Bluetooth Embedded Module

FB755AC & FB755AS User Guide

FB755AC

FB755AS

Version 1.1

Firmtech

FIRMTECH Co., Ltd.

B-606, Ssangyong IT Twin Tower, Sangdaewon-dong, 442-5

Jungwon-gu, Seongnam-si, Gyeonggi-do, Korea 462-120

Tel : +82-31-719-4812

Fax : +82-31-719-4834

www.firmtech.co.kr

Revision History

Revision	Date	Change Descriptions
1.0	05-10-2007	- Write a draft
1.1	15-12-2008	- Connecting with Connection WIZARD - PC Configuration using Config tool

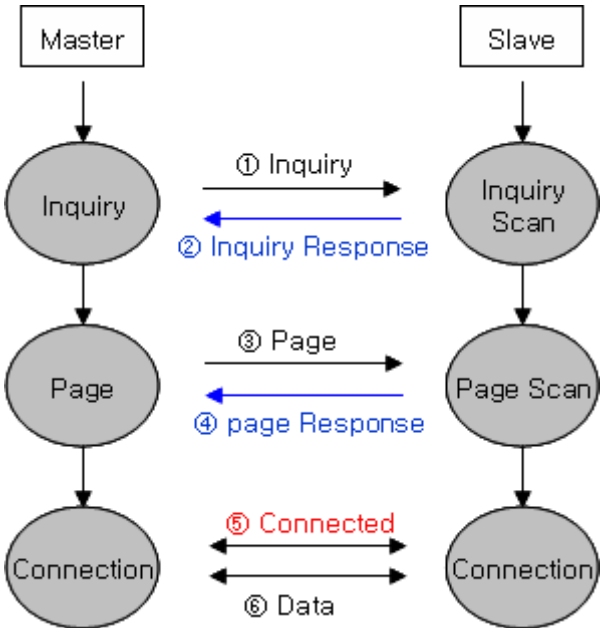
List of Content

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

FB755AC & FB755AS has been developed to replace the previous RS232 Cable system with wireless communication system to use.

Major Features of FB755AC & FB755AS

1. Bluetooth Specification 2.0 Support
2. Bluetooth Piconets(Point to Multipoint) are configurable up to(max 1:7)
3. Easily applicable to the Product with 12Pins Header type
4. Support AT Command, and capable to control FB755AC & FB755AS by using AT Command.
5. Easy to connect to use with Bluetooth PDA, Bluetooth USB Dongle, etc.
6. Provides the most compact size among Class 1 EDR.
7. Simply support the function of Bluetooth Firmware Update
8. Stable Data Transmission / Receipt

※ We request the new users of FB755AC & FB755AS to read the information on this description carefully before they start to use the products.

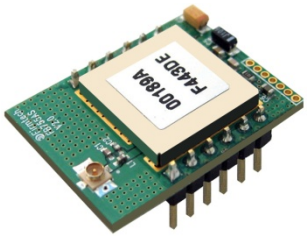
3 Product Components

3.1 FB755AC

MODEL	PICTURE	Q'TY (EA)
FB755AC (On-board Chip Antenna)		1

<Table 3-1 Basic Components of FB755AC>

3.2 FB755AS

MODEL	PICTURE	Q'TY (EA)
FB755AS		1
FCA001DA FCA015CC		1 1

<Table 3-2 Basic Components of FB755AS>

3.3 PC Interface Kit (Option)

MODEL	PICTURE	Q'TY (EA)
FBZx5xXX (Interface Board)		1

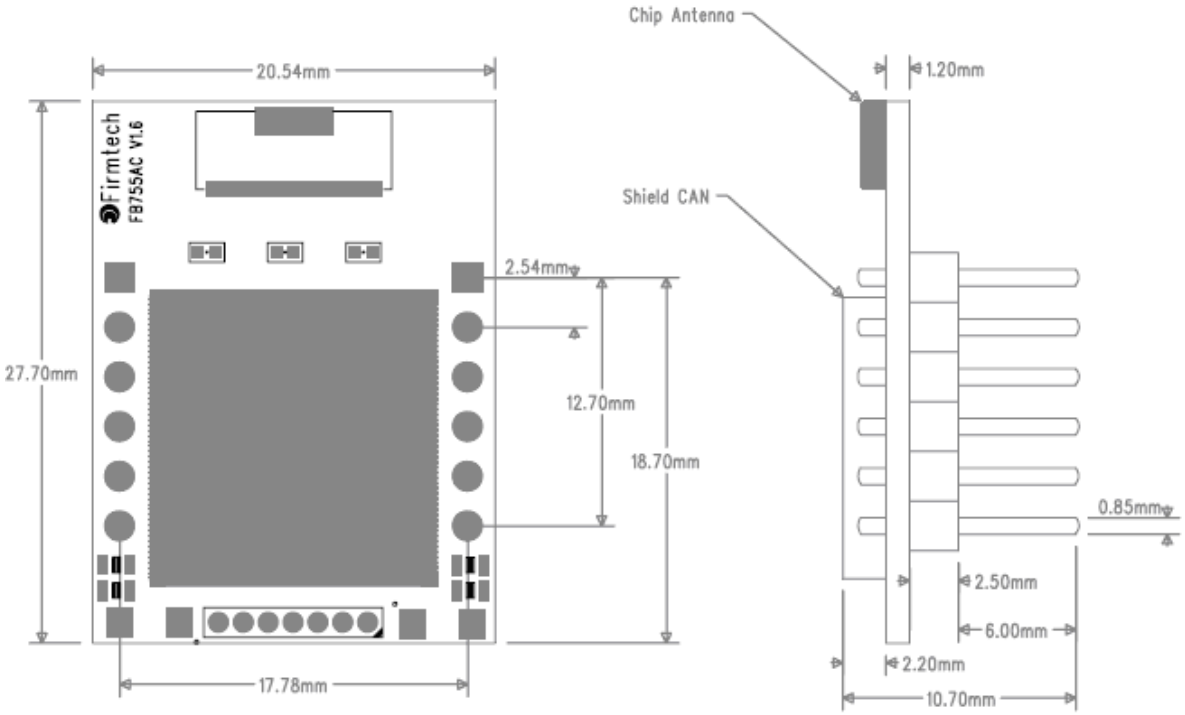
FCA180SC (RS232 Serial Cable)		1
FCA100UC (USB Power Cable)		1
FCA001PO (DC Power Adapter - 5V) **(option)**		1

<Table 3-3 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.

