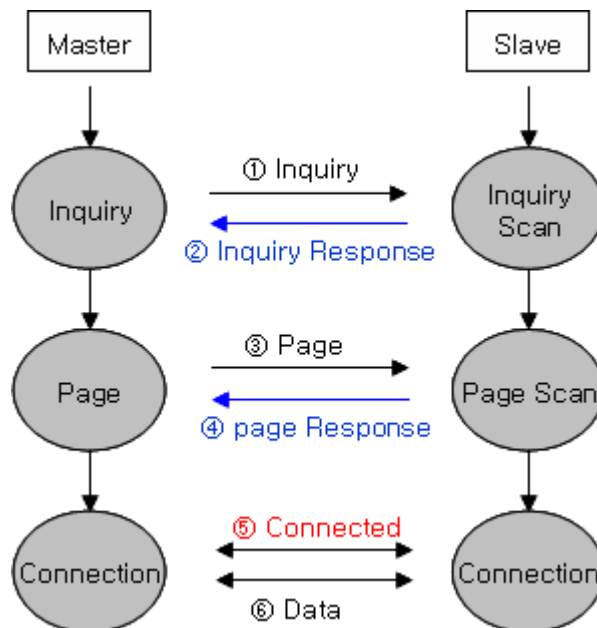
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# 1 What is Bluetooth?

## 1.1 Features of Bluetooth

- Objectives of Bluetooth : To Realize Wireless Communication for Short Distance with Low Power Consumption, High Reliability, and Low Cost.
- Frequency in Use: To Use ISM(Industrial, Scientific, Medical) Band which does not require any permission to use.
  - 2.400 - 2.4835 GHz, 79 channels
  - 2.465 - 2.4835 GHz, 23 channels (in France)
- Transmission Rate : 1Mbps ~ 3Mbps
- Transmission Output : 1mW (10m, Class2), 100mW (100m Class1)
- Network Configuration : Configured with Master and Slave relation. A Bluetooth unit shall allow simultaneous connections up to 7 devices (in case of ACL).
- Reliability : To Guarantee stable wireless communication even under severe noisy environment through adopting the technique of FHSS (Frequency Hopping Spread Spectrum).

## 1.2 Operation of Bluetooth



<Feature 1-1 Bluetooth Operation>

- Bluetooth operates based on the connection between “Master” and “Slave”.
- Masters are simply supposed to do “Inquiry” and “Page”. Slaves are supposed to do “Inquiry Scan” and “Page Scan”.
- If a Master finds a Slave and so “inquiry” is successful, a Slave responds to the Master with its information.

Interconnection between the Master and the Slave is achieved only if the information from the Slave is corresponded with the Master, and the Slave sends data to the Master.

## 2 Product Overview


Major Features of FBL601BC\_serial

1. Bluetooth Specification 5.2 Low Energy Support
2. Easily Applicable to the Product with 8 Pins Header Type
3. Support AT Command, and capable to control FBL601BC\_serial by using AT Command
4. UART can be used as an interface

※ We request the new users of FBL601BC\_serial to read the information on this description carefully before they start to use the products.


## 3 Product Components

### 3.1 FBL601BC\_serial

MODEL	PICTURE	Q'TY (EA)
FBL601BC_serial (On-board Chip Antenna)		1

<Table 3-1 Basic Components of FBL601BC\_serial >

### 3.2 Interface Board (Option)

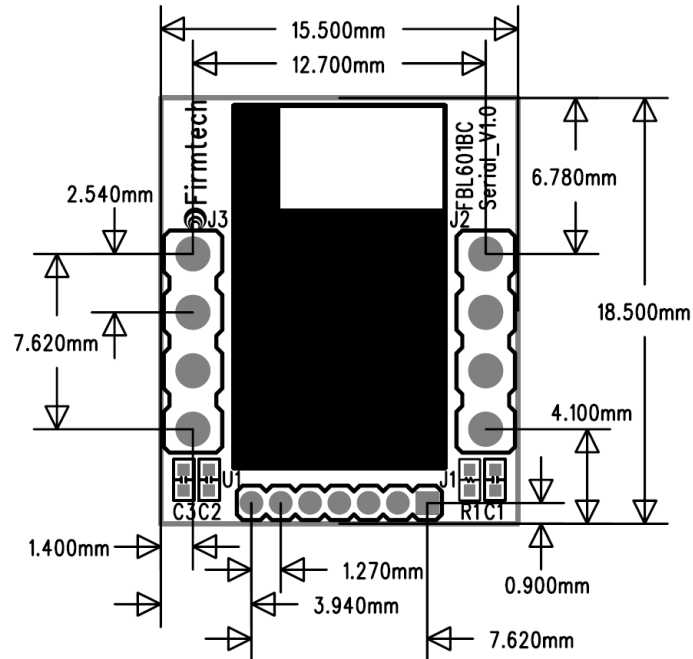
MODEL	PICTURE	Q'TY (EA)
Interface Board		1

