

# Bluetooth Embedded Module

## FBS100BC-SPP/HID User Guide



Version 0.1



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## Revision History

Revision	Date	Change Descriptions
Ver 0.1	2014-03-28	- Write a draft

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## List of Content

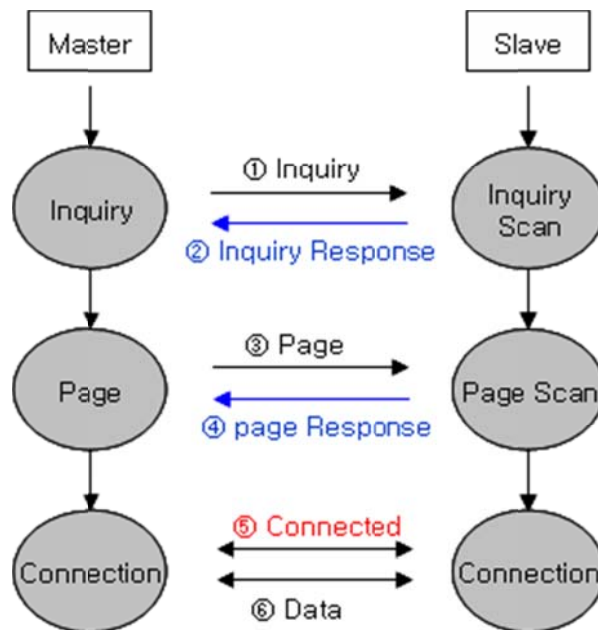
Revision History .....	2
(C) Copyright FIRMTECH Co., Ltd. 2005 .....	3
List of Content .....	4
1 What is Bluetooth? .....	5
1.1 Features of Bluetooth .....	5
1.2 Operation of Bluetooth .....	5
2 Product Overview .....	6
3 FBS100BC-SPP Components .....	7
3.1 FBS100BC-SPP .....	7
3.2 PC Interface Kit (Option) .....	7
4 FBS100BC-SPP Appearance .....	8
4.1 FBS100BC-SPP Dimension .....	8
4.2 FBS100BC-SPP PIN Assign .....	9
5 PC Interface Board (Jig Board) .....	10
6 Performance of FBS100BC-SPP .....	13
7 Current Consumption of FBS100BC-SPP .....	14
8 FBS100BC-HID Components .....	15
8.1 FBS100BC-HID .....	15
8.2 Smart HID Interface Kit (Option) .....	15
9 FBS100BC-HID Appearance .....	16
9.1 FBS100BC-HID Dimension .....	16
9.2 FBS100BC-HID PIN Assign .....	16
10 Smart HID Interface Board (Jig Board) .....	19
11 Performance of FBS100BC-HID .....	20
12 Current Consumption of FBS100BC-HID .....	21
13 FBS100BC-HID Input Data .....	22
14 Approval Information .....	27

# 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

FBS100BC has been developed to replace the previous RS232 Cable system and HID Keyboard- Mouse Device with wireless communication system to use.


Major Features of FBS100BC

1. Bluetooth Specification 2.1 Support
2. Easily applicable to the Product with 20Pins SMD(Surface-Mount Device) type
3. Support AT Command, and capable to control FBS100BC by using AT Command.
4. Easy to connect to use with Bluetooth PDA, Bluetooth USB Dongle, etc.
  - A. FBS100BC-SPP : RS232 Cable Replacement Device.
  - B. FBS100BC-HID : HID Keyboard-Mouse Device.
5. Provides the most compact size among Class 2.
6. Simply support the function of Bluetooth Firmware Update
7. Stable Data Transmission / Receipt

※ **We request the new users of FBS100BC-SPP/HID to read the information on this description carefully before they start to use the products.**






