# **Bluetooth Embedded Module**

## **FB570BC User Guide**



Version 0.1



## FIRMTECH Co., Ltd.

Homepage : <u>http://www.firmtech.co.kr</u> Mail : <u>contact@firmtech.co.kr</u> Tel : +82-31-719-4812 Fax : +82-31-719-4834

## **Revision History**

Revision	Date	Change Descriptions
Ver 0.1	04-11-2013	- Write a draft

## Copyright FIRMTECH Co., Ltd. 2005 All rights reserved

The products and operation descriptions contained herein shall be protected by copyright law.

Any part or whole of products or operation description shall not be copied, reproduced, translated, nor transformed into readable form by electronic device or machines, without prior consent in writing by FIRMTECH Co., Ltd.

There might be some misprinting or technical faults in the products and operation description which are subject to change without prior notice.

## List of Content

1 What is Bluetooth?	5
1.1 Features of Bluetooth	5
1.2 Operation of Bluetooth	5
1.3 Terminology	6
2 Product Overvies	7
3 Product Components	8
3.1 FB570BC	8
3.2 PC Interface Kit (Option)	8
4 PC Interface Board (Jig Board)	10
4.1 External view	10
4.2 External Description	10
4.3 Operation method	11
5 Product Appearance	13
5.1 FB570BC Dimension	13
5.2 FB570BC PIN Assign	13
5.3 FB570BC PIN Description	14
6 Interface (Pin Connection)	15
6.1 Audio Input (1pin ~ 4pin)	15
6.2 Audio Output (6pin ~ 9pin)	15
6.3 UART (10pin ~ 11pin)	16
6.4 Profile Status (14pin ~ 16pin)	16
6.5 Multi Function Req (17pin)	17
6.6 Profile Connect / Disconnect Req (18pin ~ 20pin)	20
6.7 Volume (21pin, 22pin)	22
6.8 Power Hold, Power On / Off (23pin, 24pin)	22
7 Performance of Products	23
8 Preliminary Product Components	24
9 Current Consumption	25
10 How to complete PC Configuration	26
10.1 PC Configuration using BTConfig tool	26
11 Approval Information	

## 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.

## 1.3 Terminology

A2DP Source	Advanced Audio Distribution Profile Source	
A2DP Sink	Advanced Audio Distribution Profile Sink	
AVRCP	Audio/Video Remote Control Profile	
HFP AG	Hands-Free Profile Audio Gateway	
HSP Headset Profile		
SPP DevA Serial Port Profile (Master)		
SPP DevB Serial Port Profile (Slave)		
BD Address Bluetooth Device Address		

<Table 1-1 Terminology>

## 2 Product Overvies

FB570BC is developed to replace existing wired transmission methods using an RS232 cable or voice cable with wireless transmission method.

Major Features of FB570BC

- 1. Bluetooth Specification 2.0 Support
- 2. Supports A2DP Source, A2DP Sink, HFP, HSP, AG and SPP
- 3. Easily applicable to the Product with 24Pins Header type
- 4. Support AT Command, and capable to control FB570BC by using AT Command.
- 5. Easy to connect to use with Bluetooth PDA, Bluetooth USB Dongle, etc.
- 6. Simply support the function of Bluetooth Firmware Update
- 7. Stable Data Transmission / Receipt

The operating method of the profile by role is as follows.

Dusfile	Role		
Profile	Master	Slave	
A2DP	A2DP Source	A2DP Sink	
AVRCP	AVRCP Target	AVRCP Controller	
HFP	HFP AG	HFP	
SPP	SPP DevA	SPP DevB	

<Table 2-1 Profile Operating Method>

**\*** We request the new users of FB570BC to read the information on this description carefully before they start to use the products.

## **3 Product Components**

## 3.1 FB570BC

MODEL	PICTURE	Q'TY (EA)
FB570BC	A A A A A A A A A A A A A A A A A A A	1

<Table 3-1 Basic Components of FB570BC>

## 3.2 PC Interface Kit (Option)

MODEL	PICTURE	Q'TY (EA)	
FBZ55xXX (Interface Board)		1	
FBA180SC (Serial-extension-cable)		1	
FBA100UC (USB-extension-cable)		1	
FBA001PO (DC Power Adapter) <mark>(Option)</mark>		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 PC Interface Board (Jig Board)

### 4.1 External view



<Figure 4-1 FBZ55xXX External view>

## 4.2 External Description

No	Model	No	Model
1	FB570BC	2	FBZ55xXX
No	Description	No	Description
1	1 MIC Input	<b>Q</b>	A2DP Connection control switch
1		0	(A2DP Connect / Disconnect Req)
2	2 AUDIO Input 9	0	HFP Connection control switch
2		9	(HFP Connect / Disconnect Req)
2		10	SPP Connection control switch
5		10	(SPP Connect / Disconnect Req)

4	Power On / Off Switch	11	Status LED
5	Multi Function Switch (Multi Function Req)	12	Power Hold LED
6	Volume Up Switch	13	Power Switch
7	Volume Down Switch		

<Table 4-1 External Description>

#### 4.3 Operation method

The following explains the operating method of making connection using two FB570BCs and two FBZ55xXX Interface Boards. This explanation is based on the assumption that FB570BCs are set to the default settings at the time of purchase.