<Table 3-2 Components of Interface Board >

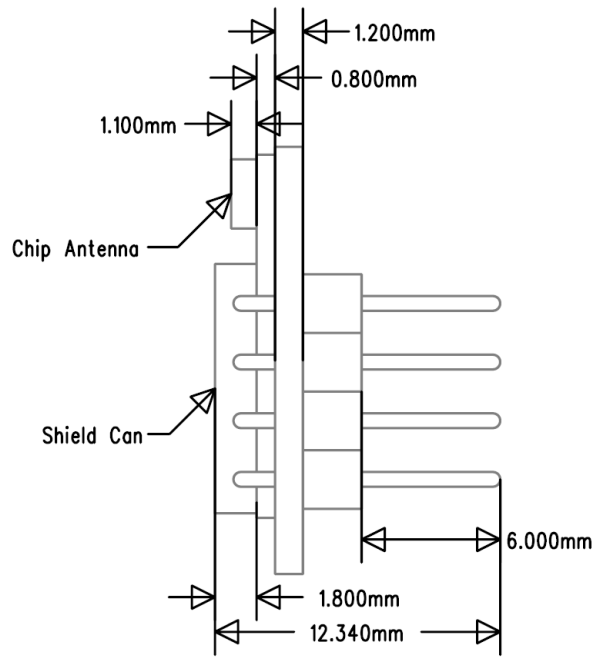
※ If you find any of above components is defective, or not included in the package, please contact the seller you purchased.

## 4 FBL601BC\_serial Appearance

### 4.1 FBL601BC\_serial Dimension



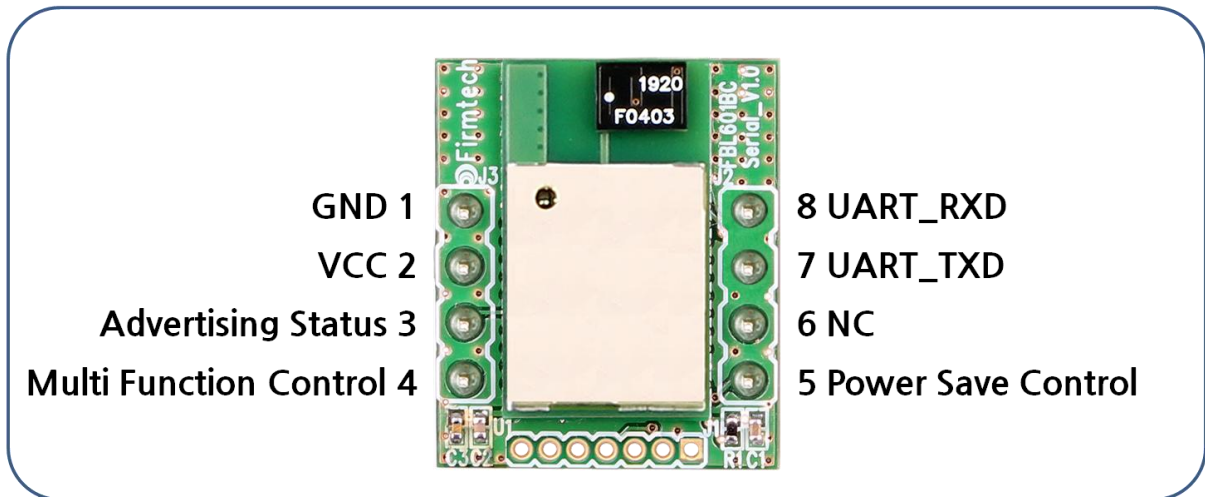
[Top View]