### 3 FBS100BC-SPP Components

#### 3.1 FBS100BC-SPP

MODEL	PICTURE	Q'TY (EA)
FBS100BC-SPP		1

<Table 3-1 Basic Components of FBS100BC-SPP>

#### 3.2 PC Interface Kit (Option)

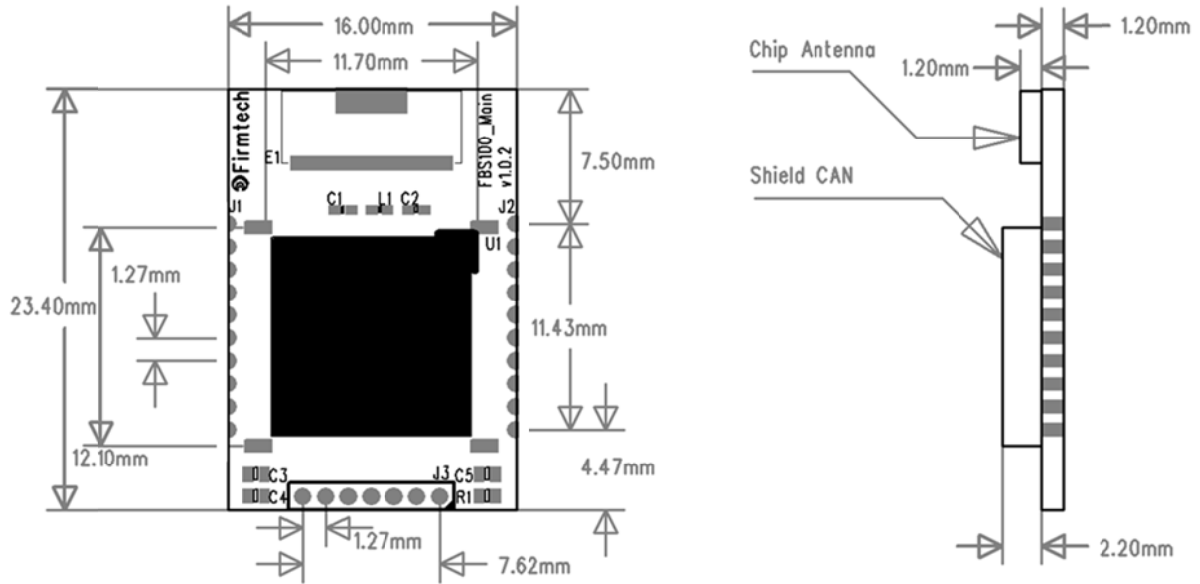
MODEL	PICTURE	Q'TY (EA)
FBZx5Xxx (Interface Board)		1
Expansion Board		1
FCA180SC (RS232 Serial Cable)		1
FCA100UC (USB Power Cable)		1
FCA001PO (DC Power Adapter - 5V) <b>(Option)</b>		1

<Table 3-2 Components of PC Interface Kit >

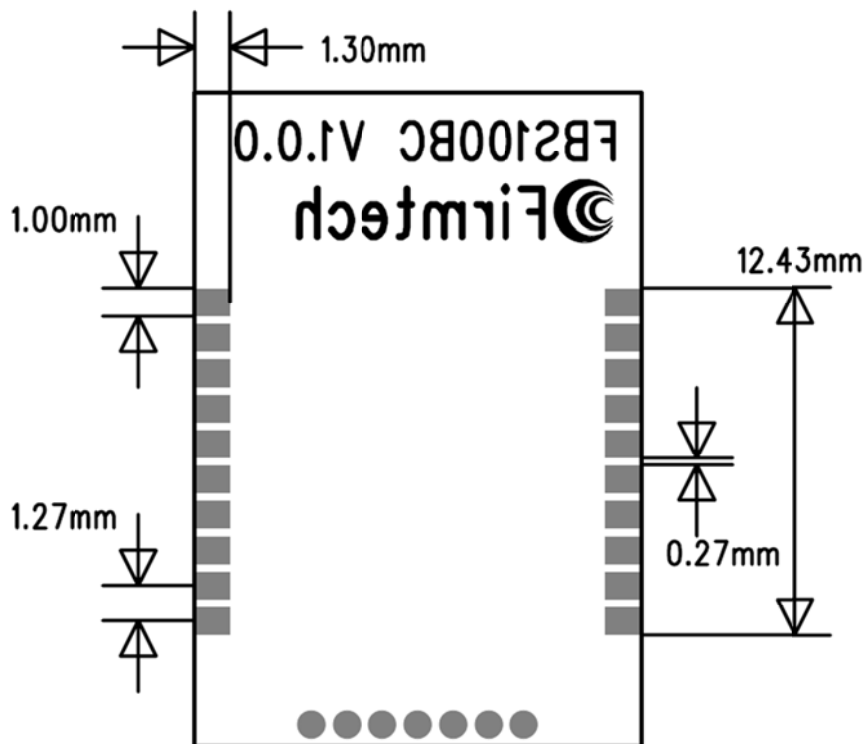
※ If you find any of above components is defective, or not included in the package, please contact the seller you purchased.