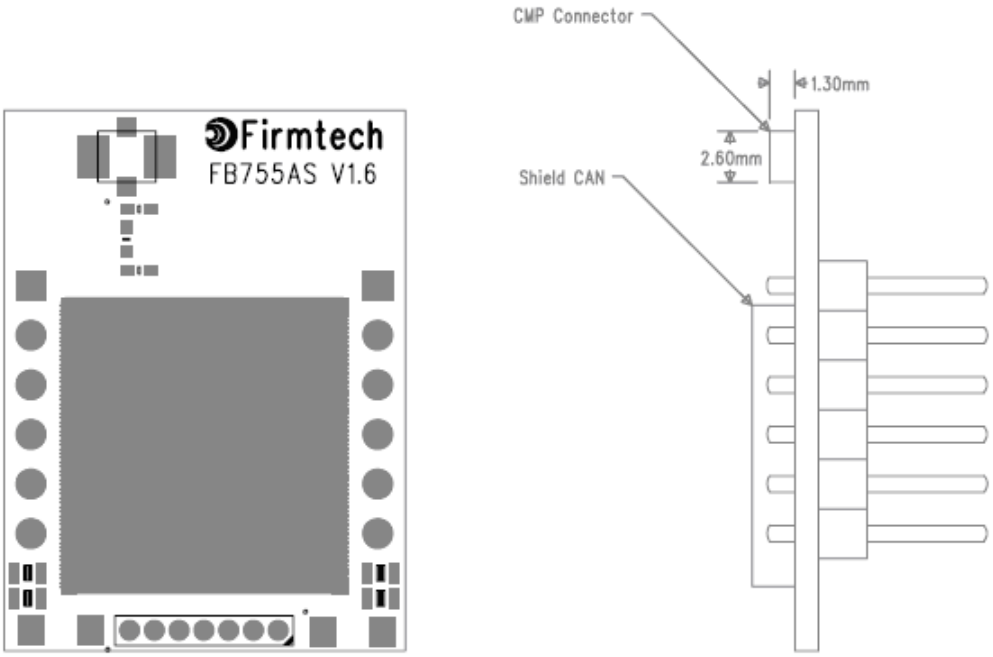
4 Product Appearance

4.1 FB755AC Dimension



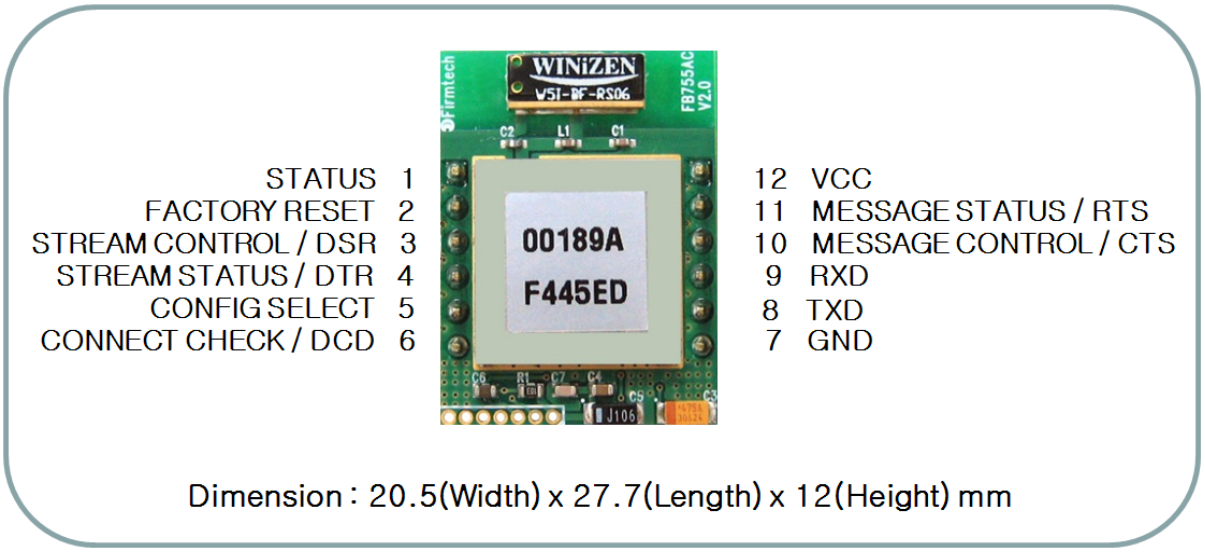
<Figure 4-1 FB755AC Dimension>

4.2 FB755AS Dimension



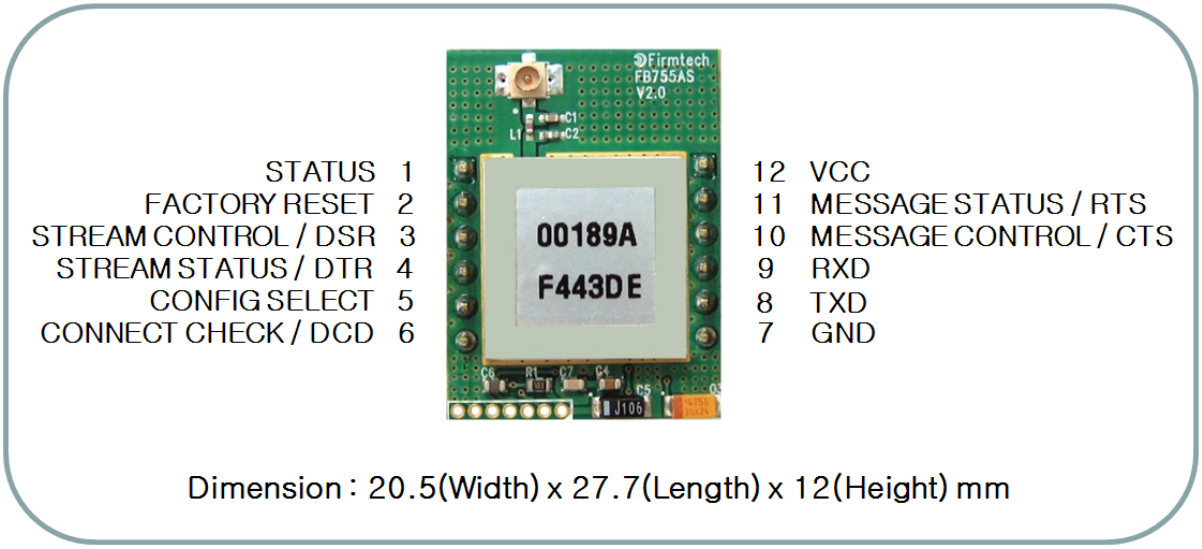
<Figure 4-2 FB755AS Dimension>

4.3 FB755AC PIN Assign



<Figure 4-3 FB755AC PIN Assign>

4.4 FB755AS PIN Assign



<Figure 4-4 FB755AS PIN Assign>

No.	Name of Signal	Features	I / O	Level
1	STATUS	STATUS LED	Output	TTL
2	FA SET	Factory Reset Go back default setting	Input	TTL Pull-up
3	STREAM_CONTROL UART_DSR	1:N – Stream Control 1:1 – UART Data Set Ready	Input	TTL
4	STREAM_STATUS UART_DTR	1:N – Stream Status 1:1 – UART Data Terminal Ready	Output	TTL

5	CONFIG_SELECT	Configuration Select	Input	TTL Pull-down
6	CONNECT_CHECK UART_DCD	1:N – Connect Check 1:1 - UART Data Carrier Detect	Output	TTL
7	GND	Ground		
8	UART_TXD	UART Transfer Data Data output	Output	TTL
9	UART_RXD	UART Received Data Data Input	Input	TTL
10	MESSAGE_CONTROL UART_CTS	1:N – Message Control 1:1 - UART Clear To Send	Input	TTL
11	MESSAGE_STATUS UART_RTS	1:N – Message Status 1:1 - UART Ready To Send	Output	TTL
12	VSUP	3V3 for RF circuit (Vcc)	Input	

<Table 4-1 Pin Description>

- Hard Reset (Factory Reset)

When the CONFIG_SELECT (No 5 PIN) is HIGH (Pull-up condition), turn the power ON (PC-Configuration Mode). And then input LOW signal (0 Volt) to FA_SET (No 2 PIN) for more then 2 seconds for the factory reset.

- STATUS port

To be used to monitor the status of FB755AC & FB755AS.

To keep LOW(0V) when the two devices are communicable since the connection between wireless range is smoothly made.

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

- UART_CTS, UART_RTS, UART_DTR, UART_DSR

When the flow control is not used, non connection will not affect the operation of FB755AC & FB755AS.

- STREAM_CONTROL, STREAM_STATUS, MESSAGE_CONTROL, MESSAGE_STATUS

The connection is necessarily required for 1:N communication. For 1:1 communication, don't need to connect.

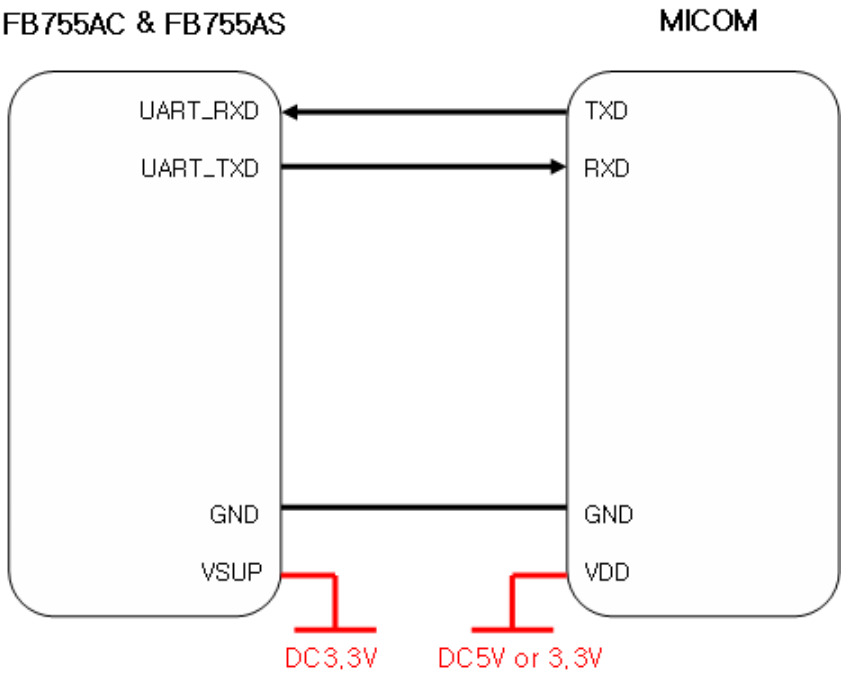
- CONNECT_CHECK / UART_DCD

CONNECT_CHECK is used for 1:N communication.

In 1:N communication, if all connection is successful, CONNECT_CHECK (DCD) in SLAVE is outputted LOW signal. However, if one or more of connections is disconnected, DCD in SLAVE will be outputted HIGH signal. (Default DCD Output : HIGH)

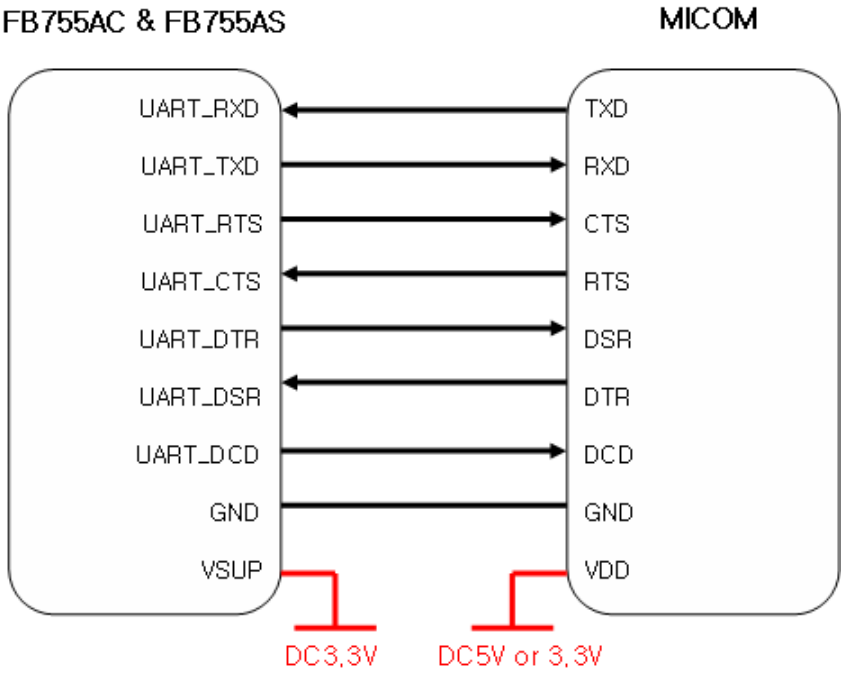
5 Interface (Pin Connection)

5.1 Without Flow Control



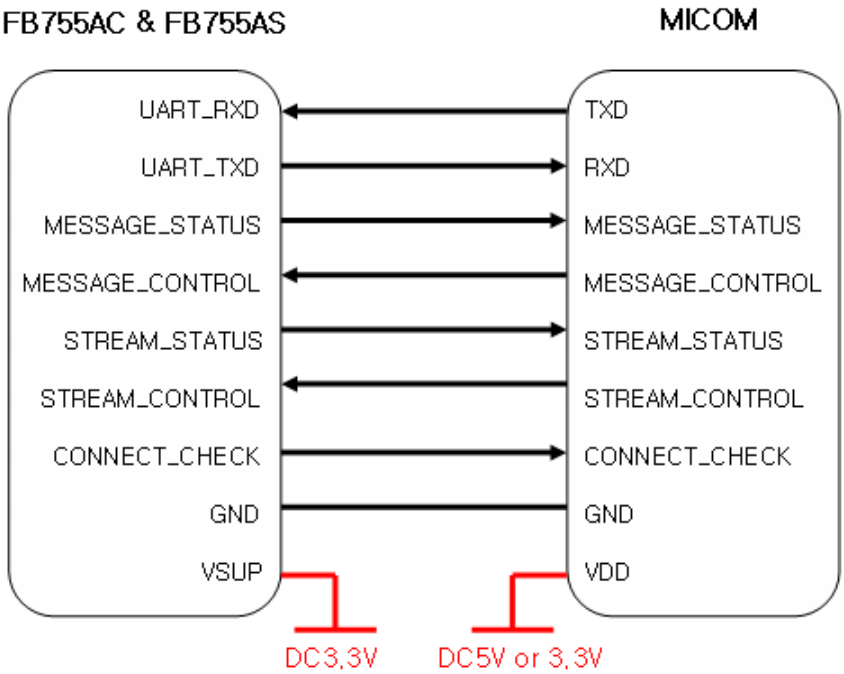
<Figure 5-1 Pin Connection without Flow Control>

5.2 With Flow Control



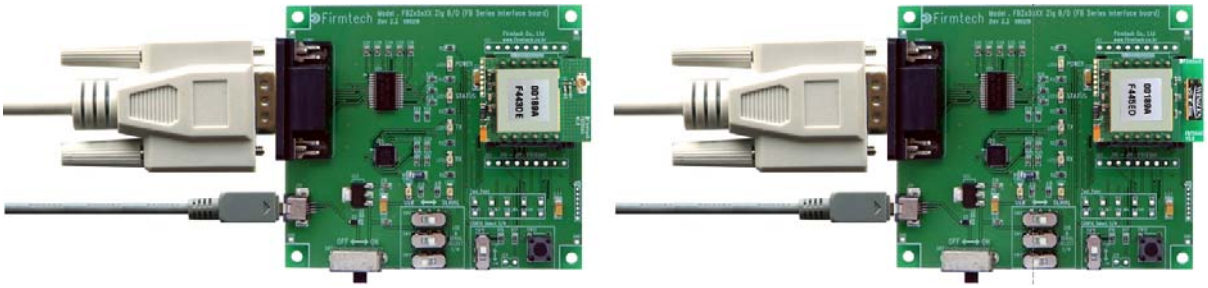
<Figure 5-2 Pin Connection Diagram with Flow Control>

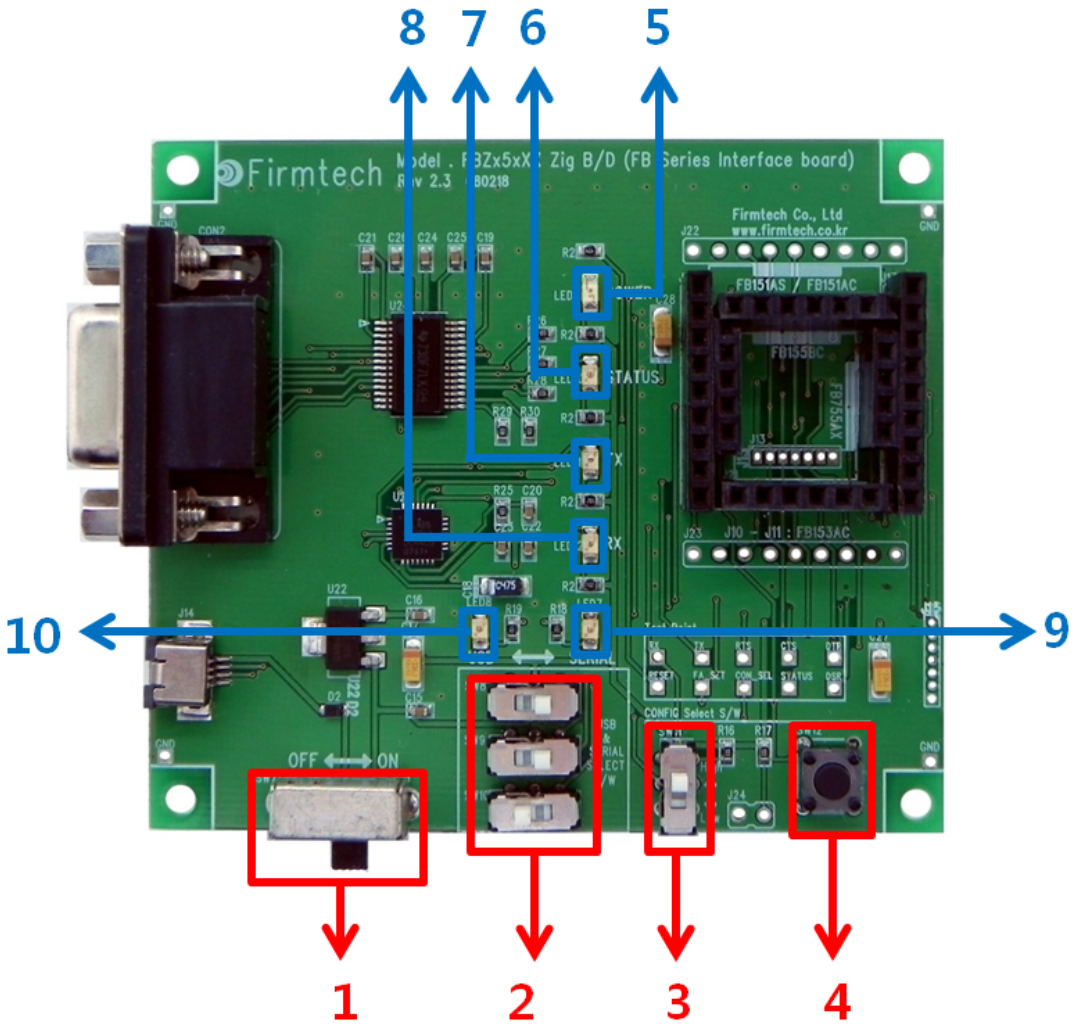
5.3 1:N Communication



<Figure 5-3 Pin Connection Diagram in 1:N Communication>

6 PC Interface Board (Jig Board)





<Figure 6-1 FB755AX Interface Board(Jig Board)>

No.	Title	Description
1	**Power ON/OFF Switch**	ON/OFF the electric power of interface board.
2	**USB/RS232 Interface Selection Switch**	The switch for selection of communication in USB/RS232 (The 3 switches shall be set in same direction.)
3	**PC Configuration/Operation Selection Switch**	The switch for selection of bluetooth activation or changing the setting value stored in FB755 ON – PC Configuration OFF – Bluetooth Operation
4	**FASET Switch**	The switch for changing the environment setting value of FB755 to the factory setting value. The procedures to make the FASET are as followings. **1. Change the environment setting / bluetooth action selection switch to ON.** **2. Power ON** **3. Press the FASET switch more than 2 seconds.**
5	**POWER LED**	LED to check the power supply condition
6	**STATUS LED**	LED to check the action of FB755
7	**TX LED**	LED to check the data output condition of FB755
8	**RX LED**	LED to check the data input condition of FB755
9	**SERIAL INTERFACE LED**	LED to check whether the communication interface is RS-232
10	**USB INTERFACE LED**	LED to check whether the communication interface is USB

<Table 6-1 Interface Board Description>

7 Performance of Products

No.	Part		Specification
1	Bluetooth Spec.		Bluetooth Specification 2.0 Support
2	Communication distance		100 M
3	Frequency Range		2.4 GHz ISM Band
4	Sensitivity		-83dBm (Typical)
5	Transmit Power	FB755AC	12dBm(Typical)
		FB755AS	12dBm(Typical)
6	Size	FB755AC	27.7 x 20.6 mm
		FB755AS	27.7 x 20.6 mm
7	Support Bluetooth Profile		SPP (Serial Port Profile)
8	Input Power		3.3V
9	Current Consumption		100 mA (Max)
10	Temperature	Operating	-20℃ ~ 50℃
		Limit Operating	-30℃ ~ 80℃
11	Communication Speed		1,200bps – 230,400bps
12	Antenna	FB755AC	Chip Antenna
		FB755AS	Helical Antenna
13	Interface		UART (TTL Level)
14	Flow Control		RTS, CTS, DTR, DSR support

<Table 7-1 FB755AS & FB755AC Performance>

8 Current Consumption

Status		Current Consumption (mA)		
		MIN	MAX	AVG
Standby		3	12	**8**
Inquiry scan & Page scan (Slave)		6	51	**28**
Page scan (Slave)		6	21	**9**
Inquiry (Master)		66	69	**67**
Connected	**Slave**	27	39	**29**
	Master	9	21	**12**
Data Transmission	**Slave**	33	42	**37**
	Master	30	39	**36**
Data Reception	**Slave**	27	42	**35**
	Master	30	42	**37**
Data Transmission/Reception	**Slave**	36	42	**39**
	Master	36	45	**40**
Power save	**Slave**	6	18	**10**
	Master	5	18	**10**

<Table 8-1 Current Consumption>

TEST CONDITIONS

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

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	FB755vx.x.x
Pin Code (Pass key)	BTWIN
Uart (baud rate-data bit-parity bit-stop bit)	9600-8-N-1
ROLE	SLAVE
Connection Mode	MODE4 (AT command)
Operation Mode	MODE0 (1:1 communication)
Debug Char	0x02

<Table 9-1 Preliminary Configuration Setting Value for FB755AC & FB755AS>

To change the configuration set value of FB755AC & FB755AS, connect FB755AC & FB755AS 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.

Note :

For details on the setting change, please refer to 11 How to complete PC Configuration.

10 Connecting the wireless section of Bluetooth

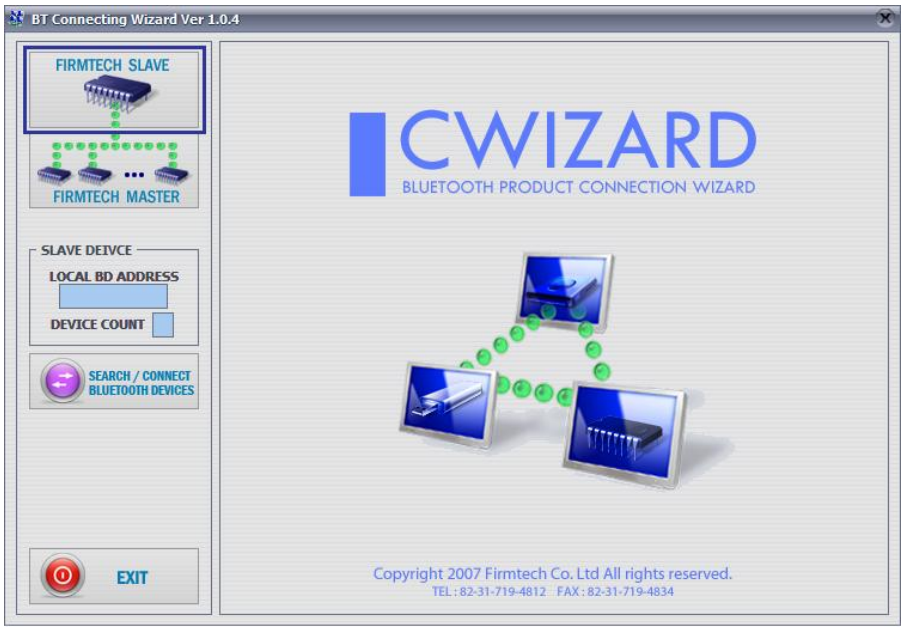
In order for Bluetooth devices to transmit data to each other, the wireless section of Bluetooth should be connected to each other. To connect the wireless section, you should set each role for each device, one for a **MASTER**, another for a **SLAVE**. It takes about 1~10 sec that a Master is connected to a Slave.
The connection can be done in use of AT command or connection can be set in use of connection WIZARD because the initial connection mode of FB755AC & FB755AS is MODE4 (AT Command).
The following contents will be processed under the assumption that the FB755AC & FB755AS are connected to the interface Board (Jig Board).

※ We will use 2 FB755AC & FB755AS and MS Windows in describing procedures.

10.1 Connecting with Connection WIZARD

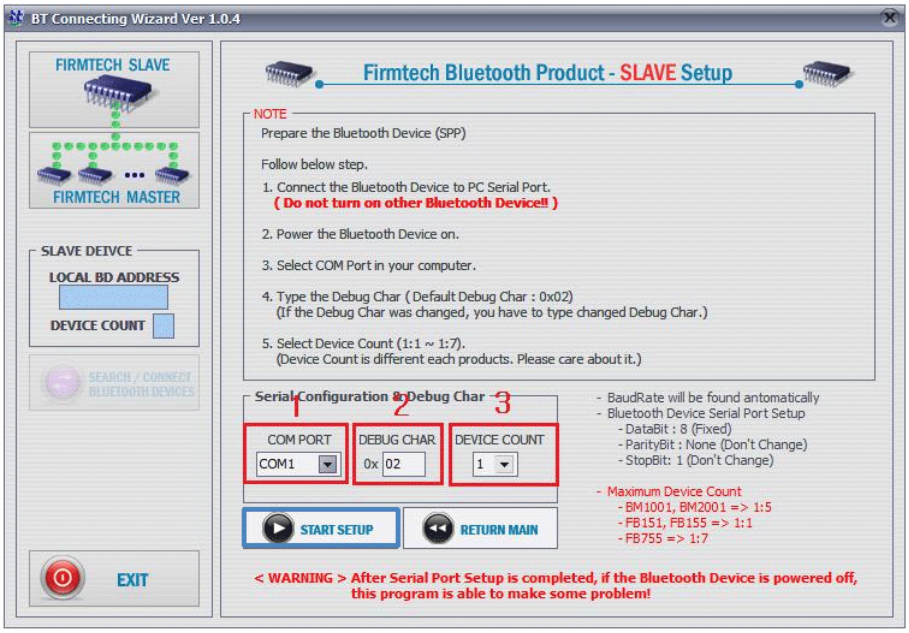
※ The connection WIZARD can not be used if the DEBUG Char is set to 0x00. Please refer to the details of environment setting in Appendix A for further details.

(1) Connect the interface board of the first FB755AC & FB755AS to the serial port of PC and switch ON. (The selection switch of environment setting/bluetooth shall be in OFF.)
(2) Execute C-Wizard Program.



<Figure 10-1 Connection Wizard Step 1>

(3) Click FIRMTECH SLAVE Set-up button (<Figure 10-1> Blue borders)



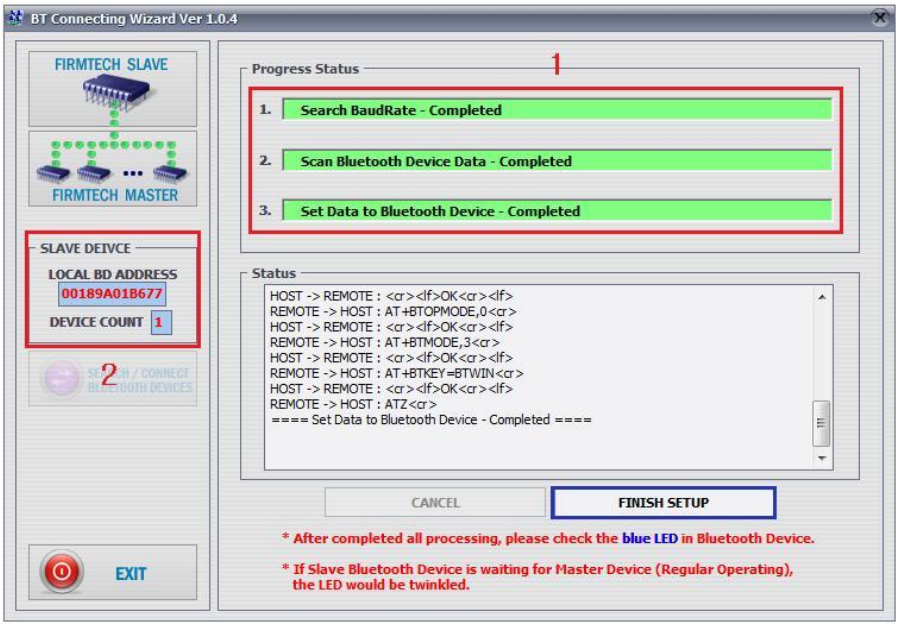
1 COM PORT : Select Serial port of PC connected a product.

2 DEBUG CHAR : Default is 0x02. (Refer to the appendix A about PC Configuration)

3 DEVICE COUNT : Select number of devices to be connected. (Default 1)

<Figure 10-2 Connection Wizard Step 2>

(4) Click the Set-up Start Button(<Figure 10-2> Blue borders) after setting each values in blanks (<Figure 10-2> Red borders **N.1 - Com Port connected to FB755AX**, **N.2 - 0x02**, **N.3 - 1**)



1 Procedures: procedures of Device Set-up.

2 SLAVE Device value: It shows values if the SLAVE Set-up is completed (optional)

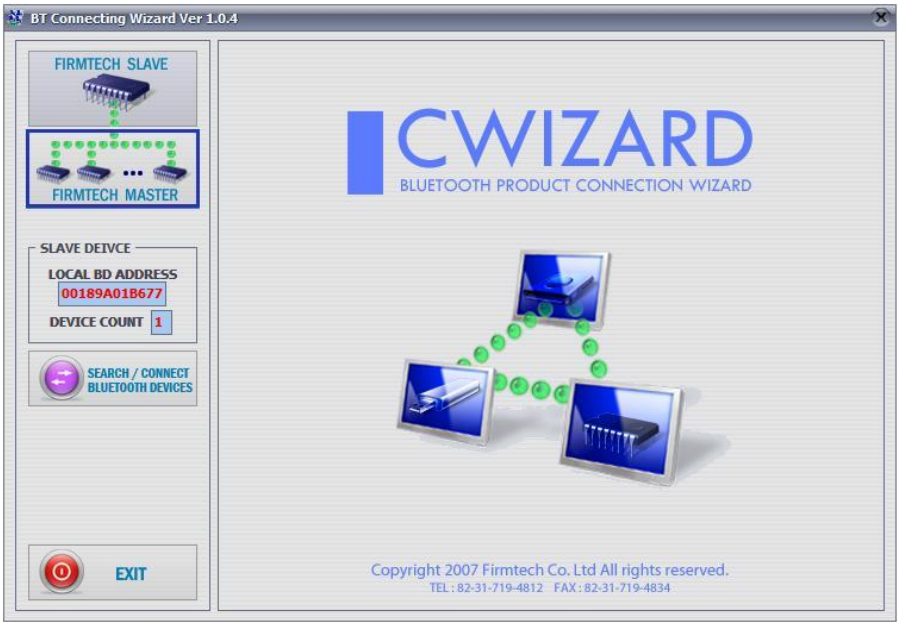
<Figure 10-3 Connection Wizard Step 3>

(5) Status Display of Procedures(<Figure 10-3>N. 1 red borders) turns red into green after Set-up is completed. Click the OK button if the blank of SLAVE Device Value is filled. (<Figure 10-3>N. 2 red borders)

(6) Check the blinking of status LED on interface board.

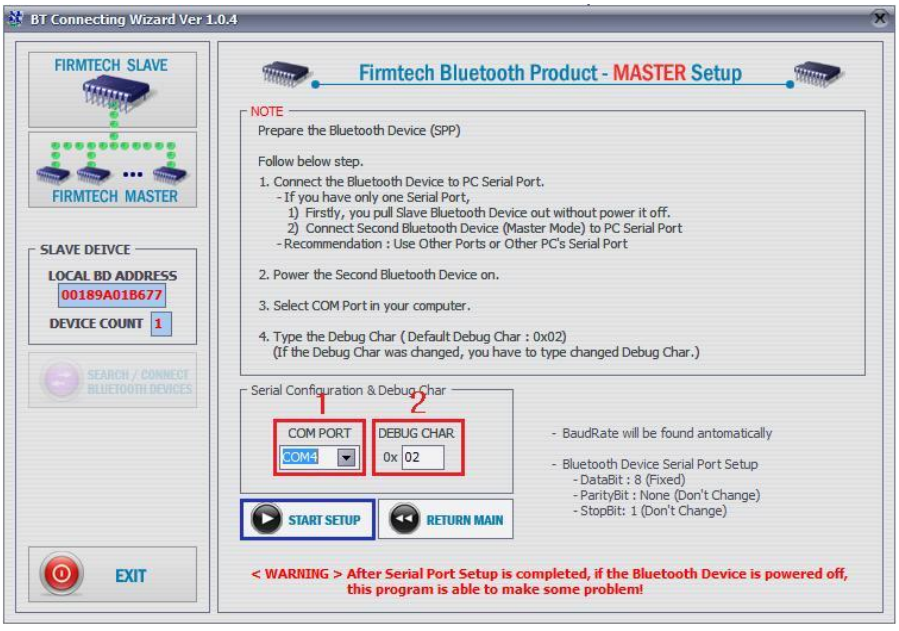
(7) Remove the interface board of the 1st FB755AC& FB755AS from the serial port of PC. (On the state of power ON)

(8) Connect the interface board of the second FB755AC & FB755AS to the serial port of PC and switch ON. (The selection switch of environment setting/bluetooth shall be in OFF.)



<Figure 10-4 Connection Wizard Step 4>

(9) Click the FIRMTECH MASTER Set-up (<Figure 10-4> Blue borders) Button

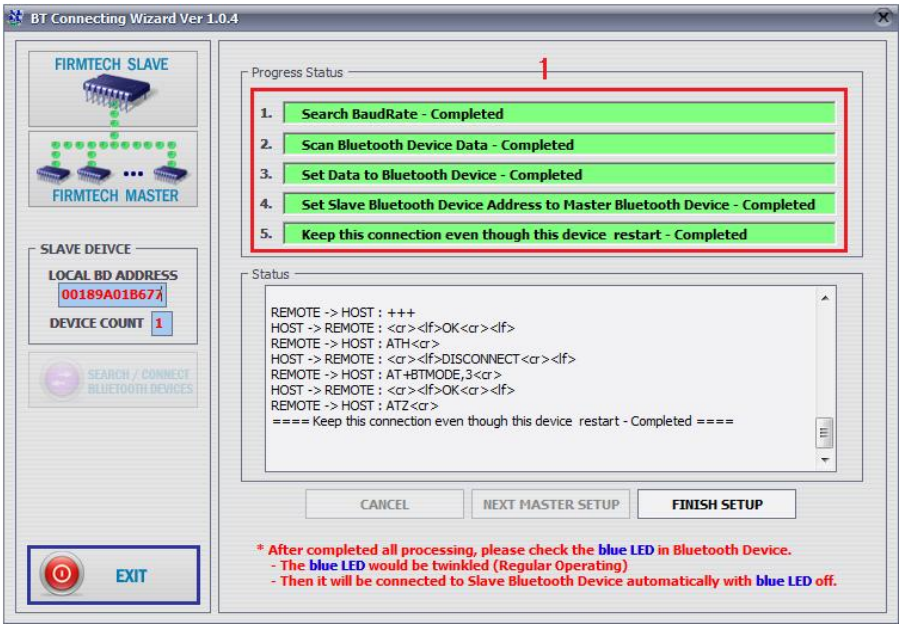


1 COM PORT : Select the Serial port of PC connected a product

2 DEBUG CHAR : Default is 0x02. (Refer to the appendix A about PC Configuration)

<Figure 10-5 Connection Wizard Step 5>

(10) Click Set-up Start (<Figure 10-5> blue borders) button after setting each value (<Figure 10-5> red borders **N.1 - Com Port connected to FB755AX**, **N.2 - 0x02**) in blanks.



<Figure 10-6 Connection Wizard Step 6>

(11) If the Status Display of Procedures (<Figure 10-6> N.1 red borders) turns red into green, Connection Set-up is completed. With Clicking the End button(<Figure 10-6> Blue borders), finish the C-Wizard

10.2 Connection with AT commands

The serial communication program is necessary to connect with AT commands.

The setting is available using the hyper terminal offered by Windows and refer to the following "11.2.1 Execution of hyper terminal" to set hyper terminal.

Refer to the "4. How to use AT commands" of "Appendix B – AT Command Language with Detailed Description and Usage" to use the AT command.

11 How to complete PC Configuration?

The following PC Configuration shall be explained on the assumption that FB755AC & FB755AS is connected with PC Interface Board(Jig board). If it is connected to MICOM, then you can change the set value by using AT command language with reference to Attachment AT command language.

Components for PC Configuration

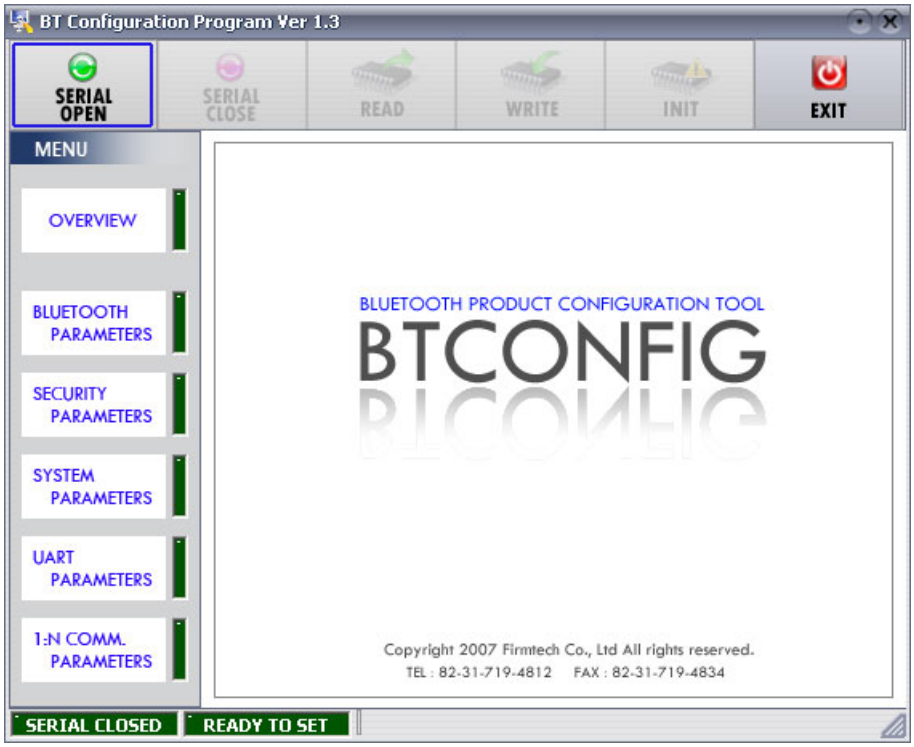
- FB755AC & FB755AS module
- PC Interface Kit

The PC Configuration could be processed with two significant ways.
First one is to use Config tool provided by FIRMTECH Co., Ltd.
Second one is to use serial communication program (Hyper Terminal, minicom) providing OS.
The respective way of setting is as follows.

11.1 PC Configuration using BTConfig tool

(1) Connect FB755AX to PC Interface Board, then connect to COM port(Serial port) of PC.

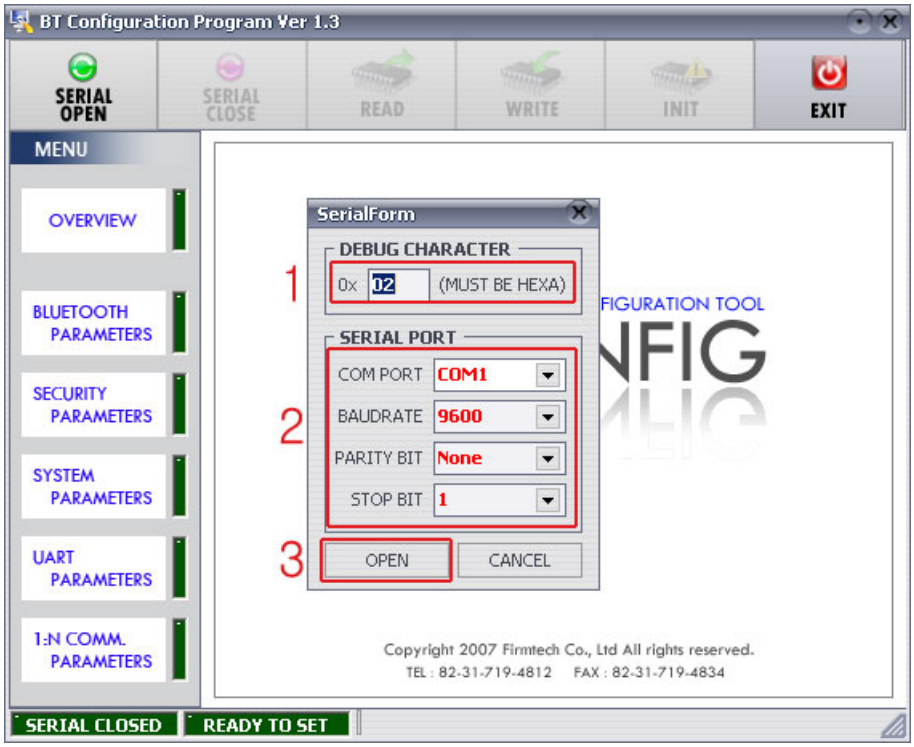
(2) Set the environment setting/bluetooth action selection switch (the 3rd switch in <Fig 6-1>) on PC interface board and switch on



<Figure 11-1 BTConfig tool initialization>

(3) Execute BTConfig tool after connect FB755AX to serial port of PC.

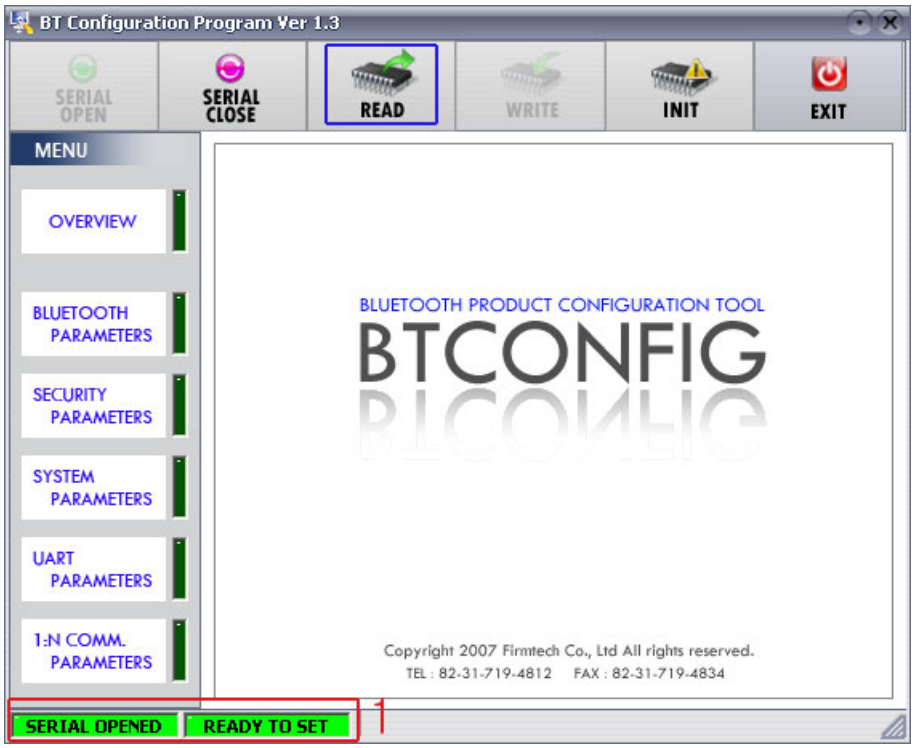
(4) Click "SERIAL OPEN" button. (<Figure 11-1> blue borders)



1 DEBUG CHARACTER : Default is 0x02. (refer to the appendix A about PC Configuration)

2 SERIAL PORT : COM PORT proper port, BAUDRATE **9600**, PARITY BIT **None**, STOP BIT **1**

<Figure 11-2 BTConfig tool Serial connection>

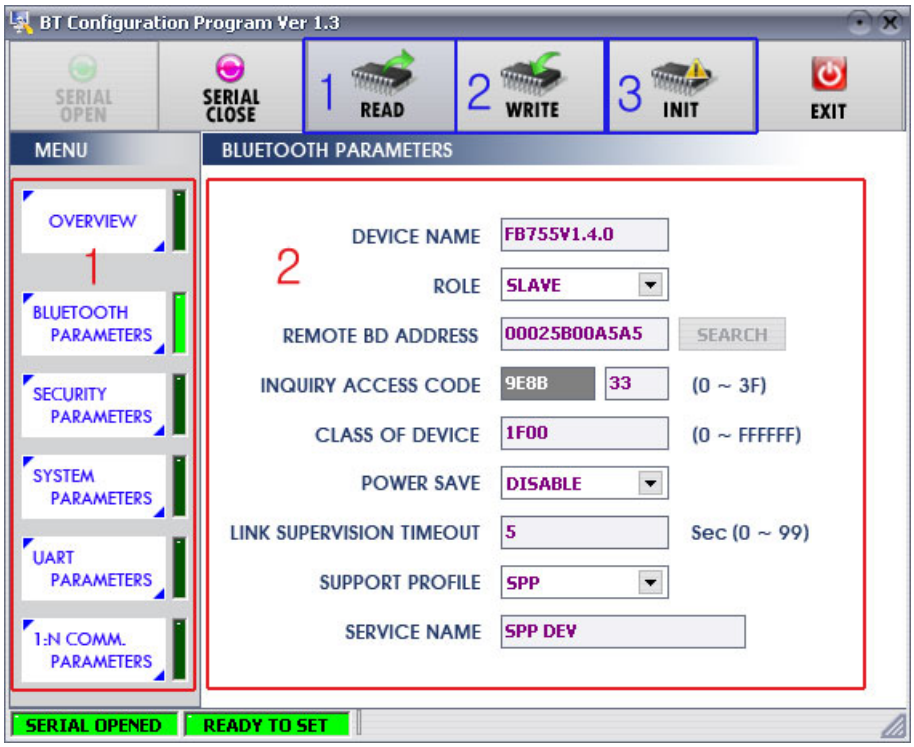


1 SERIAL OPENED, READ TO SET : BTConfig tool and communication status of products.

<Figure 11-3 BTconfig tool connection>

(5) If the <Figure 11-2> comes up, set each blank (Red borders N.1~2) to (COM PORT – **Port connected to FB100AS**, 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 11-3>
If they don't become green, check the COM PORT and execute BTConfig tool once again.

(6) If click the READ button (blue borders) as shown on <Figure 11-3> after BTConfig tool is connected to products, MENU Buttons (<Figure 11-4> red borders N.1) are activated.



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.)

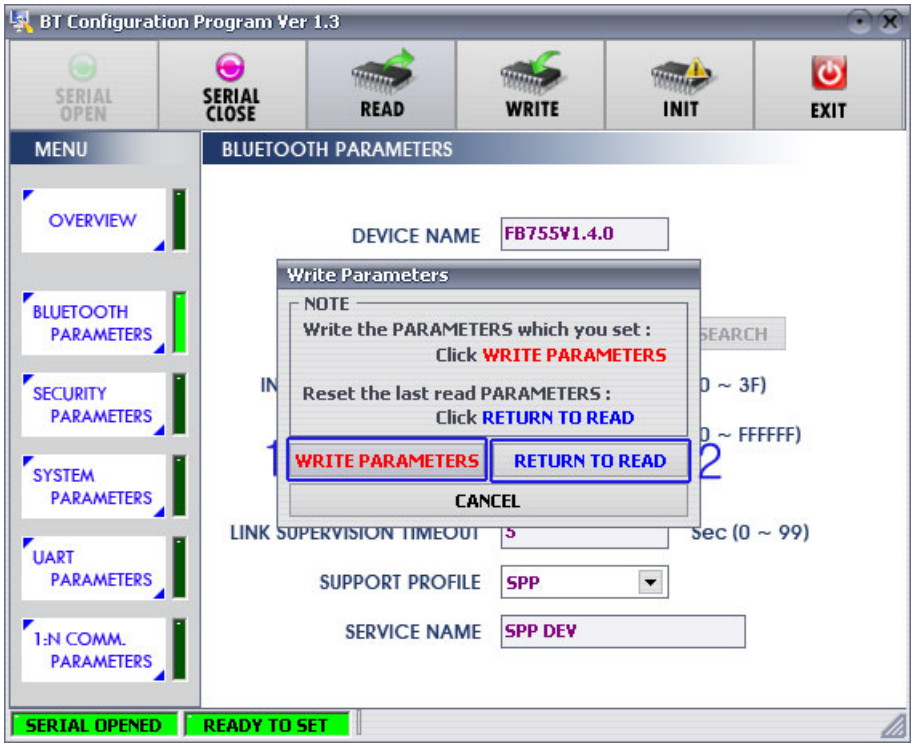
2 WRITE button: Save set values. (Serial port is automatically completed after saving.)

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

<Figure 11-4 BTConfig tool Set-up>

(7) 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

(8) Save the set values by clicking the WRITE button after Set-up completed.



1 WRITE PARAMETERS: Save the currently set values.

2 RETURN TO READ: Set to the initial value.

<Figure 11-5 BTConfig tool WRITE>

Note :

Please refer to the appendix A of PC Configuration for the detailed description.

11.2 PC Configuration using Serial Communication (Hyper Terminal) Program

11.2.1 To Execute Hyper Terminal

To set up PC Configuration using Hyper Terminal, following procedures shall be performed prior to the power is being supplied after the FB755AX is connected to the PC.

To set up PC Configuration, the Serial Communication Program is required. We will use Hyper Terminal in describing the procedures.

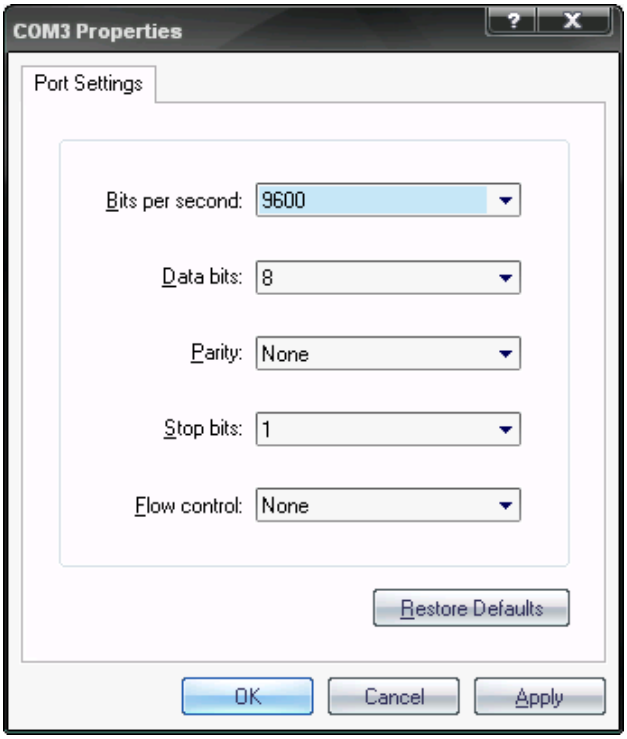
(1) Set the PC Configuration/Operation Selection Switch (<Figure 6-1> N 3 Switch) on the PC Interface Board(Jig Board) ON

<Figure 11-6 Hyper Terminal Set up Window 1>

(2) Execute in the order of **[start]→[All Programs]→[Accessories]→[Communications]→[Hyper Terminal]**, then connection window will appear on which enter appropriate name and click.

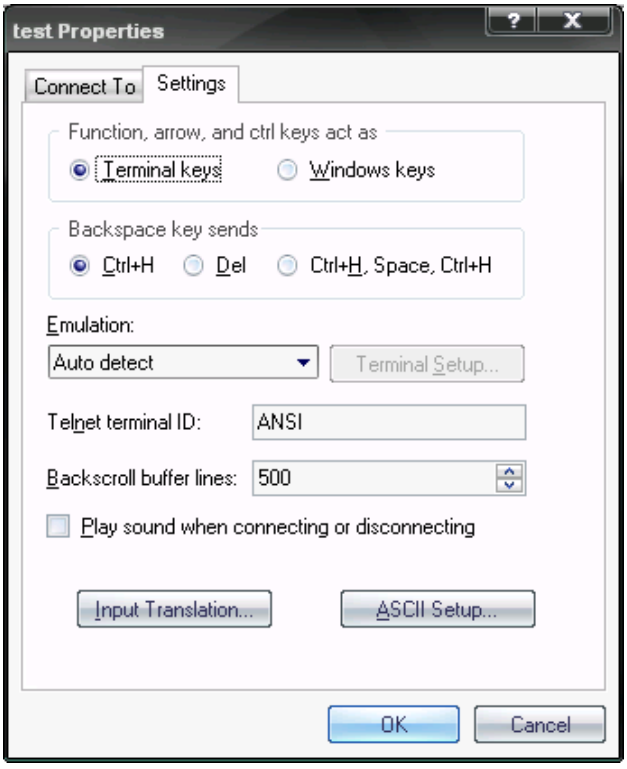
<Figure 11-7 Hyper Terminal Set up Window 2>

(3) When the <Figure 11-7> comes up, select the COM port connected to FB755AX, and clicks the OK button.



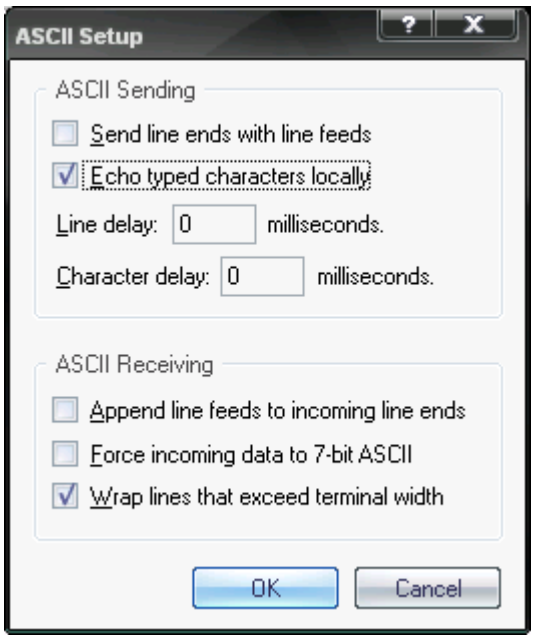
<Figure 11-8 Hyper Terminal Set up Window 3>

(4) When Registration Information Window comes up as on <Figure 11-8>, select **Bit per second** : **9600**, **Data bit** : **8**, **Parity** : **none**, **Stop bit** : **1**, **Flow control** : **none**, which will execute Hyper Terminal.



<Figure 11-9 Hyper Terminal Set Up Window 4>

(5) Basically, the Hyper Terminal does not show the entered character. To make sure of the entered character, select **[File]→[Properties]** on the Menu, then registration information window will appear shown as on <Figure 12-9>, click the ASCII Setup button.



<Figure 11-10 Hyper Terminal Set Up Window 5>

(6) As shown on <Figure 11-10>, Check **"Echo typed characters locally"** and come out pressing the acknowledge button. Now the Hyper Terminal program setting procedure is completed to use PC Configuration.

(7) If the power is on interface board, the menu like the <Fig. 11-11> si printed on the hyper terminal.

```
|================================|
|  Model name     : FB755        |
|  S/W Version    : 1.4.0        |
|  Bluetooth Spec : 2.1          |
|  Local BD Addr  : 00189A018554 |
|================================|

==================== MAIN MENU ==========================
1 => GO TO BLUETOOTH PARAMETER MENU
2 => GO TO SECURITY PARAMETER MENU
3 => GO TO SYSTEM PARAMETER MENU
4 => GO TO UART PARAMETER MENU
5 => GO TO 1:N COMMUNICATION PARAMETER MENU
=========================================================
[ Back Spcae : Input data Cancel                         ]
[ t : Move top menu                                      ]
=========================================================
Select(1 ~ 5) >
```

<Figure 11-11 Pc Configuration Menu>

11.2.2 How to Use PC Configuration Menu

The user may select the menu to change by selecting the given number in front of the left end menu.
For example : To change "GO TO BLUETOOTH PARAMETER MENU", enter : **[1]→[Enter]**

Note :

At <Figure 11-11> condition, Pressing Reset button for more than 2 seconds will reset all the configured values to the initial status (factory preset status).

Following is the order to use the menu.

(1) The execution will only be executed by pressing the "Enter" key.
(2) The small character "t" will always move to be positioned at upper side of the menu.
(3) To move menu, use the number in the end of left side. Please be sure to "Enter" key upon completion of input.
(4) "←" key is used to delete the entered character currently.
(5) If the entered character is unreadable or is not supported at the appropriate menu, "Retry >" message will be output.
(6) If the input message is more than 12 characters, "Overflow buffer" message will be output and then "Retry >" message appeared as well.

Upon completion of all PC configuration, turn off the Interface Board, switch the PC Configuration/Operation Selection switch OFF, and turn the power ON, which will start the Bluetooth to operate normally.

Note :

Please refer to Appendix A PC Configuration for the detailed description on the configuration value.

12 Approval Information

12.1 MIC – FB755AS

12.2 FCC compliance Information – FB755AS

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

1. This device may not cause harmful interference received.
2. This device must accept any interference received.

Including interference that may cause undesired operation.

FCC WARNING

This equipment may generate or use radio frequency energy. Changes or modifications to this Equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. The user could lose the authority to operate this equipment if an unauthorized change or modification is made.

A separation between the user's the antenna be at least 20cm and a prohibition that it can not Be co-located with other transmitter.
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-FB755AS

CAUTION : This device and its antenna(s) must not be co-located or operated in conjunction with any other antenna or transmitter. End users cannot modify this transmitter device. Any unauthorized modification could void the user's authority to operate this device.

12.3 CE – FB755AS

Hereby, FIRMTECH Co., Ltd, declares that this FB755AS is in compliance with the essential requirements and other relevant provisions of directive 1999/5/EC.

12.4 TELEC – FB755AS