[Side View]

<Figure 4-1 FBL601BC\_serial Dimension>

### 4.2 FBL601BC\_serial PIN Assign



<Figure 4-2 FBL601BC\_serial PIN Assign>

NO	Name of Signal	Features	I / O	Level
1	GND	Ground		
2	VCC	DC 3.3V		
3	STATUS	Operation Status	Output	TTL
4	FA_SET CONFIG_SELECT	Factory Reset Configuration Select	Input	TTL
5	Power Save Control	Power Save On/Off Control	Input	TTL
6	NC	No Connect	-	-
7	TXD	Transfer Data (Data out)	Output	TTL
8	RXD	Received Data (Data in)	Input	TTL

<Table 4-1 Pin Description>

- STATUS port

To be used to monitor the status of FBL601BC\_serial

It keeps LOW (0V) when the Bluetooth wireless section is connected smoothly and both devices can communicate

In standby mode for connection with Bluetooth, or connection trial, or searching for around Bluetooth device will repeat LOW and HIGH.



**-FA\_SET / CONFIG\_SELECT**

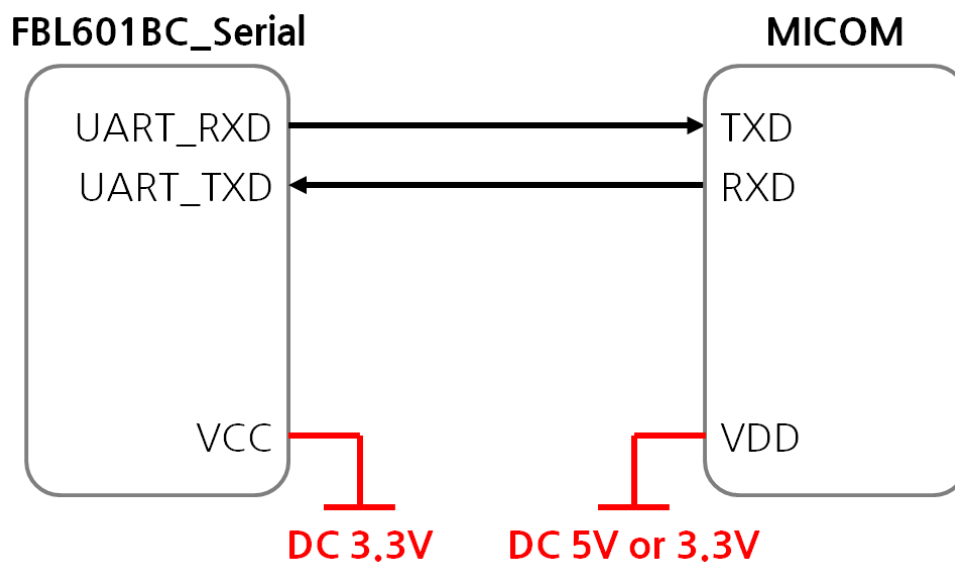
If you want to enter the configuration mode, turn on the power to the module while inputting LOW Signal (0V) to Configuration Select (No. 4 pin).

If you want to change to the factory default value, enter the LOW Signal (0V) for more than 5 seconds into the Factory Reset (Pin No. 4) after entering the configuration mode and all setting values will be changed to the original purchase status.

**- Power Save Control Port**

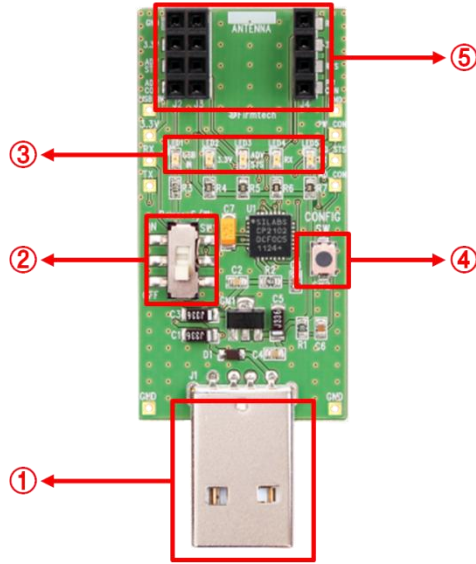
Select FBL601BC\_serial's Power Save ON/OFF Control When high is applied it operates as Power Save On When low is applied, it operates as power save off.