## 4 FBS100BC-SPP Appearance

### 4.1 FBS100BC-SPP Dimension



TOP

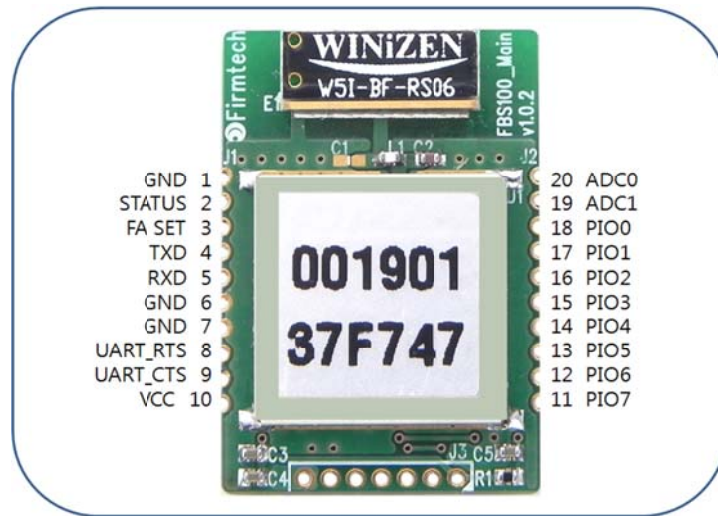


<Figure 4-1 FBS100BC-SPP Dimension>

BOTTOM



## 4.2 FBS100BC-SPP PIN Assign



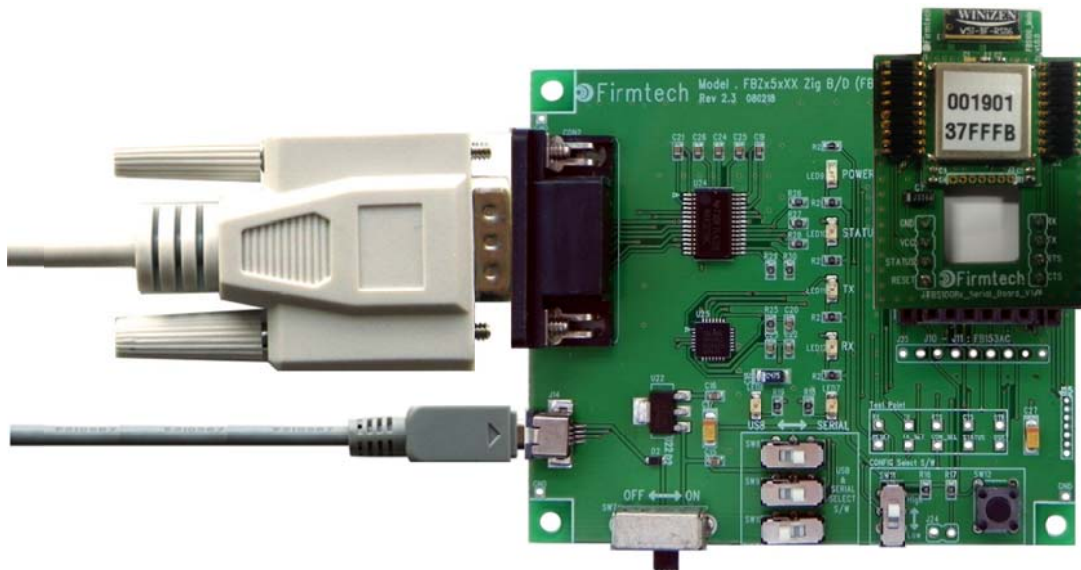
<Figure 4-2 FBS100BC-SPP PIN Assign>

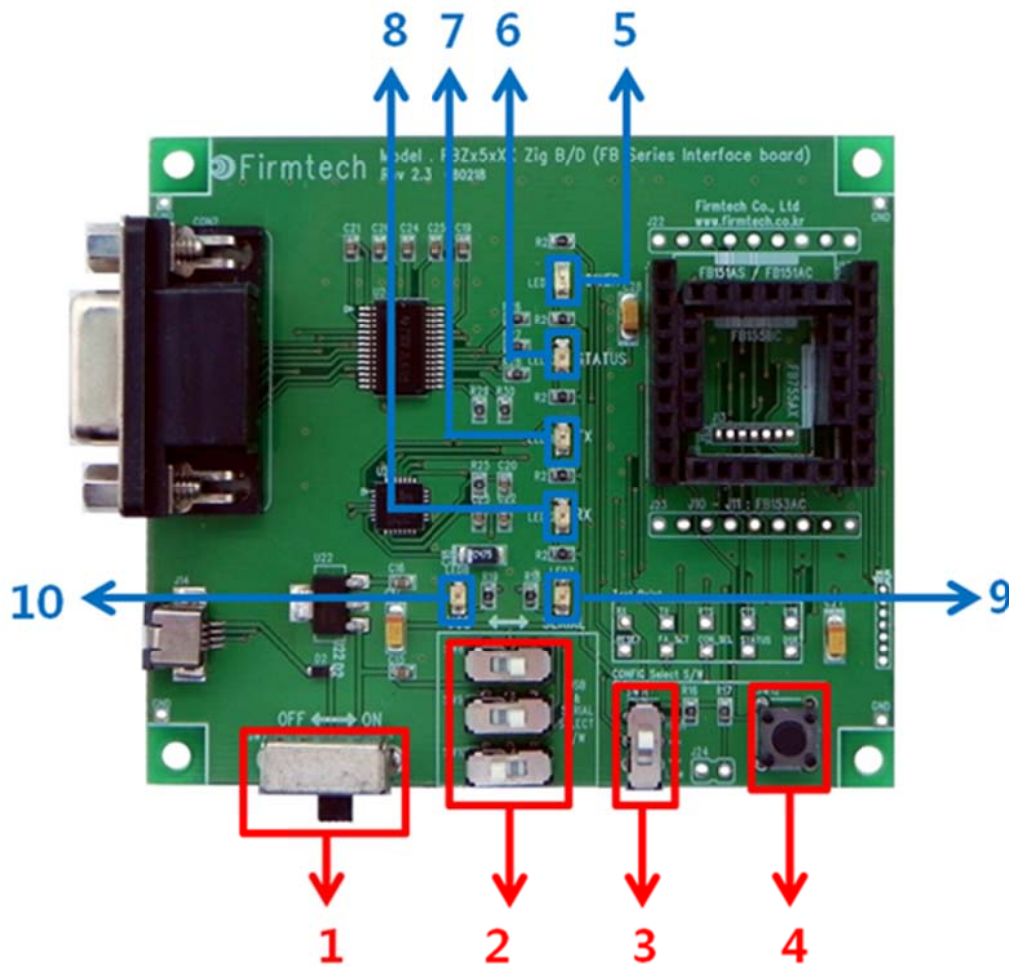
번호	핀 이름	기능	입/출 방향	신호레벨
1	GND	Ground	-	-
2	STATUS	STATUS LED	Output	TTL
3	FA SET	Factory Reset Go back default setting	Input	TTL
4	TXD	Transfer Data (Data out)	Output	TTL
5	RXD	Received Data (Data in)	Input	TTL
6	GND	Ground	-	-
7	GND	Ground	-	-
8	UART_RTS	UART Ready To Send	Output	TTL
9	UART_CTS	UART Clear To Send	Input	TTL
10	VCC	3.3V DC	Input	-
11	PIO7	Digital Input or Output Port	Input/ Output	TTL
12	PIO6	Digital Input or Output Port	Input/ Output	TTL
13	PIO5	Digital Input or Output Port	Input/ Output	TTL
14	PIO4	Digital Input or Output Port	Input/ Output	TTL
15	PIO3	Digital Input or Output Port	Input/ Output	TTL

<b>16</b>	PIO2	Digital Input or Output Port	Input/ Output	TTL
<b>17</b>	PIO1	Digital Input or Output Port	Input/ Output	TTL
<b>18</b>	PIO0	Digital Input or Output Port	Input/ Output	TTL
<b>19</b>	ADC1	Analog Input Port	Input	TTL
<b>20</b>	ADC0	Analog Input Port	Input	TTL

<Table 4-1 FBS100BC-SPP Pin Description>

## 5 PC Interface Board (Jig Board)





<Figure 5-1 FBS100BC-SPP Interface Board(Jig Board)>

No.	Title	Description
1	<b>Power ON/OFF Switch</b>	ON/OFF the electric power of interface board.
2	<b>USB/RS232 Interface Selection Switch</b>	The switch for selection of communication in USB/RS232 (The 3 switches shall be set in same direction.)
3	<b>PC Configuration/Operation Selection Switch</b>	Not is use

4	<b>FASET Switch</b>	<p>The switch for changing the environment setting value of FBS100BC-SPP to the factory setting value.</p> <p>The procedures to make the FASET are as followings.</p> <p><b>1. Power ON</b></p> <p><b>2. Press the FASET switch more than 2 seconds.</b></p>
5	<b>POWER LED</b>	LED to check the power supply condition
6	<b>STATUS LED</b>	LED to check the action of FBS100BC-SPP
7	<b>TX LED</b>	LED to check the data output condition of FBS100BC-SPP
8	<b>RX LED</b>	LED to check the data input condition of FBS100BC-SPP
9	<b>SERIAL INTERFACE LED</b>	LED to check whether the communication interface is RS-232
10	<b>USB INTERFACE LED</b>	LED to check whether the communication interface is USB

<Table 5-1 FBS100BC-SPP Interface Board Description>

## 6 Performance of FBS100BC-SPP

No.	Part	Specification	
1	Bluetooth Spec.	Bluetooth Specification 2.1 Support	
2	Communication distance	10 M	
3	Frequency Range	2402 ~ 2480MHz ISM Band	
4	Sensitivity	-83dBm (Typical)	
5	Transmit Power	4dBm(Typical)	
6	Size	16.00 x 23.40 x 3.40 mm	
7	Support Bluetooth Profile	SPP (Serial Port Profile)	
8	Input Power	3.3V	
9	Current Consumption	41mA (Max)	
10	Temperature	Operating	-10°C ~ 50°C
		Limit Operating	-35°C ~ 55°C
11	Communication Speed	1,200bps – 230,400bps	
12	Antenna	Chip Antenna	
13	Interface	UART (TTL Level)	
14	Flow Control	RTS, CTS support	

<Table 6-1 FBS100BC-SPP Performance>

## 7 Current Consumption of FBS100BC-SPP

Status		Current Consumption (mA)		
		MIN	MAX	AVG
Standby		2	6	4
Inquiry scan & Page scan (Slave)		2	41	24
Page scan (Slave)		2	7	4
Inquiry (Master)		36	41	40
Connected	Slave	18	23	20
	Master	6	10	7
Data Transmission	Slave	24	30	28
	Master	18	27	21
Data Reception	Slave	21	33	26
	Master	21	33	27
Data Transmission/Reception	Slave	27	33	29
	Master	21	33	28
Power save	Slave	0	6	1
	Master	0	9	2

<Table 7-1 Current Consumption of FBS100BC-SPP>


### TEST CONDITIONS

Baud Rate : 9600 bps, Input Voltage : DC 5V

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







## 8 FBS100BC-HID Components

### 8.1 FBS100BC-HID

MODEL	PICTURE	Q'TY (EA)
FBS100BC-HID	 A small green printed circuit board (PCB) component with a white label in the center. The label contains the numbers '001901' and '37F747'. The PCB has several pins along its edges.	1

<Table 8-1 Basic Components of FBS100BC-HID>

### 8.2 Smart HID Interface Kit (Option)

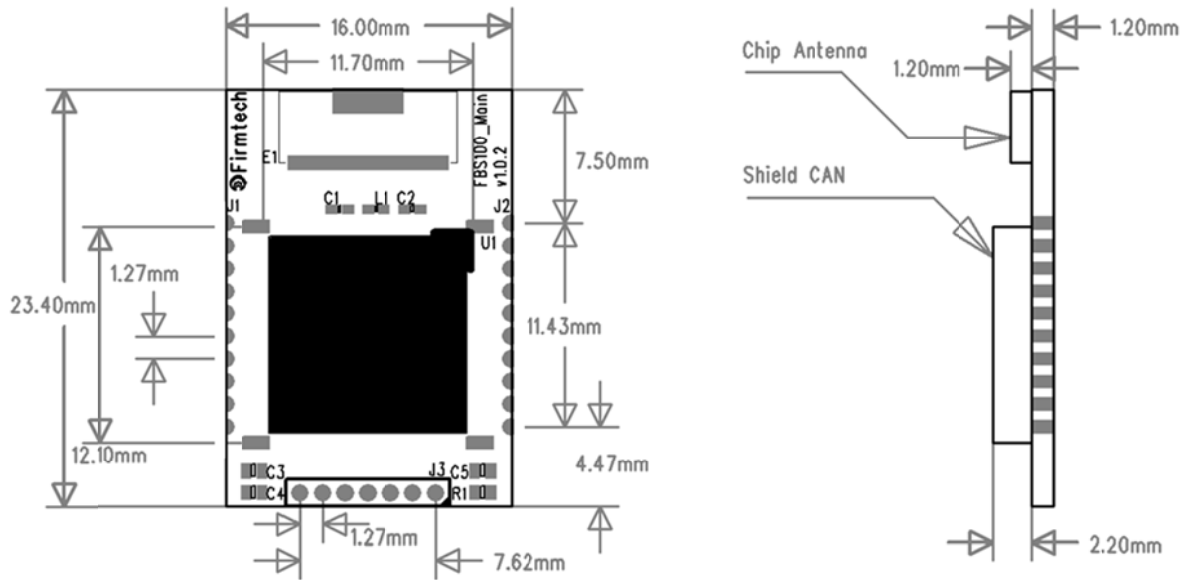
MODEL	PICTURE	Q'TY (EA)
Smart HID Interface Board ( Model : FBDx5xHID )	 A green printed circuit board (PCB) with various electronic components, including a central microcontroller, capacitors, and connectors. It has a complex layout with multiple pins and components.	1
Expansion Board	 A green printed circuit board (PCB) with two large white integrated circuits (chips) mounted on it. It has several pins along its edges.	
RS232 Cable	 A black cable with a standard RS-232 connector on one end and a different connector on the other.	1
USB Cable	 A grey USB cable with a standard USB-A connector on one end and a different connector on the other.	1
AVR Loader	 A small electronic device with a ribbon cable attached, used for programming AVR microcontrollers.	1
CD	 A CD-ROM with the Firmitch logo and text on it.	1

<Table 8-2 Components of Smart HID Interface Kit>

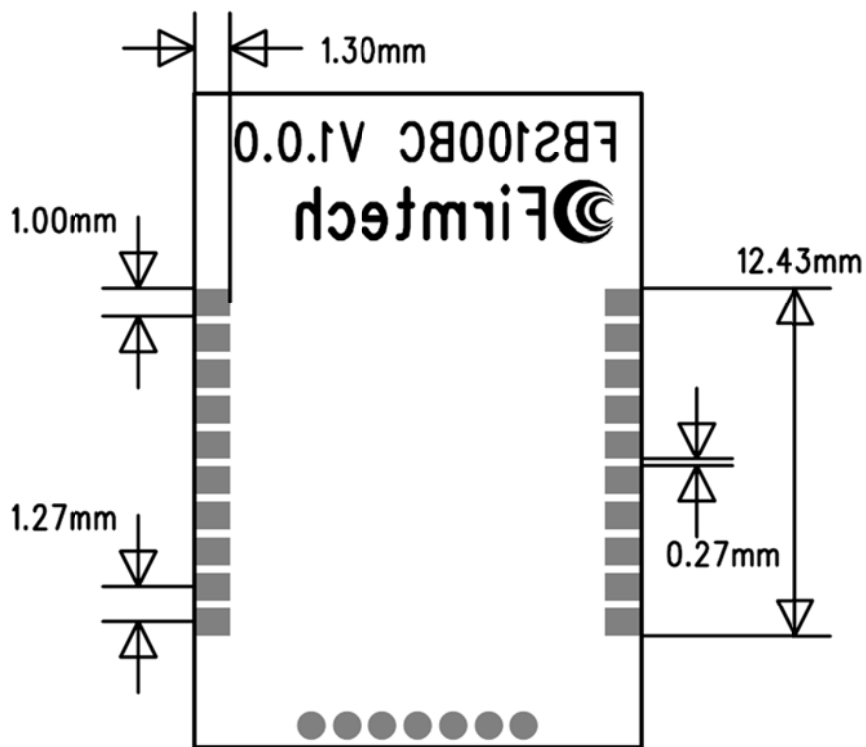
※ If you find any of above components is defective, or not included in the package, please contact the seller you purchased.

## 9 FBS100BC-HID Appearance

### 9.1 FBS100BC-HID Dimension

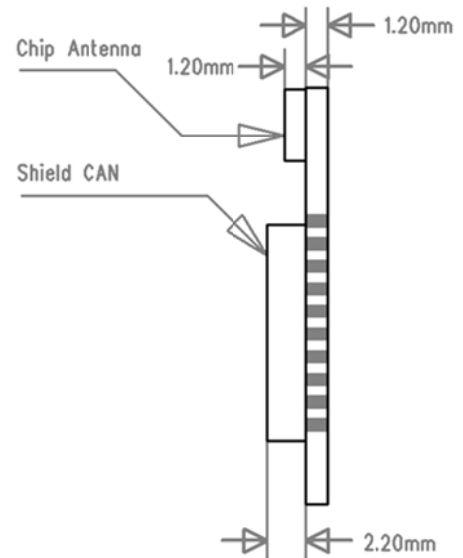


TOP



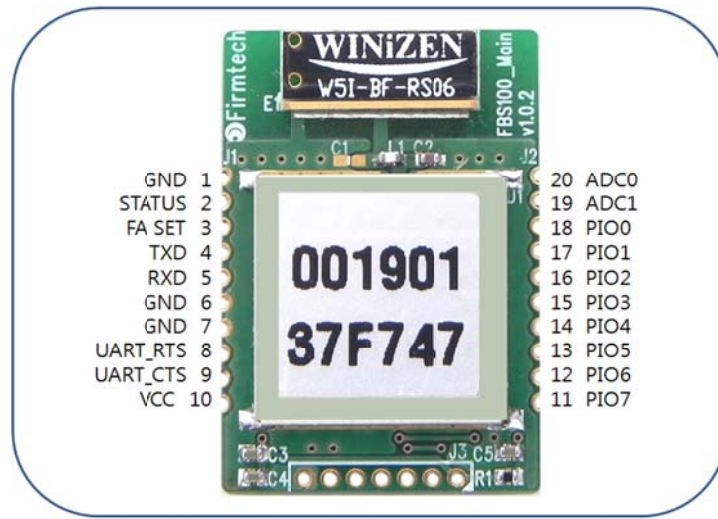
<Figure 9-1 FBS100BC-HID Dimension>

BOTTOM





## 9.2 FBS100BC-HID PIN Assign



<Figure 9-2 FBS100BC-HID PIN Assign>

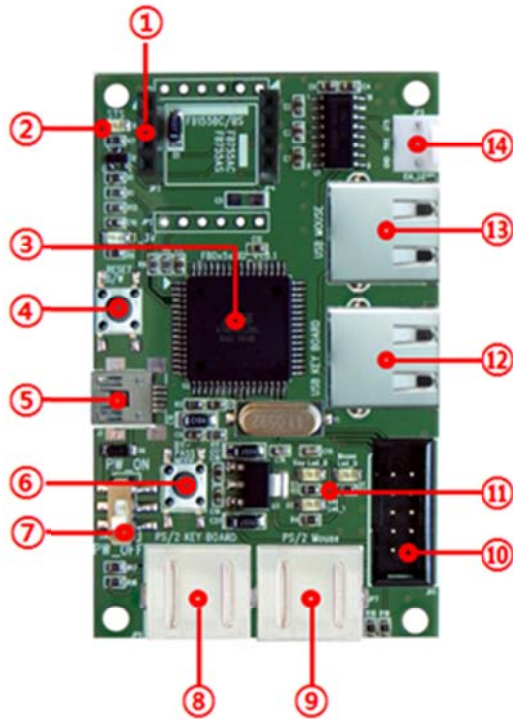
번호	핀 이름	기능	입/출 방향	신호레벨
1	GND	Ground	-	-
2	STATUS	STATUS LED	Output	TTL
3	FA SET	Factory Reset Go back default setting	Input	TTL
4	TXD	Transfer Data (Data out)	Output	TTL
5	RXD	Received Data (Data in)	Input	TTL
6	GND	Ground	-	-
7	GND	Ground	-	-
8	UART_RTS	UART Ready To Send	Output	TTL
9	UART_CTS	UART Clear To Send	Input	TTL
10	VCC	3.3V DC	Input	-
11	PIO7	Digital Input or Output Port	Input/ Output	TTL
12	PIO6	Digital Input or Output Port	Input/ Output	TTL
13	PIO5	Digital Input or Output Port	Input/ Output	TTL
14	PIO4	Digital Input or Output Port	Input/ Output	TTL
15	PIO3	Digital Input or Output Port	Input/ Output	TTL

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<b>16</b>	PIO2	Digital Input or Output Port	Input/ Output	TTL
<b>17</b>	PIO1	Digital Input or Output Port	Input/ Output	TTL
<b>18</b>	PIO0	Digital Input or Output Port	Input/ Output	TTL
<b>19</b>	ADC1	Analog Input Port	Input	TTL
<b>20</b>	ADC0	Analog Input Port	Input	TTL

&lt;Table 9-1 FBS100BC-HID Pin Description&gt;

## 10 Smart HID Interface Board (Jig Board)



NO	Description
1	FBS100(HID) Connector
2	BT Status LED
3	ATMega128
4	Reset Switch
5	USB Power Connector
6	Bypass Switch
7	Power ON/OFF Switch
8	PS2 Keyboard Connector
9	PS2 Mouse Connector
10	AVRISP Loader Connector
11	Keyboard Mouse Status LED
12	USB Keyboard Connector
13	USB Mouse Connector
14	RS-232 Connector

<Figure 10-1 FBS100BC-HID Interface Board (Jig Board)>

## 11 Performance of FBS100BC-HID

No.	Part	Specification
1	Bluetooth Spec.	Bluetooth Specification 2.1 Support
2	Communication distance	10 M
3	Frequency Range	2402 ~ 2480MHz ISM Band
4	Sensitivity	-83dBm (Typical)
5	Transmit Power	4dBm(Typical)
6	Size	16.00 x 23.40 x 3.40 mm
7	Support Bluetooth Profile	HID Device
8	Input Power	3.3V
9	Current Consumption	41mA (Max)
10	Operating Temperature	-10°C ~ 50°C
11	Communication Speed	115,200 bps
12	Antenna	Chip Antenna
13	Interface	UART (TTL Level)

<Table 11-1 FBS100BC-HID Performance>

## 12 Current Consumption of FBS100BC-HID

Status	Current Consumption (mA)		
	MIN	MIN	MIN
<b>Standby</b>	2	6	<b>4</b>
<b>Inquiry scan &amp; Page scan (Slave)</b>	2	41	<b>24</b>
<b>Page scan (Slave)</b>	2	7	<b>4</b>
<b>Connected</b>	18	23	<b>20</b>
<b>Data Transmission</b>	24	30	<b>28</b>
<b>Data Reception</b>	21	33	<b>26</b>
<b>Data Transmission/Reception</b>	27	33	<b>29</b>
<b>Power save</b>	0	6	<b>1</b>

<Table 12-1 Current Consumption of FBS100BC-HID>

### TEST CONDITIONS

Baud Rate : 115200 bps, Input Voltage : DC 5V

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

## 13 FBS100BC-HID Input Data

### - UART HID Report ID 1 Format (Keyboard)

Byte	Value	Description
0 (first byte in packet)	0x0c	Length of packet in bytes (12)
1	0x00	Type of packet: Forward HID Report
2	0xa1	HID input Report Header
3	0x01	Keyboard Report ID 1
4	0x00 to 0xff	Modifier Keys
5	0x00	Reserved
6	0x00 to 0xff	Keycode 1
7	0x00 to 0xff	Keycode 2
8	0x00 to 0xff	Keycode 3
9	0x00 to 0xff	Keycode 4
10	0x00 to 0xff	Keycode 5
11	0x00 to 0xff	Keycode 6

<Table 13-1 UART HID Report ID 1 Format>

### - Modifier Keys

Bit	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Description	LEFT CTRL	LEFT SHIFT	LEFT ALT	LEFT GUI	RIGHT CTRL	RIGHT SHIFT	RIGHT ALT	RIGHT GUI

<Table 13-2 Modifier Keys>

### - Pointer Report Format (Mouse)

Byte	Value	Description
0 (first byte in packet)	0x08	Length of packet in bytes (8)
1	0x00	Type of packet: Forward HID Report
2	0xa1	HID input Report Header

3	0x02	Keyboard Report ID 2
4	0x00 to 0xff	Up to 5 buttons, one bit each
5	0x00 to 0xff	Delta X Number between -127 and +127 representing the change in mouse movement on the x-axis
6	0x00 to 0xff	Delta Y Number between -127 and +127 representing the change in mouse movement on the y-axis
7	0x00 to 0xff	Wheel movement Number between -127 and +127 representing the amount of wheel movement

&lt;Table 13-3 Pointer Report Format&gt;

**- Mouse Button**

Bit	Bit 0	Bit 1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7
Description	Left Button	Right Button	Middle Button	Always 1	Reserved	Reserved	Reserved	Reserved

&lt;Table 13-4 Mouse Button&gt;

**- ASCII to Keycode Table (Keyboard)**

ASCII Char	ASCII value	Keycode	ASCII Char	ASCII value	Keycode
<b>Ctrl-H BS (Back Space)</b>	0x08	0x2A	<b>Ctrl-I HT (Tab)</b>	0x09	0x2B
<b>Ctrl-M CR (Carriage Return)</b>	0x0D	0x28	<b>Ctrl-[ ESC (Esc)</b>	0x1B	0x29
<b>Space</b>	0x20	0x2C	<b>'</b>	0x27	0x34
<b>,</b>	0x2C	0x36	<b>-</b>	0x2D	0x2D
<b>.</b>	0x2E	0x37	<b>/</b>	0x2F	0x38
<b>0</b>	0x30	0x27	<b>1</b>	0x31	0x1E
<b>2</b>	0x32	0x1F	<b>3</b>	0x33	0x20
<b>4</b>	0x34	0x21	<b>5</b>	0x35	0x22
<b>6</b>	0x36	0x23	<b>7</b>	0x37	0x24
<b>8</b>	0x38	0x25	<b>9</b>	0x39	0x26

;	0x3B	0x33	=	0x3D	0x2E
[	0x5B	0x2F	W	0x5C	0x31
]	0x5D	0x30	`	0x60	0x35
a	0x61	0x04	b	0x62	0x05
c	0x63	0x06	d	0x64	0x07
e	0x65	0x08	f	0x66	0x09
g	0x67	0x0A	h	0x68	0x0B
i	0x69	0x0C	j	0x6A	0x0D
k	0x6B	0x0E	l	0x6C	0x0F
m	0x6D	0x10	n	0x6E	0x11
o	0x6F	0x12	p	0x70	0x13
q	0x71	0x14	r	0x72	0x15
s	0x73	0x16	t	0x74	0x17
u	0x75	0x18	v	0x76	0x19
w	0x77	0x1A	x	0x78	0x1B
y	0x79	0x1C	z	0x7A	0x1D
! ( Shift+1 )	0x21	0x1E	" ( Shift+' )	0x22	0x34
# ( Shift+3 )	0x23	0x20	\$ ( Shift+4 )	0x24	0x21
% ( Shift+5 )	0x25	0x22	& ( Shift+7 )	0x26	0x24
( ( Shift+9 )	0x28	0x26	) ( Shift+0 )	0x29	0x27
* ( Shift+8 )	0x2A	0x25	+ ( Shift+= )	0x2B	0x2E
: ( Shift+; )	0x3A	0x33	< ( Shift+, )	0x3C	0x36
> ( Shift+.)	0x3C	0x36	? ( Shift+ / )	0x3F	0x38
@ ( Shift+2 )	0x40	0x1F	A ( Shift+a )	0x41	0x04



<b>B</b> ( Shift+b )	0x42	0x05	<b>C</b> ( Shift+c )	0x43	0x06
<b>D</b> ( Shift+d )	0x44	0x07	<b>E</b> ( Shift+e )	0x45	0x08
<b>F</b> ( Shift+f )	0x46	0x09	<b>G</b> ( Shift+g )	0x47	0x0A
<b>H</b> ( Shift+h )	0x48	0x0B	<b>I</b> ( Shift+I )	0x49	0x0C
<b>J</b> ( Shift+j )	0x4A	0x0D	<b>K</b> ( Shift+k )	0x4B	0x0E
<b>L</b> ( Shift+l )	0x4C	0x0F	<b>M</b> ( Shift+m )	0x4D	0x10
<b>N</b> ( Shift+n )	0x4E	0x11	<b>O</b> ( Shift+o )	0x4F	0x12
<b>P</b> ( Shift+p )	0x50	0x13	<b>Q</b> ( Shift+q )	0x51	0x14
<b>R</b> ( Shift+r )	0x52	0x15	<b>S</b> ( Shift+s )	0x53	0x16
<b>T</b> ( Shift+t )	0x54	0x17	<b>U</b> ( Shift+u )	0x55	0x18
<b>V</b> ( Shift+v )	0x56	0x19	<b>W</b> ( Shift+w )	0x57	0x1A
<b>X</b> ( Shift+x )	0x58	0x1B	<b>Y</b> ( Shift+y )	0x59	0x1C
<b>Z</b> ( Shift+z )	0x5A	0x1D	<b>^</b> ( Shift+6 )	0x5E	0x23
<b>-</b> ( Shift+- )	0x5F	0x2D	<b>{</b> ( Shift+[ )	0x7B	0x2F
<b> </b> ( Shift+W )	0x7C	0x31	<b>}</b> ( Shift+] )	0x7D	0x30
<b>~</b> ( Shift+` )	0x7E	0x35			

&lt;Table 13-5 ASCII to Keycode table&gt;

Ex) To send Keyboard data "1"

Byte	0	1	2	3	4	5	6	7	8	9	10	11
<b>Pressed</b>	0x0c	0x00	0xa1	0x01	0x00	0x00	0x1e	0x00	0x00	0x00	0x00	0x00
<b>Released</b>	0x0c	0x00	0xa1	0x01	0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Ex) To send Keyboard data "a"

Byte	0	1	2	3	4	5	6	7	8	9	10	11
<b>Pressed</b>	0x0c	0x00	0xa1	0x01	0x00	0x00	0x04	0x00	0x00	0x00	0x00	0x00
<b>Released</b>	0x0c	0x00	0xa1	0x01	0x00	0x00	0x00	0x00	0x00	0x00	0x00	0x00

Ex) To send Keyboard data "A"

Byte	0	1	2	3	4	5	6	7	8	9	10	11
<b>Pressed</b>	0x0c	0x00	0xa1	0x01	0x02	0x00	0x04	0x00	0x00	0x00	0x00	0x00
<b>Released</b>	0x0c	0x00	0xa1	0x01	0x02	0x00	0x00	0x00	0x00	0x00	0x00	0x00

## 14 Approval Information

### 14.1 KCC

### 14.2 FCC compliance Information

#### FCC Information to User

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 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.

#### Caution

Modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**FCC Compliance Information :** 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, and
- (2) this device must accept any interference received, including interference that may cause undesired operation

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

- 1) The transmitter module may not be co-located with any other transmitter or antenna,
- 2) OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change.

As long as 2 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.).

**IMPORTANT NOTE:** In the event that these conditions can not be met (for example certain

laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not 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.

#### End Product Labeling

To satisfy FCC exterior labeling requirements, the following text must be placed on the exterior of the end product : **Contains Transmitter Module FCC ID : U8D-FBS100BC**

#### Manual Information To the End User

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.

### 14.3 CE

### 14.4 TELEC

### 14.5 SIG