#### 4.3.1 Profile Connecting method

(1) Connect the first FB570BC (Slave) to the first FBZ55xXX Board as shown in Figure 4-1.

(2) Set the Power Source Selection Switch (No. 13 in Figure 4-1) according to the power source.



<Figure 4-2 Power Switch>



<Figure 4-3 Power supply from a battery>



<Figure 4-4 Power supply from a USB>

(3) Power on the first FB570 (Slave).

If **Battery** is selected as power source as shown in <Figure 4-3>, power is normally supplied if **the Power** Hold LED is on after **the Power On/Off Switch** (No. 4 in Figure 4-1) is pressed for longer than two **seconds**. If **USB** is selected as power source as shown in <Figure 4-4>, power is normally supplied if **the Power Hold LED** is on for two seconds after the next **Power On/Off Switch is on**.

(4) Press the switch for the connection among Connection Control Switches for the A2DP, HFP and SPP

(No. 8-10 in Figure 4-1), and enter the Page Scan and Inquiry Scan Modes. When pressed correctly, the indicator LED for the A2DP, HFP or SPP flickers.

(5) Connect the second FB57BC (Master) to the second FBZ55xXX board.

(6) Set the Power Source Selection Switch according to the power source (see Figure 6-3 and 6-4.)

(7) Power on the second FB570 (Master) while the **Multi Function Switch** (No. 5 in Figure 4-1) is pressed. (Operates as Master.)

(8) **Press the desired switch** among Connection Control Switches for the A2DP, HFP and SPP. Search the Bluetooth device operating as Slave and make connection to it. If the switch is normally pressed, only the **indicator LED for the selected profile flickers**.

(9) If the indicator LED continues to be lighted for seconds, the connection is made correctly.

#### (Connected status)

(10) If you want to connect to another profile, first press the **Connection Control Switch of the Slave** (No. 8  $\sim$  10 in Figure 4-1) and press the **Connection Control Switch of the Master**.

(11) The connection is **released by pressing the Connection Control Switch** of the **connected profile**. Note : Simultaneous connections to the SPP, HFP and A2DP can be made by connecting to them.

#### 4.3.2 HFP voice communication method.(SCO)

The basic audio transmission for FB570BC is set to A2DP. For voice communication (SCO) by connecting the HFP, proceed as follows:

(1) Proceed with the **HFP profile connection** by pressing the **HFP Switch** (No. 9 in Figure 4-1) on FB570BC **Slave and Master** (see 4.3.1 Profile connecting method.)

(2) Press the **Multi Function Switch** of FB570BC **Master** (No. 5 in Figure 4-1.) (Voice Communication Request sent from the Master to the Slave)

(3) An alarm for Voice Communication Request Event is sounded from FB570BC **Slave**. **Voice communication is connected by pressing the Multi Function Switch** of FB570BC **Slave** at this time. (**Voice communication accepted by the Slave**)

(4) The connection for voice communication is released by pressing the Multi Function Switch either on the Master or Slave FB570BC once more while the connection for voice communication is made.

(5) For voice communication while both A2DP and HFP are connected, repeat (2) and (3) above.

#### 4.3.3 FASET (Initialization of settings) method

To initialize FB570BC to the default settings of the time of purchase, do as follows:

(1) Turn the power on for FB570BC.

(2) **FASET is progressed and the power goes off** by pressing the Multi Function Switch for over two seconds **while the Volume Up Switch** (No. 6 in Figure 4-1) **is pressed**.

## **5 Product Appearance**

## 5.1 FB570BC Dimension





### 5.2 FB570BC PIN Assign





## 5.3 FB570BC PIN Description

No	Name of Signal	Features	Ι/Ο	Level
1	Audio IN R -	Right Audio Input (Negative)	Input	
2	Audio IN R +	Right Audio Input (Positive)	Input	
3	Audio IN L -	Left Audio Input (Negative)	Input	
4	Audio IN L +	Left Audio Input (Positive)	Input	
5	GND	Ground	-	
6	Audio OUT R -	Right Audio Output (Negative)	Output	
7	Audio OUT R +	Right Audio Output (Positive)	Output	
8	Audio OUT L -	Left Audio Output (Negative)	Output	
9	Audio OUT L +	Left Audio Output (Positive)	Output	
10	UART RX	UART Received Data	Input	TTL
11	UART	UART Transfer Data	Output	TTL
12	3.3V Vcc	Supply Voltage (+3.3V DC)	Input	
13	V check	Vcc Check	Input	
14	A2DP Status	A2DP Connection Status	Output	TTL
15	HFP Status	HFP Connection Status	Output	TTL
16	SPP Status	SPP Connection Status	Output	TTL
17	Multi Function Req	Multi Function Request	Input	TTL Pull Down
18	A2DP Connect / Disconnect Req	A2DP Connect / Disconnect Request	Input	TTL Pull Up
19	HFP Connect / Disconnect Req	HFP Connect / Disconnect Request	Input	TTL Pull Up
20	SPP Connect / Disconnect Req	SPP Connect / Disconnect Request	Input	TTL Pull Up
21	Vol Down	Volume Down	Input	TTL Pull Up
22	Vol Up	Volume Up	Input	TTL Pull Up
23	Power Hold	Power Hold	Output	TTL
24	Power On / Off	Power On / Off	Input	TTL
L	1	<table 5-1="" description="" pin=""></table>	1	1

## 6 Interface (Pin Connection)

## 6.1 Audio Input (1pin ~ 4pin)

Inputs Audio Signal.





## 6.2 Audio Output (6pin ~ 9pin)

Outputs Audio Signal.



<Figure 6-2 Audio Output>

#### 6.3 UART (10pin ~ 11pin)

Cross-connect UART RX and TX to the host device. The following example is for making connections at TTL Level. To smoothly connect to a PC, you need to make level conversion using the MAX Chip.



<Figure 6-3 Connects to UART in TTL>

## 6.4 Profile Status (14pin ~ 16pin)

You can check the connections to each profile.

A LOW (0V) signal is output when connection to each signal is made and a HIGH (3.3V) signal is output when the connection is released. During the standby mode and when connecting to the profile, HIGH and LOW signals repeat regularly.



<Figure 6-4 Profile Status>

## 6.5 Multi Function Req (17pin)



<Figure 6-5 Multi Function Request>

Multi Function Request is used to run a series of operations when a signal is input according to the status of each profile. The operation is executed at the moment when the signal input changes **from LOW to HIGH** in the following priority according to the profile's connection status.

Priority	Operation Role	Function	Description
	Noic		When the connection mode is in Mode4(Default)
			- When the power is supplied while a HIGH (Pull-up)
		Polo coloction of the	signal is input to the Multi Function Request, FB570 is
		Master or Slave	designated to Master.
			- When the power is supplied while LOW (Pull-down)
1			signal is input to the Multi Function Request, FB570 is
-			designated to Slave.
			- When power is supplied while the Multi Function
		Operating method of the interface board	Switch (Button No. 5 in Figure 4-1) is pressed, the
			board operates as Master
			- When <b>power is supplied</b> while the Multi Function
			Switch is not pressed, the board operates as <b>Slave</b> .
			When the <b>connection mode</b> is not Mode 4
			- When power is supplied while the HIGH (Pull-up)
			signal is input to the Multi Function Request, FB570
2		Selection of connectiom	operates in MODE 4 (where the user environment can
2		mode	be set by using BT Config.)
			- When power is supplied while the LOW (Pull-down)
			signal is input to the Multi Function Request, FB570
			operates in the preset MODE.

		Operating method of the interface board	- When <b>power is supplied</b> while the <b>Multi Function</b> <b>Switch</b> (No. 5 in Figure 4-1) <b>is pressed</b> , FB570 operates in MODE 4.		
3 Master Slave	Master	FASET (Initialization of settings)	- When a LOW signal is input to the Multi Function Request for longer than two seconds while the power is on and a LOW signal is input to Volume Up, the board is reset to the factory default settings (settings at the factory shipment.)		
	Operating method of the interface board	- When the <b>Multi Function Switch</b> (No. 6 in Figure 4-1) is pressed for longer than two seconds while the power is on and <b>Volume Up Switch</b> is pressed (No.5 in Figure 4-1), the board is reset to the <b>factory default settings</b> (settings at the factory shipment.)			
	Mantar	SPP Escape Signal	When a HIGH signal is input to the Multi Function Request while the SPP is connected, the board enters the AT Command Standby Mode at the SPP Bypass.		
4	Slave	Operating method of the interface board	When you press the <b>Multi Function Switch</b> (No. 5 in Figure 4-1) while the SPP is connected, the board enters the AT command Standby mode at the SPP Bypass.		
5	Master Slave	HFP Call Signal	When a HIGH signal is input to the Multi Function Request while the HFP is connected, the board generates a Call Event for voice communication.		
		Operating method of the interface board	When you press the <b>Multi Function Switch</b> (No. 5 in Figure 4-1) while the HFP is connected, the board generates a Call Event for voice communication.		
6	Master Slave	HFP Answer Signal	When a Call Event for communication is received while the HFP is connected, the device acknowledges the Call Event and gets ready for voice communication by sending a HIGH signal to the Multi Function Request.		
		Operating method of the interface board	When a Call Event for communication is received while HFP is connected, the device acknowledges the Call Event and gets ready for voice communication by pressing the <b>Multi Function Switch</b> (Button No. 5 in Figure 4-1.)		
7	Master Slave	HFP Call Terminate Signal	When a HIGH signal is input to the Multi Function Request while the HFP performs voice communication by using a Call Event, the current voice communication		

		is completed.
	Operating method of	When you press the <b>Multi Function Switch</b> (Button No. 5 in Figure 4-1) while the HFP performs voice
	the interface board	communication by using a Call Event, the voice communication is completed.

<Table 6-1 Function of the Multi Function Request>

#### 6.6 Profile Connect / Disconnect Req (18pin ~ 20pin)

It performs the function of processing the Connection Request and the Disconnection Request for each profile. It **operates when a HIGH signal is changed to LOW signal**. It processes the Connect Request and the Disconnect Request according to the **status of Profile Status (14 - 16 pin)**.



<Figure6-6 Profile Connect / Disconnect Request Interface>

Detailed operating status is as shown in the Figure below.

Pin No.	Profile status signal status	Role	Profile Connect / Disconnect Req operations
14 A2DP Status	HIGH (Non-operating status)	Master	<ul> <li>In case no remote board address ("00000000000") is found, it tries to make a connection with a device having the same pin code after searching for a nearby A2DP Sink (Slave).</li> <li>If a remote board address is found, it tries to make a connection to the relevant board address.</li> </ul>
		Slave	It always enters the Inquiry Scan and the Page Scan modes.
	LOW (Connected status)	Master	Releases the connection from the A2DP Sink (Slave).
		Slave	Releases the connection from the A2DP Source (Master).
	Regular repetition of HIGH and LOW (Connected and Connection standby	Master	Stops tries to make a connection from the A2DP Sink(Slave).
		Slave	Stops scan operation (Inquiry Scan and Page Scan.)

	status)		
15	HIGH (Non-operating status)	Master	<ul> <li>In case no remote board address ("00000000000") is found, it tries to make a connection with a device having the same pin code after searching for a nearby HFP (Slave).</li> <li>If a remote board address is found, it tries to make a connection to the relevant board address.</li> </ul>
		Slave	It always enters the Inquiry Scan and the Page Scan modes.
HFP Status	LOW (Connected status)	Master	Releases the connection from the HFP (Slave).
		Slave	Releases the connection from the HFP AG(Master)
	Regular repetition of HIGH and LOW	Master	Stops tries to make a connection from the HFP(Slave).
	(Connected and Connection standby status)	Slave	Stops scan operation (Inquiry Scan and Page Scan.)
16	HIGH (Non-operating status)	Master	<ul> <li>In case no remote board address ("00000000000") is found, it tries to make a connection with a device having the same pin code after searching for a nearby SPP DevB(Slave).</li> <li>If a remote board address is found, it tries to make a connection to the relevant board address.</li> </ul>
		Slave	It always enters the Inquiry Scan and the Page Scan modes.
SPP Status	LOW (Connected status)	Master	Releases the connection from the SPP DevB(Slave).
		Slave	Releases the connection from the SPP DevA(Master)
	Regular repetition of HIGH and LOW		Stops tries to make a connection from the SPP DevB(Slave).
	(Connected and Connection standby status)	Slave	Stops scan operation (Inquiry Scan and Page Scan.)

<Table 6-2 Profile Connect / Disconnect Request operations status>

### 6.7 Volume (21pin, 22pin)



<Figure 6-7 Volume Interface>

It is used for adjusting the volume of the A2DP or the HFP.

It operates when a HIGH signal is converted to LOW. The volume gain is in 15 levels.

#### 6.8 Power Hold, Power On / Off (23pin, 24pin)



**The operation of Power On/Off is Active HIGH.** Power is on when Power Hold gets HIGH by maintaining HIGH for Power On/Off for longer than two seconds. Power is off when Power Hold gets LOW by maintaining LOW for Power On/Off for longer than two seconds.

**※** For more details, please refer to the circuit diagram of FBZ55xXX

## 7 Performance of Products

No.	Part		Specification
1	Bluetooth Spec.		Bluetooth Specification 2.0 Support
2	Communication distance		10 M
3	Frequency Range		2.4 GHz ISM Band
4	Sensitivity		-83dBm (Typical)
5	Transmit Power	FB570BC	3dBm(Typical)
		FB570BS	3dBm(Typical)
6	Size	FB570BC	30.7 x 20.3 mm
		FB570BS	30.7 x 20.3 mm
7	Support Bluetooth Profile		A2DP Source, Sink HFP, HSP HFP AG, SPP DevA, DevB
8	Input Power		3.3V
9	Current Consumption		48 mA (Max)
10	Temperature	Operating	-20°C ~ 50°C
		Limit Operating	-30°C ~ 80°C
11	UART Communication Speed		9600bps – 115200bps
12	Antenna	FB570BC	Chip Antenna
		FB570BS	Helical Antenna
13	Interface		UART (TTL Level) Audio Input Audio Output

<Table 7-1 FB570BC Performance>

## **8 Preliminary Product Components**

The preliminary value of product is set as on the <Table 8-1>. Please be sure of basic set value and so on before using the product.

Туре	Set Value
Device Name	FB570vx.x
Authentication	ENABLED (Pin code exchange)
Pin Code (Pass key)	0000
Uart (baud rate-data bit-parity bit-stop bit)	9600-8-N-1
ROLE	SLAVE
Connection Mode	MODE4 (AT command)
Support Profile	SPP, HFP, A2DP, AVRCP

<Table 8-1 Preliminary Configuration Setting Value for FB570BC>

To change the configuration set value of FB570BC, connect FB570BC to the PC using the PC Interface board then, you may change using the PC software (such as Window Hyper Terminal, FIRMTECH's PC configuration program). With MICOM, you may change the set value by using AT command.

## 9 Current Consumption

being prepare.

## **10 How to complete PC Configuration**

Explanation on the below configuration is based on the assumption that FB570BC is connected to the interface board (jig board). If it is connected to a MICOM, you can change the settings by using AT commands while referring to "Appendix B - Detailed explanation and operating method of AT commands."

Components for PC Configuration

- FB570BC module
- PC Interface Kit(FBZ55xXX kit)

#### 10.1 PC Configuration using BTConfig tool

- (1) After connecting FB570BC to the interface board and connecting the serial port of the interface board to a PC by using a serial cable, turn the power on.
- (2) Run BTConfig Tool.



<Figure 10-1 BTConfig tool initialization>

(1) Click "SERIAL OPEN" button. (<Figure 10-1> blue borders)



 DEBUG CHARACTER : Default is 0x02. (refer to the appendix A about PC Configuration)
 SERIAL PORT : COM PORT proper port, BAUDRATE 9600, PARITY BIT None, STOP BIT 1 <Figure 10-2 BTConfig tool Serial Connection>



**1 SERIAL OPENED, READ TO SET** : BTConfig tool and communication status of products. <Figure 10-3 BTconfig tool connection> (1) If the <Figure 10-2> comes up, set each blank (Red borders N.1~2) to (COM PORT – Port connected to FB570BC, BAUDRATE – 9600, PARITY BIT – None, STOP BIT – 1). After the set-up, click the OPEN button (Red borders N.3), then Serial Connection and Ready To Set (Red borders N.1) parts become green as shown on <Figure 10-3>

If they don't become green, check the COM PORT and execute BTConfig tool once again.

(2) If click the READ button (blue borders) as shown on <Figure 10-3> after BTConfig tool is connected to products, MENU Buttons (<Figure 10-4> red borders N.1) are activated.



<그림 10-4 BTConfig tool Set-up>

- 1 BLUETOOTH PARAMETERS: Set-up Group Button
- 2 Set-up window: change Set-up Groups and values

**1 READ button**: read set values. (READ should be done after BTConfig tool is connected to products at the very first initialization.)

2 WRITE button: Save set values. (Serial port is automatically completed after saving.)

3 INIT button: Reset all the set values to Factory fix points.

- (3) If you select any PARAMETERS(<Figure 11-4> red borders N.1), the window for Value Check and Set-up comes up on the right
- (4) Save the set values by clicking the WRITE button after Set-up completed.



<Figure 10-5 BTConfig tool WRITE>

- **1 WRITE PARAMETERS**: Save the currently set values.
- 2 RETURN TO READ: Set to the initial value.

## **11 Approval Information**