## 5 Interface (Pin Connection)



<Figure 5-1 Pin Connection Control>

## 6 Interface Board (Jig Board)



<Figure 6-1 Interface Board>

No.	Title	Description
1	UART communication & power port	UART communication interface terminal for PC connection 5V power input terminal
2	Power ON/OFF Switch	Interface Board Power On/Off Switch
3	STATUS LED	<b>USB LED:</b> USB port status LED <b>POWER LED:</b> 3.3V power supply LED <b>STATUS LED:</b> Status confirmation LED <b>RX LED:</b> UART input confirmation LED <b>TX LED:</b> UART Output confirmation LED
4	Configuration Select Switch	Switch for enter the configuration mode <b>The configuration entry mode method is as follows.</b> ①Hold CONFIG switch and power on.. ②Enter the configuration mode completed
	Factory Reset Switch	Factory initialization switch <b>The Factory initialization is as follows.</b> ①Enter the configuration mode ②After entering configuration mode, press the FASET switch Hold for 5 seconds. ③Factory initialization completed
5	Connection connector	FBL601BC_serial Connection connector

<Table 6-1 PC Interface Board>

## 7 Specification of FBL601BC\_serial

No.	Part		Specification
1	Bluetooth Spec.		Bluetooth Specification 5.2 Low Energy Support
2	Communication distance		10 M
3	Frequency Range		2402 ~ 2480 MHz ISM Band
4	Sensitivity		-79dBm (Typical)
5	Transmit Power		0dBm(Typical)
6	Size		15.50mm x 18.50 mm x 12.34mm
7	Support Bluetooth Profile		GATT Service
8	Input Power		3.3V
9	Current Consumption	Peripheral	2.1mA(Max : Power Save Off)
		Central	4.5mA(Max : Scanning)
10	Temperature	Operating	-10℃ ~ 50℃
		Limit Operating	-40℃ ~ 85℃
11	Communication Speed		9,600bps - 115,200bps
12	Antenna		Chip Antenna
13	Interface		UART (TTL Level)

<Table 7-1 FBL601BC\_serial Specification>

## 8 Current Consumption

Status	Current Consumption (mA)		
	MIN	MAX	AVG
Ready	1.79	1.79	1.79
Advertising	1.86	1.97	1.90
Connection	1.92	1.94	1.93

< Table 8-1 Peripheral Current Consumption of FBL601BC\_serial >

Status	Current Consumption (mA)		
	MIN	MAX	AVG
Ready	1.87	1.87	1.87
Scanning	4.25	4.48	4.32
Connection	1.95	1.97	1.96

< Table 8-2 Central Current Consumption of FBL601BC\_serial >

### TEST CONDITIONS

Baud Rate : 9600 bps, Input Voltage : DC 3.3V

The power consumption will change depending on transmission speed and volume of data.

## 9 Preliminary Product Components

The preliminary value of product is set as on the <Table 9-1>.

Please be sure of basic set value and so on before using the product.

Type	Set Value
Device Name	FBL601(XXXXXX)
Uart (baud rate-data bit-parity bit-stop bit)	9600-8-N-1
ROLE	Peripheral
Advertising Interval	100ms
Connection Interval	12ms

<Table 9-1 Preliminary Configuration Setting Value for FBL601BC\_serial >

※ FBL601BC\_serial can change the setting value by using AT command of Bluetooth setting.

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## **FCC MODULAR APPROVAL INFORMATION EXAMPLES for Manual**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

**CAUTION:** Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### **FCC Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

### **OEM INTEGRATION INSTRUCTIONS:**

This device is intended only for OEM integrators under the following conditions:

The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal on-board antenna that has been originally tested and certified with this module. External antennas are not supported. As long as these 3 conditions above are met, further transmitter test will not be required.

However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change or new Certification. Please involve a FCC certification specialist in order to determine what will be exactly applicable for the end-product.

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### Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. In such cases, please involve a FCC certification specialist in order to determine if a Permissive Class II Change or new Certification is required.

### Upgrade Firmware:

The software provided for firmware upgrade will not be capable to affect any RF parameters as certified for the FCC for this module, in order to prevent compliance issues.

### Information that must be placed in the end user manual:

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as show in this manual.

### End product labeling:

